Department of Energy
Washington, DC 20585

Northern Indiana Public Service Company LLC and
Midcontinent Independent System Operator, Inc.
Regarding R.M. Schahfer Generating Station

Order No. 202-26-46

Pursuant to the authority vested in the Secretary of Energy (Secretary) by section 202(c) of the Federal Power Act (FPA),[1] and section 301(b) of the Department of Energy (DOE or the Department) Organization Act,[2] and for the reasons set forth below, I hereby determine that an emergency exists in portions of the Midcontinent Independent System Operator (MISO) region due to a sudden increase in demand for electric energy, or a shortage of electric energy or of facilities for the generation or transmission of electric energy, and other causes. Issuance of this Order will meet the emergency and serve the public interest.

BACKGROUND

The R.M. Schahfer Generating Station (Schahfer) is an electric generating facility in Wheatfield, Indiana. Schahfer is owned and operated by Northern Indiana Public Service Company (NIPSCO), a division of NiSource Inc. Schahfer consists of two 129 MW natural-gas fired electric generating units and two coal-fired electric generating units, Unit 17 (423.5 MW) and Unit 18 (423.5 MW), with a combined nameplate capacity of 1,105 MW.[3] Units 17 and 18 began operations in 1983 and 1986, respectively. They were both slated to cease operations in December 2025.[4]

Order Nos. 202-25-12, 202-26-19, and 202-26-29, issued pursuant to FPA section 202(c), required that Schahfer Unit 17 and Unit 18 remain in operation for 90 days, until March 23, 2026, June 21, 2026, and September 19, 2026, respectively.

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[1] 16 U.S.C. § 824a(c).

[2] 42 U.S.C. § 7151(b).

[3] U.S. Energy Info. Admin., *Form EIA-860 detailed data with previous form data (EIA-860A/860B)*, *)*, https://www.eia.gov/electricity/data/eia860/ (click "2025 (early release)").

[4] It likely would be difficult for the coal-fired units to resume operations once retired. Specifically, practical issues, such as employment, contracts, and permits, may greatly increase the timeline for resumption of operations during the period they are needed. Moreover, if NIPSCO were to begin disassembling the units or other related facilities, the associated challenges would be greatly exacerbated. The costs and time of decommissioning a coal plant are extensive, and restarting such decommissioned plants would presumably cost the same as decommissioning in dollars and time, if not more. Thus, continuous operation is required in such cases so long as the Secretary determines a shortage exists and is likely to persist. *See* Jennifer Lessick, et al., *Bus. Models for Coal Plant Decommissioning*, at 9-12 (DOE, Pac. Nw. Nat'l Lab'y, Report, Aug. 2021), https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-31348.pdf.

Those orders were based on my determination that emergency conditions existed in the region served by MISO.

Specifically, I determined that MISO faced tight reserve margins due to well-documented year-round resource adequacy concerns, particularly during periods of high demand or low generation resource output.[5] I determined that the continued operation of Schahfer Units 17 and 18 would provide additional generation capacity during these periods, which would help prevent the loss of power to homes and businesses in the areas that might have been affected by curtailments or outages that would otherwise pose a risk to public health and safety.[6] I determined that the continued operation of Schahfer Units 17 and 18 was necessary to alleviate immediate and anticipated threats to reliability.[7]

My determination was based on several facts. First, in its 2024 Long-Term Reliability Assessment (2024 LTRA), the North American Electric Reliability Corporation (NERC) notes that the MISO assessment area, which covers portions of Arkansas, Illinois, Indiana, Iowa, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Montana, North Dakota, South Dakota, Texas, and Wisconsin, is at an elevated risk, "because probabilistic assessments indicate above-normal generator outages during extreme weather can result in unserved energy or load loss. With uncertainty around new resource additions and existing generator retirements, MISO is also at risk of falling below [Reference Margin Levels] within the next five years."[8] Additionally, the 2024 LTRA notes that "[t]he departure of MISO's coal fleet has continued with a reduction in capacity of around 6 GW in the past year, and a projected reduction of a further 12 GW over the next five years."[9]

CONTINUING EMERGENCY CONDITIONS

The emergency conditions that necessitated the issuance of Order Nos. 202-25-12, 202-26-19, and 202-26-29 continue, both in the near and long term. The production of electricity from Schahfer Units 17 and 18 continue to be a critical asset to maintain reliability in MISO. MISO's resource adequacy concerns were recently demonstrated during Winter Storm Fern, when Schahfer operated under a cold weather alert and declared conservative operations from January 23 through February 1, 2026. On January 24, MISO declared an Energy Emergency Alert (EEA) 1, as well as an EEA 2 "MaxGen" event for MISO's North and Central Regions due to generation outages, high demand,

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[5] *See, e.g.*, *Midcontinent Indep. Sys. Operator, Inc*, DOE Order No. 202-26-29, at 2–5 (June 18, 2026,).

[6] *See, e.g.*, *id.*

[7] *See, e.g.*, *id.* at 5.

[8] N. Am. Elec Reliability Corp., *2024 Long-Term Reliability Assessment*, at 13 (Dec. 2024, corrected July 11, 2025), https://www.nerc.com/globalassets/our-work/assessments/2024-ltra_corrected_july_2025.pdf.

[9] *Id.* at 44.

and transfer capability limits.[10] From January 21–February 1, 2026, Schahfer Units 17 and 18 operated at roughly 285 MW almost every day.[11] According to the EIA-923 Power Plant Operations Report's monthly generation data for June 2026, the total net generation for Schahfer Units 17 and 18 was 303,344 MWh from January 2026 to June 2026 for an average of 50,557.3 MWh per month.[12] This generation data indicates that Schahfer Units 17 and 18 are providing vital generation capacity to the region.

MISO's year-round resource adequacy concerns are well-documented. MISO requested that the Federal Energy Regulatory Commission (FERC) approve its filing to revise its resource adequacy construct (including the Planning Resource Auction or PRA) to establish capacity requirements for each of the four seasons of the year rather than on an annual basis determined by peak summer demand.[13] MISO justified this revision by explaining that "[r]eliability risks associated with [r]esource [a]dequacy have shifted from 'Summer only' to a year-round concern."[14] MISO noted that over 60% of all "MaxGen" events (events when MISO initiates emergency procedures because of concerns over the adequacy of available generation) occurred outside of the summer season.[15]

In December 2023, MISO released an "Attributes Roadmap," in which it presented "an in-depth look at the challenges of operating a reliable bulk electric system in a rapidly transforming energy landscape."[16] Among other things, this report described changes in the time of year during which the risk of the loss of load was greatest. For the 2023 –2024 Planning Year, the greatest risk of loss of load was in the summer, but it is expected that by the summer of 2027, there will be an equal loss of load risk in both the summer and fall seasons.[17] MISO also projected that the risk of loss of load in the winter

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[10] MISO, *Operations Rep.*, at 10 (Mar. 24, 2026), https://cdn.misoenergy.org/20260324%20Markets%20Committee%20of%20the%20BOD%20Item%2008%20MISO%20Operations%20Report746763.pdf.

[11] DOE, *FACT SHEET: Energy Dep't Prevented Blackouts & Saved Am. Lives During Winter Storms* (Feb. 6, 2026), https://www.energy.gov/articles/fact-sheet-energy-department-prevented-blackouts-saved-american-lives-during-winter-storms.

[12] *See* EIA, *Form EIA-923 detailed data with previous form data (EIA-906/920)*, https://www.eia.gov/electricity/data/eia923/ (choose "2026: EIA-923 May 2026").

[13] *Midcontinent Indep. Sys. Operator, Inc.*, Transmittal Letter, FERC Dkt. No. ER22-495-000 (filed Nov. 30, 2021). FERC accepted MISO's proposed tariff revisions on August 31, 2022. *See also Midcontinent Indep. Sys. Operator, Inc.*, 180 FERC ¶ 61,141 (2022), *order on reh'g & compliance*, 182 FERC ¶ 61,096 (2023).

[14] *MISO*, Transmittal Letter, FERC Dkt. No. ER22-495-000, at 3.

[15] *Id.* at 3–4.

[16] MISO, *Attributes Roadmap*, at 3 (Dec. 2023), https://cdn.misoenergy.org/2023%20Attributes%20Roadmap%20Executive%20Summary631175.pdf.

[17] *Id.* at 11.

and spring seasons will nevertheless increase over time, although not as high as in the summer or fall.[18]

More recently, MISO affirmed the resource adequacy problems occurring outside of its summer season in its 2024 report entitled, "*MISO's Response to the Reliability Imperative.*"[19] In a section of that report entitled, "Risks in Non-Summer Seasons," MISO again stressed that it has resource reliability concerns outside of the summer season:

> Widespread retirements of dispatchable resources, lower reserve margins, more frequent and severe weather events and increased reliance on weather-dependent renewables and emergency-only resources have altered the region's historic risk profile, creating risks in non-summer months that rarely posed challenges in the past.[20]

These MISO studies indicate that the emergency conditions caused by the loss of generation capacity in MISO extend past the summer season.

In January 2026, NERC released its 2025 Long-Term Reliability Assessment (2025 LTRA).[21] NERC assessed that the MISO region is at high risk of energy shortfalls over the next five years,[22] stating that it faces significant reliability challenges as "projected resource additions do not keep pace with escalating demand forecasts and announced generator retirements."[23] This determination is based on the combination of accelerating demand growth from new data centers and the retirement of existing thermal generators.[24] The 2025 LTRA notes that "MISO's accredited thermal capacity has decreased by 8.8 GW, driven primarily by reductions in accredited capacity of existing facilities and retirements."[25] NERC observes that winter peak periods are a particular concern, with projections showing "shortfalls in planned resources for winter peak periods."[26] However, NERC also concluded that "risks could expand into spring and fall generator maintenance periods when the available dispatchable generation is not enough to counter wind and solar variability when demand is high."[27]

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[18] *Id*.

[19] MISO, *MISO's Response to the Reliability Imperative* (updated Feb. 2024), https://cdn.misoenergy.org/2024+Reliability+Imperative+report+Feb.+21+Final504018.pdf.

[20] *Id.* at 12.

[21] NERC, *2025 Long-Term Reliability Assessment* (Jan. 2026), https://www.nerc.com/globalassets/our-work/assessments/nerc_ltra_2025.pdf.

[22] *Id.* at 6, 8.

[23] *Id.* at 8.

[24] *Id.* at 43.

[25] *Id.* at 15.

[26] *Id*.

[27] *Id.*

The 2025–2026 NERC Winter Reliability Assessment found the MISO region to be at normal risk in 2026 and elevated risk in 2027. The two previous winter studies respectively characterized MISO as a region at elevated risk with the "[p]otential for insufficient operating reserves in above-normal conditions"[28] and noted that "[g]enerating capacity is 10 GW lower (-6.8%) compared to the prior winter as generators have retired, withdrawn from MISO's capacity market, or received lower winter accredited capacity."[29]

NERC released its 2026 Summer Reliability Assessment (SRA) on May 19, 2026. In its assessment, NERC stated that "MISO's peak load has increased by 2.5 GW from the 2025 SRA."[30] The 2026 SRA also projects that data center load will continue to accelerate in 2027 and beyond, potentially increasing reliability risk if capacity additions do not keep pace.[31] Furthermore, the 2026 SRA states that "[a]bove-normal summer peak load combined with low resource conditions could result in the need to employ operating mitigations (e.g., load-modifying resources) and EEAs [Energy Emergency Alerts]."[32] Since the region benefits from transmission connections with neighbors to meet extreme conditions, MISO's reliance on electricity imports will increase when extreme conditions arise."[33]

The evidence indicates that there is also a potential longer-term resource adequacy emergency in MISO. When MISO reported the results of its PRA for the 2025–26 Planning Year, it noted that "new capacity additions were insufficient to offset the negative impacts of decreased accreditation, suspensions/retirements and external resources" in the northern and central zones, which include Indiana.[34]

There continues to be tight capacity available during summer despite the recent "gains in offered capacity outpacing pressure of load growth" in the MISO region, as reported in its PRA for the 2026-2027 Planning Year.[35] MISO noted that "new generation

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[28] NERC, *2023–2024 Winter Reliability Assessment*, at 5 (Nov. 2023), https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_WRA_2023.pdf.

[29] NERC, *2024–2025 Winter Reliability Assessment*, at 15 (Nov. 2024), https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_WRA_2024.pdf.

[30] NERC, *2026 Summer Reliability Assessment*, at 16 (May 2026), https://www.nerc.com/globalassets/our-work/assessments/nerc_sra_2026.pdf.

[31] *Id.*

[32] *Id.*

[33] *Id*.

[34] MISO, *Planning Res. Auction: Results for Planning Year 2025–26*, at 13 (Apr. 2025), https://cdn.misoenergy.org/2025%20PRA%20Results%20Posting%2020250529_Corrections694160.pdf.

[35] MISO, *Planning Res. Auction Results for Planning Year 2026/27*, at 3 (Apr. 2026, updated May 22, 2026), https://cdn.misoenergy.org/2026%20PRA%20Results%20Posting%2020260522%20-%20Corrections754715.pdf.

capacity is coming online, but faster resource additions are still needed to support large-load growth and ensure resource adequacy."

On June 4, 2026, the Organization of MISO States (OMS) and MISO issued the results of their 2026 survey, which has been conducted annually for many years to determine the degree to which expected capacity resources satisfy planning reserve margin requirements.[36] The 2026 OMS-MISO Survey presented projections of resource adequacy for the summer of 2026 and subsequent years and states "growth as submitted by [load serving entities or LSEs] continues to accelerate, with a [compound annual growth rate or CAGR] projected between 3.1% and 5.1% over [the next] five years."[37]

The OMS-MISO Survey further indicates that "[v]arious projected capacity scenarios and large load additions highlight increasing uncertainty and evolving risk"[38] and observes various negative risks. Examples include intensification of winter reliability risks based on resource availability/performance, which exacerbates seasonal reliability vulnerabilities; delay of new resource deployment owing to persistent supply-chain disruptions, labor constraints and permitting challenges; resource adequacy pressures continuing from load growth driven by data centers, new industrial, and commercial development; and continued backlog and uncertainty related to resources with signed Generator Interconnection Agreements (GIA).[39] In addition, 87 GW of signed GIAs are not yet online, and 192 GW of active GIAs still under study.[40]

Finally, the OMS-MISO Survey lists ongoing challenges such as more frequent extreme weather; accelerating demand for electricity and large load interconnections; loss of accredited capacity and reliability attributes as resource mixes evolve; the increasing pace of new resources additions; addressing local reliability issues (load pocket); and evolving storage participation.[41]

NERC released its 2026 State of Reliability (SOR) on June 24, 2026. In the SOR, NERC identifies worsening reliability concerns tied to large-load integration and localized operating stress. In its technical discussion of major system events, NERC states "shoulder seasons have become increasingly challenging for Bulk Power System operators to manage, resulting in several recent instances of pre-contingent load shedding."[42] The SOR also finds large load growth is increasing reliability risk and states

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[36] OMS & MISO, *OMS-MISO Survey Results* (updated June 4, 2026) (2026 OMS-MISO Survey), https://cdn.misoenergy.org/20260604%20OMS-MISO%20Survey%20Results%20Workshop%20Presentation761711.pdf.

[37] *Id.* at 2.

[38] *Id.* at 3.

[39] *Id.* at 4.

[40] *Id.*

[41] *Id.* at 16.

[42] NERC, *2026 State of Reliability: Tech. Assessment of 2025 Bulk Power Sys. Performance*, at 5 (June 24, 2026), https://www.nerc.com/globalassets/programs/rapa/pa/nerc_sor_2026_technical_assessment.pdf.

that "data center and computational loads continued emerging as a major reliability consideration due to their scale, speed of development, and unique operational characteristics."[43] Finally, data in the SOR shows that 2025 MISO summer and winter peak demands of 121.6 GW and 108.8 GW, respectively, met or exceeded extreme scenario levels showing how rapid load growth and extreme weather continue to be a real risk in MISO.[44]

MISO has been taking steps to address these projected deficits. For example, on June 6, 2025, MISO submitted a proposal to FERC to establish an Expedited Resource Addition Study (ERAS) process to provide a framework for the expedited study of interconnection requests to address urgent resource adequacy and reliability needs in the near term. This proposal was approved by FERC on July 21, 2025.[45] MISO's ERAS should help expedite the construction of needed new capacity; however, resources studied under the ERAS will have commercial operation dates that are at least three years away and are provided an additional three-year grace period to commence commercial operations.[46] In addition, supply chain constraints impeding the acquisition of critical grid components, including large natural gas turbines and transformers, are likely to further hinder rapid construction and exacerbate reliability concerns.[47] Consequently, the new ERAS process is unlikely to result in the addition of any new generation capacity in the next few years.

Order Nos. 202-25-12, 202-26-19, and 202-26-29 were preceded by executive orders on January 20, 2025, and April 8, 2025, in which President Donald J. Trump underscored the dire energy challenges facing the Nation due to growing resource adequacy concerns. President Trump declared a national energy emergency in Executive Order No. 14156, "Declaring a National Energy Emergency," in which he determined that the "United States' insufficient energy production, transportation, refining, and generation constitutes an unusual and extraordinary threat to our Nation's economy, national security, and foreign policy."[48] The Executive Order adds that "hostile state and non-state foreign actors have targeted our domestic energy infrastructure, weaponized our

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[43] *Id.* at vii.

[44] *Id.* at 28, 30.

[45] *Midcontinent Indep. Sys. Operator, Inc.*, 192 FERC ¶ 61,064 (2025).

[46] NERC, *State of Reliability*, *supra* note 48, at 84.

[47] *See generally* Jared Anderson, *US Gas-Fired Turbine Wait Times as Much as Seven Years; Costs Up Sharply*, S&P GLOBAL (May 2025) ("With demand for natural gas-fired turbines in the US rapidly accelerating amid power demand growth forecasts driven by AI, manufacturing, and electrification, wait times for turbines are anywhere between one and seven years depending on the model, and costs have increased considerably, experts told Platts."), https://www.spglobal.com/energy/en/news-research/latest-news/electric-power/052025-us-gas-fired-turbine-wait-times-as-much-as-seven-years-costs-up-sharply.

[48] Exec. Order No. 14156, 90 Fed. Reg. 8433 (Jan. 20, 2025), https://www.federalregister.gov/documents/2025/01/29/2025-02003/declaring-a-national-energy-emergency.

reliance on foreign energy, and abused their ability to cause dramatic swings within international commodity markets."[49] In the subsequent Executive Order No. 14262, "Strengthening the Reliability and Security of the United States Electric Grid," President Trump emphasized that "the United States is experiencing an unprecedented surge in electricity demand driven by rapid technological advancements, including the expansion of artificial intelligence data centers and increase in domestic manufacturing."[50]

In addition, President Trump issued a White House Memo for the Secretary that emphasized the findings of Executive Order No. 14156, stating that "ensuring reliable coal supply chains and baseload power generation capacity is essential to the United States national defense . . . . Without sufficient coal-fired baseload power, the United States will lack the stable electricity required to support defense installations, industrial expansion, and the high-energy demands of emerging technologies, such as artificial intelligence."[51] The President "further determine[d] that action to expand coal supply chain capacity and baseload generation availability is necessary to avert an industrial resource or critical technology item shortfall that would severely impair national defense capability."[52]

Further, the Department detailed the myriad challenges affecting the Nation's energy systems in its July 2025 "Resource Adequacy Report: Evaluating the Reliability and Security of the United States Electric Grid," which was issued pursuant to the President's directive in Executive Order No. 14262. The Department concluded that "[a]bsent decisive intervention, the Nation's power grid will be unable to meet projected demand for manufacturing, re-industrialization, and data centers driving artificial intelligence (AI) innovation."[53] The prolific growth of data centers for the development of AI, as well as their immense energy needs, presents a new and unexpected source of load growth. This growth is illustrated by NiSource's announcement of executed long-

[49] *Id*.

[50] Exec. Order No. 14262, 90 Fed. Reg. 15521 (Apr. 8, 2025), https://www.federalregister.gov/documents/2025/04/14/2025-06381/strengthening-the-reliability-and-security-of-the-united-states-electric-grid.

[51] Memorandum from President Donald J. Trump to the Secretary of Energy (Apr. 20, 2026) (*Presidential Determination Pursuant to Sec. 303 of the Def. Prod. Act of 1950, as Amended, on Coal Supply Chains & Baseload Power Generation Capacity*), https://www.whitehouse.gov/presidential-actions/2026/04/presidential-determination-pursuant-to-section-303-of-the-defense-production-act-of-1950-as-amended-on-coal-supply-chains-and-baseload-power-generation-capacity/.

[52] *Id.*

[53] DOE, *Res. Adequacy Rep.: Evaluating the Reliability & Sec. of the U.S. Elec. Grid*, at 1 (July 2025), https://www.energy.gov/sites/default/files/2025-07/DOE%20Final%20EO%20Report%20%28FINAL%20JULY%207%29.pdf.

term agreements[54] to deliver energy solutions and energy capacity for approximately 4 GW of large-scale data centers in Northern Indiana.[55]

Grid operators—including MISO itself—have also acknowledged the Nation's current energy crisis. For instance, during a March 25, 2025, hearing before the House Committee on Energy and Commerce, MISO's Senior Vice President for Planning and Operations, Jennifer Curran, testified that "the MISO region faces resource adequacy and reliability challenges due to the changing characteristics of the electric generating fleet, inadequate transmission system infrastructure, growing pressures from extreme weather, and rapid load growth."[56]Ms. Curran also described "much stronger growth [in demand for electricity] from continued electrification efforts, a resurgence in manufacturing, and an unexpected demand for energy-hungry data centers to support artificial intelligence."[57] She added that "[a] growing reliability risk is that the rapid retirement of existing coal and gas power plants threatens to outpace the ability of new resources with the necessary operational characteristics to replace them."[58]

Pursuant to section 202(c)(4)(B) of the FPA, DOE has consulted with the primary Federal agency with expertise in the environmental interest protected by the laws or regulations that may conflict with this Order. The agency did not submit additional conditions for inclusion in this Order.

ORDER

FPA section 202(c)(1) provides that whenever the Secretary determines "that an emergency exists by reason of a sudden increase in the demand for electric energy, or a shortage of electric energy or of facilities for the generation or transmission of electric energy," the Secretary has the authority "to require by order . . . such generation, delivery, interchange, or transmission of electric energy as in [his] judgment will best meet the

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[54] *NiSource announces strategic energy infrastructure agreements to enhance customer value and economic growth in Indiana,* NIPSCO (Apr. 16, 2026), https://www.nipsco.com/our-company/news-room/news-article/nisource-announces-strategic-energy-infrastructure-agreements-to-enhance-customer-value-and-economic-growth-in-indiana.

[55] NiSource Inc., *Supplemental Slides 1Q 2026 Results,* (May 6, 2026), https://s1.q4cdn.com/829981032/files/doc_earnings/2026/q1/supplemental-info/NiSource-1Q_2026-Earnings-Slides-FINAL.pdf.

[56] *Keeping the Lights On: Examining the State of Reg'l Grid Reliability; Hearing Before the House Comm. on Energy & Commerce*, *Subcommittee on Energy,* 119th Cong. 5 (2025) (statement of Ms. Jennifer Curran, Senior Vice President for Planning and Operations, MISO), https://www.congress.gov/119/meeting/house/118040/witnesses/HHRG-119-IF03-Wstate-CurranJ-20250325.pdf.

[57] *Id.* at 6.

[58] *Id.* at 7.

emergency and serve the public interest."[59] This statutory language constitutes a specific grant of authority to the Secretary to require the continued operation of Schahfer Units 17 and 18 when the Secretary has determined that such operation will best meet an emergency.

As described above, the emergency conditions resulting from increasing demand and shortage of electric energy from premature retirement of generation facilities will continue in the near term and are also likely to continue in subsequent years. This could lead to the loss of power to homes and businesses in the areas that may be affected by curtailments or power outages, presenting a risk to public health and safety.

I have determined that, to best meet the emergency arising from increased demand, determined shortage, and other causes, and serve the public interest under FPA section 202(c), Schahfer Units 17 and 18 shall be made available for operation through December 18, 2026.[60]

[59] Although the text of FPA section 202(c) grants this authority to "the Commission," section 301(b) of the Department of Energy Organization Act transferred this authority to the Secretary of the Department of Energy. *See* 42 U.S.C. § 7151(b).

[60] 16 U.S.C. § 824a(c)(4).

Based on my determination of an emergency set forth above, I hereby order:

A. From September 20, 2026, NIPSCO and MISO shall take all measures necessary to ensure that Schahfer Units 17 and 18 are available to operate. For the duration of this Order, MISO is directed to take every step to employ economic dispatch of Schahfer Units 17 and 18 to minimize cost to ratepayers. Following the conclusion of this Order, sufficient time for orderly ramp down is permitted, consistent with industry practices. NIPSCO is directed to comply with all orders from MISO related to the availability and dispatch of Schahfer Units 17 and 18.

B. To minimize adverse environmental impacts, this Order limits operation of Schahfer Units 17 and 18 to the times and within the parameters as determined by MISO, pursuant to paragraph A. MISO shall provide a daily notification to the Department (via AskCR@hq.doe.gov) reporting whether Schahfer Units 17 and 18 have operated in compliance with this Order.

C. All operations of Schahfer Units 17 and 18 must comply with applicable environmental requirements, including but not limited to monitoring, reporting, and recordkeeping requirements, to the maximum extent feasible while operating consistent with the emergency conditions. This Order does not provide relief from any obligation to pay fees or purchase offsets or allowances for emissions that occur during the emergency conditions or to use other geographic or temporal flexibilities available to generators.

D. By October 3, 2026, MISO is directed to provide the Department (via AskCR@hq.doe.gov) with information concerning the measures it has taken and is planning to take to ensure the operational availability of Schahfer Units 17 and 18 consistent with this Order. NIPSCO and MISO shall also provide such additional information regarding the environmental impacts of this Order and its compliance with the conditions of this Order, in each case as requested by the Department from time to time.

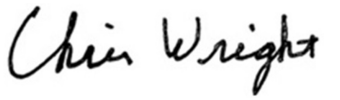
E. NIPSCO is directed to file with FERC tariff revisions or waivers to effectuate this Order, as needed. Rate recovery is available pursuant to 16 U.S.C. § 824a(c).

F. This Order shall not preclude the need for Schahfer Units 17 and 18 to comply with applicable state, local, or Federal law or regulations following the expiration of this Order.

G. Because this Order is predicated on the shortage of facilities for generation of electric energy and other causes, Schahfer Units 17 and 18 shall not be considered capacity resources.

H. This Order shall be effective from September 20, 2026, through December 18, 2026, with the exception of applicable compliance obligations in paragraph D.

Issued in Washington, D.C. on this 18th Day of September 2026.



Chris Wright
Secretary of Energy

cc: **Federal Energy Regulatory Commission**
Chairman Laura V. Swett
Commissioner David Rosner
Commissioner Lindsay S. See
Commissioner Judy W. Chang
Commissioner David A. LaCerte

Indiana Utility Regulatory Commission
Chairman Anthony Swinger
Commissioner Joshua Bain
Commissioner Bob Deig
Commissioner Joby Jerrells
Commissioner David Ziegner

Department of Energy
Washington, DC 20585

CenterPoint Energy and
Midcontinent Independent System Operator, Inc.
Regarding F.B. Culley Generating Station

Order No. 202-26-47

Pursuant to the authority vested in the Secretary of Energy (Secretary) by section 202(c) of the Federal Power Act (FPA),[1] and section 301(b) of the Department of Energy (DOE or the Department) Organization Act,[2] and for the reasons set forth below, I hereby determine that an emergency exists in portions of the Midcontinent Independent System Operator (MISO) region due to a sudden increase in demand for electric energy, or a shortage of electric energy or of facilities for the generation or transmission of electric energy, and other causes. Issuance of this Order will meet the emergency and serve the public interest.

BACKGROUND

The F.B. Culley Generating Station (Culley) is an electric generating facility in Warrick County, Indiana. Culley is owned and operated by CenterPoint Energy and consists of two coal-fired electric generating units, Unit 2 (103.7 MW) and Unit 3 (265.2 MW), with a combined nameplate capacity of 368.9 MW.[3] Unit 2 and Unit 3 began operations in 1966 and 1973, respectively. Unit 2 was slated to cease operations in December 2025.[4]

Order Nos. 202-25-13, 202-26-20, and 202-26-30, issued pursuant to FPA section 202(c), required that Culley Unit 2 remain in operation for 90 days, until March 23, 2026, June 21, 2026, and September 19, 2026, respectively. Those orders

[1] 16 U.S.C. § 824a(c).

[2] 42 U.S.C. § 7151(b).

[3] U.S. Energy Info. Admin., *Form EIA-860 detailed data with previous form data (EIA-860A/860B)*, https://www.eia.gov/electricity/data/eia860/ (click "2025 (early release)").

[4] It likely would be difficult for the coal-fired units to resume operations once retired. Specifically, practical issues, such as employment, contracts, and permits, may greatly increase the timeline for resumption of operations during the period they are needed. Moreover, if CenterPoint Energy were to begin disassembling the units or other related facilities, the associated challenges would be greatly exacerbated. The costs and time of decommissioning a coal plant are extensive, and restarting such decommissioned plants would presumably cost the same as decommissioning in dollars and time, if not more. Thus, continuous operation is required in such cases so long as the Secretary determines a shortage exists and is likely to persist. *See* Jennifer Lessick et al., *Bus. Models for Coal Plant Decommissioning*, at 9–12 (DOE, Pac. Nw. Nat'l Lab'y, Report, Aug. 2021), https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-31348.pdf.

were based on my determination that emergency conditions existed in the region served by MISO.

Specifically, I determined that MISO faced tight reserve margins due to well-documented year-round resource adequacy concerns, particularly during periods of high demand or low generation resource output.[5] I determined that the continued operation of Culley Unit 2 would provide additional generation capacity during these periods, which would help prevent the loss of power to homes and businesses in the areas that might have been affected by curtailments or outages that would otherwise pose a risk to public health and safety.[6] I determined that the continued operation of Culley Unit 2 was necessary to alleviate immediate and anticipated threats to reliability.[7]

My determination was based on several facts. First, in its 2024 Long-Term Reliability Assessment (2024 LTRA), the North American Electric Reliability Corporation (NERC) notes that the MISO assessment area, which covers portions of Arkansas, Illinois, Indiana, Iowa, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Montana, North Dakota, South Dakota, Texas, and Wisconsin, is at an elevated risk, "because probabilistic assessments indicate above-normal generator outages during extreme weather can result in unserved energy or load loss. With uncertainty around new resource additions and existing generator retirements, MISO is also at risk of falling below [Reference Margin Levels] within the next five years."[8] Additionally, the 2024 LTRA notes that "[t]he departure of MISO's coal fleet has continued with a reduction in capacity of around 6 GW in the past year, and a projected reduction of a further 12 GW over the next five years."[9]

CONTINUING EMERGENCY CONDITIONS

The emergency conditions that necessitated the issuance of Order Nos. 202-25-13, 202-26-20, and 202-26-30 continue, both in the near and long term. The production of electricity from Culley Unit 2 continues to be a critical asset to maintain reliability in MISO. MISO's resource adequacy concerns were recently demonstrated during Winter Storm Fern, when Culley operated under a cold weather alert and declared conservative operations from January 23 through February 1, 2026. On January 24, MISO declared an Energy Emergency Alert (EEA) 1, as well as an EEA 2 "MaxGen" event for MISO's North and Central Regions due to generation outages, high demand, and transfer

[5] *See, e.g.*, *Midcontinent Indep. Sys. Operator, Inc*, DOE Order No. 202-26-30, at 2–5 (June 18, 2026).

[6] *See, e.g.*, *id.*

[7] *See, e.g.*, *id.* at 5.

[8] N. Am. Elec Reliability Corp., *2024 Long-Term Reliability Assessment*, at 13 (Dec. 2024, corrected July 11, 2025), https://www.nerc.com/globalassets/our-work/assessments/2024-ltra_corrected_july_2025.pdf.

[9] *Id.* at 44.

capability limits.[10] From January 21–February 1, 2026, Culley operated at roughly 30 MW almost every day.[11] According to the EIA-923 Power Plant Operations Report's monthly generation data for June 2026, the total net generation for the Culley Unit 2was 48,923 MWh from January 2026 to June 2026 for an average of 8,154 MWh per month.[12] This generation data indicates that Culley Unit 2 is providing vital generation capacity to the region.

MISO's year-round resource adequacy concerns are well-documented. MISO requested that the Federal Energy Regulatory Commission (FERC) approve its filing to revise its resource adequacy construct (including the Planning Resource Auction or PRA) to establish capacity requirements for each of the four seasons of the year rather than on an annual basis determined by peak summer demand.[13] MISO justified this revision by explaining that "[r]eliability risks associated with [r]esource [a]dequacy have shifted from 'Summer only' to a year-round concern."[14] MISO noted that over 60% of all "MaxGen" events (events when MISO initiates emergency procedures because of concerns over the adequacy of available generation) occurred outside of the summer season.[15]

In December 2023, MISO released an "Attributes Roadmap," in which it presented "an in-depth look at the challenges of operating a reliable bulk electric system in a rapidly transforming energy landscape."[16] Among other things, this report described changes in the time of year during which the risk of the loss of load was greatest. For the 2023–2024 Planning Year, the greatest risk of loss of load was in the summer, but it is expected that by the summer of 2027, there will be an equal loss of load risk in both the summer and fall seasons.[17] MISO also projected that the risk of loss of load in the winter

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[10] MISO, *Operations Rep.*, at 10 (Mar. 24, 2026), https://cdn.misoenergy.org/20260324%20Markets%20Committee%20of%20the%20BOD%20Item%2008%20MISO%20Operations%20Report746763.pdf.

[11] DOE, *FACT SHEET: Energy Dep't Prevented Blackouts & Saved Am. Lives During Winter Storms* (Feb. 6, 2026), https://www.energy.gov/articles/fact-sheet-energy-department-prevented-blackouts-saved-american-lives-during-winter-storms.

[12] *See* U.S. Energy Info. Admin., *Form EIA-923 detailed data with previous form data (EIA-906/920)*, https://www.eia.gov/electricity/data/eia923/ (choose "2026: EIA-923 June 2026").

[13] *Midcontinent Indep. Sys. Operator, Inc.*, Transmittal Letter, FERC Dkt. No. ER22-495-000 (filed Nov. 30, 2021). FERC accepted MISO's proposed tariff revisions on August 31, 2022. *See also Midcontinent Indep. Sys. Operator, Inc.*, 180 FERC ¶ 61,141 (2022), *order on reh'g & compliance*, 182 FERC ¶ 61,096 (2023).

[14] *MISO*, Transmittal Letter, FERC Dkt No. ER22-495-000, at 3.

[15] *Id.* at 3–4.

[16] MISO, *Attributes Roadmap*, at 3 (Dec. 2023), https://cdn.misoenergy.org/2023%20Attributes%20Roadmap%20Executive%20Summary631175.pdf.

[17] *Id.* at 11.

and spring seasons will nevertheless increase over time, although not as high as in the summer or fall.[18]

More recently, MISO affirmed the resource adequacy problems occurring outside of its summer season in its 2024 report entitled, "*MISO's Response to the Reliability Imperative.*"[19] In a section of that report entitled, "*Risks in Non-Summer Seasons*," MISO again stressed that it has resource reliability concerns outside of the summer season:

> Widespread retirements of dispatchable resources, lower reserve margins, more frequent and severe weather events and increased reliance on weather-dependent renewables and emergency-only resources have altered the region's historic risk profile, creating risks in non-summer months that rarely posed challenges in the past.[20]

These MISO studies indicate that the emergency conditions caused by the loss of generation capacity in MISO extend past the summer season.

In January 2026, NERC released its 2025 Long-Term Reliability Assessment (2025 LTRA).[21] NERC assessed that the MISO region is at high risk of energy shortfalls over the next five years,[22] stating that it faces significant reliability challenges as "projected resource additions do not keep pace with escalating demand forecasts and announced generator retirements."[23] This determination is based on the combination of accelerating demand growth from new data centers and the retirement of existing thermal generators.[24] The 2025 LTRA notes that "MISO's accredited thermal capacity has decreased by 8.8 GW, driven primarily by reductions in accredited capacity of existing facilities and retirements."[25] NERC observes that winter peak periods are a particular concern, with projections showing "shortfalls in planned resources for winter peak periods."[26] However, NERC also concluded that "risks could expand into spring and fall generator maintenance periods when the available dispatchable generation is not enough to counter wind and solar variability when demand is high."[27]

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[18] *Id*.

[19] MISO, *MISO's Response to the Reliability Imperative* (updated Feb. 2024), https://cdn.misoenergy.org/2024+Reliability+Imperative+report+Feb.+21+Final504018.pdf.

[20] *Id.* at 12.

[21] NERC, *2025 Long-Term Reliability Assessment* (Jan. 2026), https://www.nerc.com/globalassets/our-work/assessments/nerc_ltra_2025.pdf.

[22] *Id.* at 6, 8.

[23] *Id.* at 8.

[24] *Id.* at 43.

[25] *Id.* at 15.

[26] *Id*.

[27] *Id.*

The 2025–2026 NERC Winter Reliability Assessment found the MISO region to be at normal risk in 2026 and elevated risk in 2027. The two previous winter studies respectively characterized MISO as a region at elevated risk with the "[p]otential for insufficient operating reserves in above-normal conditions"[28] and noted that "[g]enerating capacity is 10 GW lower (-6.8%) compared to the prior winter as generators have retired, withdrawn from MISO's capacity market, or received lower winter accredited capacity."[29]

NERC released its 2026 Summer Reliability Assessment (SRA) on May 19, 2026. In its assessment, NERC stated that "MISO's peak load has increased by 2.5 GW from the 2025 SRA."[30] The 2026 SRA also projects that data center load will continue to accelerate in 2027 and beyond, potentially increasing reliability risk if capacity additions do not keep pace.[31] Furthermore, the 2026 SRA states that "[a]bove-normal summer peak load combined with low resource conditions could result in the need to employ operating mitigations (e.g., load-modifying resources) and EEAs [Energy Emergency Alerts]."[32] Since the region benefits from transmission connections with neighbors to meet extreme conditions, MISO's reliance on electricity imports will increase when extreme conditions arise."[33]

The evidence indicates that there is also a potential longer-term resource adequacy emergency in MISO. When MISO reported the results of its PRA for the 2025–26 Planning Year, it noted that "new capacity additions were insufficient to offset the negative impacts of decreased accreditation, suspensions/retirements and external resources" in the northern and central zones, which include Indiana.[34]

There continues to be tight capacity available during summer despite the recent "gains in offered capacity outpacing pressure of load growth" in the MISO region, as reported in its PRA for the 2026-2027 Planning Year.[35] MISO noted that "new generation

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[28] NERC, *2023–2024 Winter Reliability Assessment*, at 5 (Nov. 2023), https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_WRA_2023.pdf.

[29] NERC, *2024–2025 Winter Reliability Assessment*, at 15 (Nov. 2024), https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_WRA_2024.pdf.

[30] NERC, *2026 Summer Reliability Assessment*, at 16 (May 2026), https://www.nerc.com/globalassets/our-work/assessments/nerc_sra_2026.pdf.

[31] *Id.*

[32] *Id.*

[33] *Id*.

[34] MISO, *Planning Res. Auction: Results for Planning Year 2025–26*, at 13 (Apr. 2025), https://cdn.misoenergy.org/2025%20PRA%20Results%20Posting%2020250529_Corrections694160.pdf.

[35] MISO, *Planning Res. Auction Results for Planning Year 2026/27*, at 3 (Apr. 2026, updated May 22, 2026), https://cdn.misoenergy.org/2026%20PRA%20Results%20Posting%2020260522%20-%20Corrections754715.pdf.

capacity is coming online, but faster resource additions are still needed to support large-load growth and ensure resource adequacy."

On June 4, 2026, the Organization of MISO States (OMS) and MISO issued the results of their 2026 survey, which has been conducted annually for many years to determine the degree to which expected capacity resources satisfy planning reserve margin requirements.[36] The 2026 OMS-MISO Survey presented projections of resource adequacy for the summer of 2026 and subsequent years and states "growth as submitted by [load serving entities or LSEs] continues to accelerate, with a [compound annual growth rate or CAGR] projected between 3.1% and 5.1% over [the next] five years."[37]

The OMS-MISO Survey further indicates that "[v]arious projected capacity scenarios and large load additions highlight increasing uncertainty and evolving risk"[38] and observes various negative risks. Examples include intensification of winter reliability risks based on resource availability/performance, which exacerbates seasonal reliability vulnerabilities; delay of new resource deployment owing to persistent supply-chain disruptions, labor constraints and permitting challenges; resource adequacy pressures continuing from load growth driven by data centers, new industrial, and commercial development; and continued backlog and uncertainty related to resources with signed Generator Interconnection Agreements (GIA).[39] In addition, 87 GW of signed GIAs are not yet online, and 192 GW of active GIAs still under study.[40]

Finally, the OMS-MISO Survey lists ongoing challenges such as more frequent extreme weather; accelerating demand for electricity and large load interconnections; loss of accredited capacity and reliability attributes as resource mixes evolve; the increasing pace of new resources additions; addressing local reliability issues (load pocket); and evolving storage participation.[41]

NERC released its 2026 State of Reliability (SOR) on June 24, 2026. In the SOR, NERC identifies worsening reliability concerns tied to large-load integration and localized operating stress. In its technical discussion of major system events, NERC states "shoulder seasons have become increasingly challenging for Bulk Power System operators to manage, resulting in several recent instances of pre-contingent load shedding."[42] The SOR also finds large load growth is increasing reliability risk and

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[36] OMS & MISO, *OMS-MISO Survey Results* (updated June 4, 2026) (2026 OMS-MISO Survey), https://cdn.misoenergy.org/20260604%20OMS-MISO%20Survey%20Results%20Workshop%20Presentation761711.pdf.

[37] *Id.* at 2.

[38] *Id.* at 3.

[39] *Id.* at 4.

[40] *Id.*

[41] *Id.* at 16.

[42] NERC, *2026 State of Reliability: Tech. Assessment of 2025 Bulk Power Sys. Performance*, at 5 (June 24, 2026), https://www.nerc.com/globalassets/programs/rapa/pa/nerc_sor_2026_technical_assessment.pdf.

states that "data center and computational loads continued emerging as a major reliability consideration due to their scale, speed of development, and unique operational characteristics."[43] Finally, data in the SOR shows that 2025 MISO summer and winter peak demands of 121.6 GW and 108.8 GW, respectively, met or exceeded extreme scenario levels showing how rapid load growth and extreme weather continue to be a real risk in MISO.[44]

MISO has been taking steps to address these projected deficits. For example, on June 6, 2025, MISO submitted a proposal to FERC to establish an Expedited Resource Addition Study (ERAS) process to provide a framework for the expedited study of interconnection requests to address urgent resource adequacy and reliability needs in the near term. This proposal was approved by FERC on July 21, 2025.[45] MISO's ERAS should help expedite the construction of needed new capacity; however, resources studied under the ERAS will have commercial operation dates that are at least three years away and are provided an additional three-year grace period to commence commercial operations.[46] In addition, supply chain constraints impeding the acquisition of critical grid components, including large natural gas turbines and transformers, are likely to further hinder rapid construction and exacerbate reliability concerns.[47] Consequently, the new ERAS process is unlikely to result in the addition of any new generation capacity in the next few years

Order Nos. 202-25-13, 202-26-20, and 202-26-30 were preceded by executive orders on January 20, 2025, and April 8, 2025, in which President Donald J. Trump underscored the dire energy challenges facing the Nation due to growing resource adequacy concerns. President Trump declared a national energy emergency in Executive Order No. 14156, "Declaring a National Energy Emergency," in which he determined that the "United States' insufficient energy production, transportation, refining, and generation constitutes an unusual and extraordinary threat to our Nation's economy, national security, and foreign policy."[48] The Executive Order adds that "hostile state and non-state foreign actors have targeted our domestic energy infrastructure, weaponized our reliance on foreign energy, and abused their ability to cause dramatic

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[43] *Id.* at vii.

[44] *Id.* at 28, 30.

[45] *Midcontinent Indep. Sys. Operator, Inc.*, 192 FERC ¶ 61,064 (2025).

[46] NERC, *State of Reliability*, *supra* note 48, at 84.

[47] *See generally* Jared Anderson, *US Gas-Fired Turbine Wait Times as Much as Seven Years; Costs Up Sharply*, S&P GLOBAL (May 2025) ("With demand for natural gas-fired turbines in the US rapidly accelerating amid power demand growth forecasts driven by AI, manufacturing, and electrification, wait times for turbines are anywhere between one and seven years depending on the model, and costs have increased considerably, experts told Platts."), https://www.spglobal.com/energy/en/news-research/latest-news/electric-power/052025-us-gas-fired-turbine-wait-times-as-much-as-seven-years-costs-up-sharply.

[48] Exec. Order No. 14156, 90 Fed. Reg. 8433 (Jan. 20, 2025), https://www.federalregister.gov/documents/2025/01/29/2025-02003/declaring-a-national-energy-emergency.

swings within international commodity markets."[49] In the subsequent Executive Order No. 14262, "Strengthening the Reliability and Security of the United States Electric Grid," President Trump emphasized that "the United States is experiencing an unprecedented surge in electricity demand driven by rapid technological advancements, including the expansion of artificial intelligence data centers and increase in domestic manufacturing."[50]

In addition, President Trump issued a White House Memo for the Secretary that emphasized the findings of Executive Order No. 14156, stating that "ensuring reliable coal supply chains and baseload power generation capacity is essential to the United States national defense . . . . Without sufficient coal-fired baseload power, the United States will lack the stable electricity required to support defense installations, industrial expansion, and the high-energy demands of emerging technologies, such as artificial intelligence."[51] The President "further determine[d] that action to expand coal supply chain capacity and baseload generation availability is necessary to avert an industrial resource or critical technology item shortfall that would severely impair national defense capability."[52]

Further, the Department detailed the myriad challenges affecting the Nation's energy systems in its July 2025 "Resource Adequacy Report: Evaluating the Reliability and Security of the United States Electric Grid," which was issued pursuant to the President's directive in Executive Order No. 14262. The Department concluded that "[a]bsent decisive intervention, the Nation's power grid will be unable to meet projected demand for manufacturing, re-industrialization, and data centers driving artificial intelligence (AI) innovation."[53]

Grid operators—including MISO itself—have also acknowledged the Nation's current energy crisis. For instance, during a March 25, 2025, hearing before the House Committee on Energy and Commerce, MISO's Senior Vice President for Planning and Operations, Jennifer Curran, testified that "the MISO region faces resource adequacy and reliability challenges due to the changing characteristics of the electric generating fleet,

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[49] *Id*.

[50] Exec. Order No. 14262, 90 Fed. Reg. 15521 (Apr. 8, 2025), https://www.federalregister.gov/documents/2025/04/14/2025-06381/strengthening-the-reliability-and-security-of-the-united-states-electric-grid.

[51] Memorandum from President Donald J. Trump to the Secretary of Energy (Apr. 20, 2026) (*Presidential Determination Pursuant to Sec. 303 of the Def. Prod. Act of 1950, as Amended, on Coal Supply Chains & Baseload Power Generation Capacity*), https://www.whitehouse.gov/presidential-actions/2026/04/presidential-determination-pursuant-to-section-303-of-the-defense-production-act-of-1950-as-amended-on-coal-supply-chains-and-baseload-power-generation-capacity/.

[52] *Id.*

[53] DOE, *Res. Adequacy Rep.: Evaluating the Reliability & Sec. of the U.S. Elec. Grid*, at 1 (July 2025), https://www.energy.gov/sites/default/files/2025-07/DOE%20Final%20EO%20Report%20%28FINAL%20JULY%207%29.pdf.

inadequate transmission system infrastructure, growing pressures from extreme weather, and rapid load growth."[54] Ms. Curran also described "much stronger growth [in demand for electricity] from continued electrification efforts, a resurgence in manufacturing, and an unexpected demand for energy-hungry data centers to support artificial intelligence."[55] She added that "[a] growing reliability risk is that the rapid retirement of existing coal and gas power plants threatens to outpace the ability of new resources with the necessary operational characteristics to replace them."[56]

Pursuant to section 202(c)(4)(B) of the FPA, DOE has consulted with the primary Federal agency with expertise in the environmental interest protected by the laws or regulations that may conflict with this Order. The agency did not submit additional conditions for inclusion in this Order.

ORDER

FPA section 202(c)(1) provides that whenever the Secretary determines "that an emergency exists by reason of a sudden increase in the demand for electric energy, or a shortage of electric energy or of facilities for the generation or transmission of electric energy," the Secretary has the authority "to require by order . . . such generation, delivery, interchange, or transmission of electric energy as in [his] judgment will best meet the emergency and serve the public interest."[57] This statutory language constitutes a specific grant of authority to the Secretary to require the continued operation of Culley Unit 2 when the Secretary has determined that such operation will best meet an emergency.

As described above, the emergency conditions resulting from increasing demand and shortage of electric energy from premature retirement of generation facilities will continue in the near term and are also likely to continue in subsequent years. This could lead to the loss of power to homes and businesses in the areas that may be affected by curtailments or power outages, presenting a risk to public health and safety.

I have determined that, to best meet the emergency arising from increased demand, determined shortage, and other causes, and serve the public interest under FPA

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[54] *Keeping the Lights On: Examining the State of Reg'l Grid Reliability Before the House Comm. on Energy & Commerce*, Subcomm. on Energy, 119th Cong., at 5 (Mar. 25, 2025) (statement of Ms. Jennifer Curran, Senior Vice President for Planning and Operations, MISO), https://www.congress.gov/119/meeting/house/118040/witnesses/HHRG-119-IF03-Wstate-CurranJ-20250325.pdf.

[55] *Id.* at 6.

[56] *Id.* at 7.

[57] Although the text of FPA section 202(c) grants this authority to "the Commission," section 301(b) of the Department of Energy Organization Act transferred this authority to the Secretary of the Department of Energy. *See* 42 U.S.C. § 7151(b).

section 202(c), Culley Unit 2 shall be made available for operation through December 18, 2026.[58]

[58] 16 U.S.C. § 824a(c)(4).

Based on my determination of an emergency set forth above, I hereby order:

A. From September 20, 2026, MISO and CenterPoint Energy shall take all measures necessary to ensure that Culley Unit 2 is available to operate. For the duration of this Order, MISO is directed to take every step to employ economic dispatch of Culley Unit 2 to minimize cost to ratepayers. Following the conclusion of this Order, sufficient time for orderly ramp down is permitted, consistent with industry practices. CenterPoint Energy is directed to comply with all orders from MISO related to the availability and dispatch of Culley Unit 2.

B. To minimize adverse environmental impacts, this Order limits operation of Culley Unit 2 to the times and within the parameters as determined by MISO, pursuant to paragraph A. MISO shall provide a daily notification to the Department (via AskCR@hq.doe.gov) reporting whether Culley Unit 2 has operated in compliance with this Order.

C. All operations of Culley Unit 2 must comply with applicable environmental requirements, including but not limited to monitoring, reporting, and recordkeeping requirements, to the maximum extent feasible while operating consistent with the emergency conditions. This Order does not provide relief from any obligation to pay fees or purchase offsets or allowances for emissions that occur during the emergency conditions or to use other geographic or temporal flexibilities available to generators.

D. By October 3, 2026, MISO is directed to provide the Department (via AskCR@hq.doe.gov) with information concerning the measures it has taken and is planning to take to ensure the operational availability of Culley Unit 2 consistent with this Order. CenterPoint Energy and MISO shall also provide such additional information regarding the environmental impacts of this Order and its compliance with the conditions of this Order, in each case as requested by the Department from time to time.

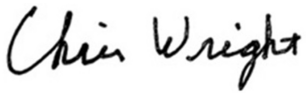
E. CenterPoint Energy is directed to file with FERC tariff revisions or waivers to effectuate this Order, as needed. Rate recovery is available pursuant to 16 U.S.C. § 824a(c).

F. This Order shall not preclude the need for Culley Unit 2 to comply with applicable state, local, or Federal law or regulations following the expiration of this Order.

G. Because this Order is predicated on the shortage of facilities for generation of electric energy and other causes, Culley Unit 2 shall not be considered a capacity resource.

H. This Order shall be effective from September 20, 2026, through December 18, 2026, with the exception of applicable compliance obligations in paragraph D.

Issued in Washington, D.C. on this 18th Day of September 2026.



Chris Wright
Secretary of Energy

cc: **Federal Energy Regulatory Commission**
Chairman Laura V. Swett
Commissioner David Rosner
Commissioner Lindsay S. See
Commissioner Judy W. Chang
Commissioner David A. LaCerte

Indiana Utility Regulatory Commission
Chairman Anthony Swinger
Commissioner Joshua Bain
Commissioner Bob Deig
Commissioner Joby Jerrells
Commissioner David Ziegner

UNITED STATES DEPARTMENT OF ENERGY

Midcontinent Independent System Operator	Order Nos. 202-25-12, 202-25-13

MOTION TO INTERVENE AND PETITION FOR REHEARING OF THE STATES OF MINNESOTA AND ILLINOIS AND THE PEOPLE OF THE STATE OF MICHIGAN

Pursuant to section 202 (c) of the Federal Power Act, 16 U.S.C. §§ 824a(c), 825l, the States of Minnesota and Illinois and the People of the State of Michigan ("the States"), move to intervene and petition for rehearing of the Department of Energy's ("DOE") orders 202-25-12 (Schahfer) and 202-25-13 (Culley Unit 2) (together, "Orders"),[1] directing the Midcontinent Independent System Operator ("MISO"), Northern Indiana Public Service Company ("NIPSCO") and CenterPoint Energy ("CenterPoint") to take all measures necessary to ensure that the coal-burning Schahfer plant ("Schahfer") and coal-burning Culley Unit 2 ("Culley") are "available to operate" and "to take every step to employ economic dispatch" of those resources. The Orders are in effect from 11:59 PM Eastern Standard Time (EST) on December 23, 2025, until 11:59 PM Eastern Daylight Time (EDT) on March 23, 2026,.

Pursuant to the Federal Power Act ("the Act") and Department procedures applying it to petitions for rehearing, the States hereby file this timely request for rehearing of DOE's Schahfer and Culley Orders. Some of the States have already sought both rehearing and review of three similar orders that the

[1] All Exhibits are lettered and attached; to be submitted in separate serial emails to the DOE's AskCR <askcr@hq.doe.gov> account.

DOE issued to the J.H. Campbell Plant in West Olive, Michigan. The Schahfer and Culley Orders perpetuate the same errors underlying the Campbell Order, perpetuating DOE's flawed analyses, faulty conclusion that an emergency exists for the MISO Regional Transmission Organization ("RTO"), and unlawful directives—all of which together harm the States.

The Schahfer and Culley Orders exceed DOE's legal authority in several respects. And even if an emergency did exist and DOE had the legal authority to issue such orders, the Schahfer and Culley Orders are not rationally related to meet the purported need. They should be rescinded.

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C. The Orders exceed DOE's authority because they requires actions not listed in Section 202(c)(1). 39

D. The Orders exceed DOE's authority because they do not set hours of operation, limit hours of operation, or minimize environmental impact as required by Section 202(c)(3). .. 40

E. The Orders exceed DOE's authority because Section 201(b)(1) reserves decisions about plant retirements to the states. 40

F. The Orders are unreasoned, arbitrary, and capricious because their directive for "economic dispatch" is inherently contradictory with the needs to meet an actual emergency. 45

G. The purported emergency is pretext for a prejudged outcome. 51

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MOTION TO INTERVENE

The States[2] move to intervene in this proceeding and thereby to become parties for purposes of Section 313l of the Act, 16 U.S.C. § 825l. The States have an interest in and are aggrieved by the subject orders (Exs. A, B) in several ways and seek to intervene and petition for rehearing. *FDR v. R.J. Reynolds Vapor Co.*, 606 U. S. ___ (2025) (slip op., at 3–8) (defining an "adversely affected or aggrieved" party within the APA as "anyone even 'arguably within the zone of interests to be protected or regulated by the statute . . . in question.'" (quoting *Association of Data Processing Service Organizations, Inc. v. Camp*, 397 U. S. 150, 153 (1970))).

Factual Background

The utilities regulated by the States are members of MISO, the electric grid operator for the central United States. MISO covers the largest geographical range of any independent system operator ("ISO") in the U.S. The 15 states covered by MISO are: Arkansas, Illinois, Indiana, Iowa, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Montana, North Dakota, South Dakota, Texas, and Wisconsin. As the ISO of the electric grid in this region, MISO manages the flow of electricity across the high-voltage, long-distance power lines. To do so, MISO develops rules so that the wholesale electricity transmission system operates reliably and safely. MISO has described this as being like the "air traffic controller" for the grid in its territory,[3] meaning that MISO seeks to resolve power congestion (traffic) issues in real-time through its control room and has processes in place to anticipate and avoid emergencies that could lead to the loss of power.

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[2] *See* Minn. Stat. § 8.01 ("The attorney general shall appear for the state in all causes in the supreme and federal courts wherein the state is directly interested; also in all civil causes of like nature in all other courts of the state whenever, in the attorney general's opinion, the interests of the state require it.).

[3] "Meet MISO," https://www.misoenergy.org/meet-miso/about-miso/industry-foundations/what-we-do/ (last visited June 23, 2025).

On December 23, 2025, the DOE issued the Schahfer Order (202-7-12) to MISO and NIPSCO. Ex. A. On December 23, 2025, the DOE issued the Culley Order (202-7-13) to MISO and CenterPoint. Ex. B. Both orders were issued pursuant to section 202(c) of the Federal Power Act. *See* 16 U.S.C. § 824(c)(1).

The Orders direct MISO, in coordination with NIPSCO (Schahfer) and CenterPoint (Culley), the respective operators of the plants, to ensure that the plants remain available for operation during the period of the order (December 23, 2025, through March 23, 2026). *Id.*

These eleventh-hour Orders disrupted a longstanding planning sequence handled by state authorities and submitted to MISO, which included plans to retire the Schahfer and Culley Unit 2 plants on December 31, 2025.[4] Ex. C (NIPSCO IRP). The integrated resource planning process already accounted for increased need and slated adequate generation to meet requirements. Ex. C at 6 ("Thus, the 2024 IRP was structured to ensure a robust assessment of the type of resources needed to respond to emerging market conditions and future portfolio retirements."). As recently as October 29, 2025, NIPSCO recommitted to Indiana regulators its plan to retire Schahfer Units 17 and 18 in accordance with its January 2023 submission to MISO, which MISO approved in February 2023. Ex. E.

All three units at these two plants were slated for retirement because they are old and in disrepair, and the units experienced deferred maintenance leading up to their planned retirement; they cannot be economically operated and require significant overhaul and upkeep costs to stay running. For example, CenterPoint explained that the Culley Unit 2 retirement was part of a plan

[4] *See* Consumers Energy, "2021 Clean Energy Plan," https://www.consumersenergy.com/-/media/CE/Documents/company/IRP-2021.pdf (last accessed June 23, 2025).

that would save ratepayers $80 million. Ex. D. And upon announcing the retirement of the Schahfer units, NIPSCO touted the cost-savings of transitioning away from coal as a fuel source. Ex. F.

Adverse Effects

The States will be adversely affected by the Orders directed to the Schahfer and Culley coal units in many of the same ways that they were harmed by the Campbell Orders that they have separately requested rehearing or otherwise challenged.

The Schahfer and Culley Orders prevent the planned retirement of the respective plants with consequent negative impacts on the States.

First, households and businesses in the States, and the States as consumers in their own right, will pay higher electricity bills as a result of the Orders' imposition of costs and cost-recovery to the States. By ordering the utilities to take all steps necessary to make the coal plants available and ordering MISO to take all steps necessary for the plants to provide economic dispatch, costs are already being incurred and more costs will continue to be generated.

Notably, the age of the units is concerning for costs, especially given the cost-savings assessments of the retirement plans. The Orders will likely require at least a portion of capital expenditures and major maintenance costs, which will drive up costs and impact ratepayer bills. This would be in addition to the cost of rehiring operators and obtaining more coal, among other expenses.

Although the precise amount is not yet known, the Orders provide that cost recovery is available through Federal Energy Regulatory Commission ("FERC") proceedings. Exs. A-B at ¶E. The operators have already initiated cost recovery complaints before FERC that, if approved, will impact ratepayers on the States.

Second, the States will suffer environmental harms as a result of the Order. The coal operations at Schahfer and Culley are a significant source of particulate matter, nitrogen oxides,

sulfur oxides, and carbon dioxide,[5] among other pollutants. By extending the operations of the plants beyond their planned retirement dates, the Orders increase the amount of pollution emitted in the region, causing harm to the public health and welfare.[6] The States of Minnesota, Illinois, Michigan, and Wisconsin share the upper Midwest region and Great Lakes environment with Indiana. Depending on weather, air emissions in Indiana impact conditions in the States. Further, the States have an interest in the Great Lakes ecosystem into which pollutants from coal-burning power plants such as mercury are deposited. Such pollution is harmful to state economies including fisheries and recreation, human health, and the environment in general. The Schahfer plant is immediately southeast of Chicago, Illinois, and near the shore of Lake Michigan. The Culley Plant is located on the shore of the Ohio River immediate upstream of Illinois's southern border. Thus, the States have an economic, public health, and ecological interest in protecting their environment and natural resources from unnecessary pollution emanating from the Schahfer and Culley plants. The States are harmed because the Orders result in the unnecessary consumption of coal fuel that generates such pollution.

Coal-fired power plants also contribute to regional, national, and global greenhouse gas emissions, which cause global climate change. Climate change directly harms the States by imposing significant additional costs for responsive actions, disaster recovery, and resiliency programs. Increased emissions threaten state climate goals and the States' ability to comply with federal and state air pollution requirements.

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[5] See In the Matter of the Application of Consumers Energy Co. for Approval of Its Integrated Res. Plan Pursuant to Mcl 460.6t & for Other Relief., No. U-21090, 2022 WL 2915368, at *73 (June 23, 2022).

[6] *See* Cross-State Air Pollution Rule (CSAPR) and Clean Air Act § 110.

Minnesota, for example, is experiencing rapid changes including higher winter temperatures and larger, more frequent extreme precipitation events, extreme heat, and drought.[7] Each of Minnesota's top-ten combined warmest and wettest years on record have occurred since 1998, with 2024 standing as the warmest year on record and 2019 the wettest.[8] Minnesota is already suffering from a significant uptick in devastating, large-area extreme rain events, threatening the state with ever greater frequency and intensity.[9] These events damage streets, wastewater facilities, businesses, homes, farms, and natural resources, costing local governments, business owners, and residents millions of dollars in cleanup, repairs, and adaptation expenses.[10] Wildfires are also becoming larger and more frequent, including a rash of devastating fires in the spring of 2025 that consumed more than 32,000 acres and destroyed an estimated 150 structures. The spring of 2024 included heavy precipitation and extreme rainfall events, leading to extensive flooding and federal disaster declarations for large parts of the state.[11] From 1980 to 2024, the annual average for billion-dollar weather and climate disasters in Minnesota is 1.4 events per year, but the annual average from 2020 to 2024 is 4.6 events.[12] The "Lost Winter" of 2023-2024 was the

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[7] Minnesota Climate Trends, *Minnesota Department of Natural Resources* (2023), https://www.dnr.state.mn.us/climate/climate_change_info/climate-trends.html.
[8] *Id*.
[9] *Id*.
[10] *Id*.
[11] "Extreme Rainfall Drenches Northeastern Minnesota," Minnesota Department of Natural Resources, https://www.dnr.state.mn.us/climate/journal/extreme-rainfall-northeast-mn-june-18-2024; "Extreme Rain and Flooding in Southern Minnesota, June 20-22," Minnesota Department of Natural Resources, (August 9, 2024), https://www.dnr.state.mn.us/climate/journal/extreme-rain-flooding-southern-minnesota-june-20-22.html; "Disaster information," Minnesota Department of Public Safety, https://dps.mn.gov/divisions/hsem/em-resources/disaster-information (last visited June 23, 2025).
[12] "Billion Dollar Weather and Climate Disasters, Minnesota Summary, *NOAA National Centers for Environmental Information*, Billion-Dollar Weather and Climate Disasters | Minnesota Summary | National Centers for Environmental Information (NCEI)," https://www.ncei.noaa.gov/access/billions/state-summary/MN.

warmest on record, with temperatures averaging 10.9°F above 1991-2020 averages, greatly harming Minnesota's recreational economy.[13] These impacts will continue, and emissions from the Schahfer and Culley coal operations will contribute to them.

Climate change is affecting Illinois in a number of ways. Illinois' farming industry is vulnerable to cycles of extreme drought and extreme precipitation caused by climate change. In 2023, a severe drought dried up soil throughout the state, with extreme dryness extending down to 20 inches below the surface in some areas.[14] In other years, extreme precipitation has threatened Illinois' agriculture. For instance, January to June of 2013 was the wettest period ever recorded in Illinois, causing widespread flooding in farmland that forced farmers to delay planting and lose revenue.[15] Climate change is also intensifying catastrophic extreme weather events. In 2024, the Illinois State Climatologist recorded strong wind, hail, and tornadoes across all of Illinois' 102 counties and the state logged 142 tornadoes—a new annual record.[16] These storms included a July 15, 2024 "derecho" that produced 100 mile-per-hour winds and 48 separate tornados.[17] In the

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[13] *Id*.
[14] Illinois State Climatologist, Drought Worsens in a Very Dry June (June 30, 2023), https://stateclimatologist.web.illinois.edu/2023/06/30/drought-worsens-in-a-very-dry-june/ (last visited May 23, 2025).
[15] University of Illinois–Institute of Government & Public Affairs, Preparing for Climate Change in Illinois: An Overview of Anticipated Impacts (2015), https://indigo.uic.edu/articles/report/Preparing_for_Climate_Change_in_Illinois_An_Overview_of_Anticipated_Impacts/15078939/1 (last visited May 23, 2025). See also U.S. Dept. of Agriculture Climate Hubs and Great Lakes Research Integrated Science Assessment, Climate Change Impacts on Illinois Agriculture (2022), https://www.climatehubs.usda.gov/sites/default/files/2022_ClimateChangeImpactsOnIllinoisAgriculture.pdf (last visited May 23, 2025).
[16] Tony Briscoe, Lake Michigan Water Levels Rising at Near Record Rate, CHICAGO TRIBUNE (July 12, 2015), https://www.chicagotribune.com/2015/07/12/lake-michigan-water-levels-rising-at-near-record-rate/ (last visited May 23, 2025).
[17] National Weather Service, July 15, 2024 Derecho Produces Widespread Wind Damage and Numerous Tornadoes, available at https://www.weather.gov/lot/2024_07_15_Derecho#:~:text=With%2032%20tornadoes%2C%20t

Chicago area alone, the derecho produced 32 tornados, breaking the previous records set by the July 2014 "double derecho" and a March 2023 storm.

As demonstrated by the attached declarations of Douglas Jester, Exhibits DD and EE, the Schahfer and Culley coal burning units—if continued to operate—would have significant monetary and environmental impacts on the States. The operation of Schahfer will result in approximately 1.0-1.9 deaths and $15.8 million to $29 million monetized health effects across Illinois, Michigan, and Minnesota. Ex. DD at ¶22 (*citing* EPA's the Co-Benefits Risk Assessment Health Impacts Screening and Mapping Tool (COBRA)). And the operation of Culley will result in approximately 0.16-0.325 deaths and $2.12 million to $4.23 million monetized health effects across Illinois, Michigan, and Minnesota. Ex. EE (same). The continued operation of the Schahfer and Culley coal units will have a net harmful effect on public health in Illinois, Michigan, and Minnesota. Ex. DD at ¶ 26; Ex. EE at ¶ 26.

Moreover, the States have an interest given their primary responsibility for resource planning and ensuring that there will be adequate and reliable electricity generation. The processes that States employ to ensure reliability—which takes into account planned retirements, new generation projects, transmission infrastructure, and meet consumer demand—are both sophisticated and robust. The Orders harm the States by usurping the traditional role that states play in generation planning and resource adequacy.

PETITION FOR REHEARING

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he%20July,March%2031%2C%202023%20tornado%20outbreaks. (last visited May 25, 2025). See also David Struett, Tornado Record Broken with 27 Chicago Area Twisters July 15—Spawned by 'Ring of Fire', WBEZ CHICAGO, available at https://www.wbez.org/weather/2024/07/24/chicago-weather-tornado-record-derecho-july-15 (last accessed May 23, 2025)

I. Overview and Concise Statement of Error

The challenged Orders compound the error of the DOE's Campbell Orders in that they declare an emergency based on a shortage of electric energy generation when there is no emergency. Even if there were an emergency, the Orders impose several requirements that are inconsistent with and exceed DOE's legal authority. And even if DOE had the authority to impose the requirements, they are not directed to actions that will actually meet the purported emergency.

The Orders are premised on an incomplete recitation of MISO's planned capacity and reserves for the summer of 2025 through 2032.

The Orders misconstrue the source material on which they rely and still conclude only that there is a possibility of shortfalls. But they do not cite or rely on any evidence that there is any likelihood or probability that any shortfall will occur during the relevant timeframe of the Orders (December 23, 2025, through March 23, 2026).

The Orders conclude that the evidence collected (and discussed below) supports their issuance. They contend that the purported emergency will continue in the near term and is likely to continue in subsequent years. It declares—without any evidence identifying an emergency in December-March timeframe—that the alleged emergency "could lead to the potential loss of power to homes and local businesses in the areas that may be affected by curtailments or outages, presenting a risk to public health and safety." Exs. A at 4, B at 5 (emphasis added). They then order that MISO and the relevant utility shall take "all measures necessary to ensure that" the plants are "available to operate." *Id*. at ¶A. And MISO must "take every step to employ economic dispatch" of the plants "to minimize cost to ratepayers." *Id*. Further, they order that the plants operate according to times as determined by MISO. Importantly, the orders prohibit the plants from being considered a capacity resource. *Id*. at ¶ G.

These Orders were issued in error. The DOE did not have substantial evidence or engage in reasoned decision-making in declaring the existence of an emergency in general, be it far into the future or even in the December 2025-March 2026 timeframe.

The Orders start from the proposition that there is only a "potential" for insufficient capacity that "could" result in a need for mitigation, which does not present an actual existing or imminent emergency. *Id*. at 2. And in the same discussion, the Orders acknowledge that there is actually a projected surplus in the summer of 2026. *Id*. at 3 (citing MISO Survey, attached as Ex. G). But Section 202(c)'s plain terms limit DOE to actual emergencies—not the potential that emergencies might arise. Section 202(c) is also limited in the type of conduct it allows DOE to order, such as directing the generation, delivery, or transmission of electric energy. These Orders, however, require the plants to be "available to operate." Nothing in section 202(c) grants DOE authority to order a plant be available to operate without any demonstrated need during the timeframe of the order identified by the states with primary resource planning authority, the utility operating the resource, or grid operator responsible for forecasting and coordinating adequate and reliable supply.

Even if an emergency did exist during the timeframe of the orders and DOE had the legal authority to issue them, directing the plants to participate in the bidding market using economic dispatch would not rationally "best" meet the purported need because there is no evidence the coal plants can reasonably address any given future emergency need; this is because emergency responses do not require economic evaluation, and because the coal plants take so long to ramp up. The Orders should be rescinded.

II. Legal Background

Under section 202(c) of the Federal Power Act, the Commission[18] has authority to issue an order:

> [d]uring the continuance of any war in which the United States is engaged, or whenever the Commission determines that an emergency exists by reason of a sudden increase in the demand for electric energy, or a shortage of electric energy or of facilities for the generation or transmission of electric energy, or of fuel or water for generating facilities, or other causes. . . .

16 U.S.C. § 824(c)(1). The same subsection states that the Commission may order "temporary connections of facilities" and "generation, delivery, interchange, or transmission of electric energy" that, in the Commission's "judgment will best meet the emergency and serve the public interest." *Id*. The next subsection, 16 U.S.C. § 824(c)(2), establishes that an emergency order must be limited to only those hours necessary to meet the emergency. It states:

> With respect to an order issued under this subsection that may result in a conflict with a requirement of any Federal, State, or local environmental law or regulation, the Commission shall ensure that such order requires generation, delivery, interchange, or

[18] The "Commission" refers to the Federal Power Commission (FPC), whose powers were transferred in 1977 to either the Secretary of DOE or the Federal Energy Regulatory Commission (FERC). 16 U.S.C. § 796(14); Department of Energy Organization Act, Pub. L. No. 95-91, 91 Stat. 565, 565-613 (1977). This transfer gave FERC the authority over "the interconnection, under section 202(b), of such Act [16 U.S.C. 824a(b)], of facilities for the generation, transmission, and sale of electric energy (*other than emergency interconnection*)." 42 U.S.C. § 7172(a)(1)(B) (emphasis added). However, this transfer also gave DOE "the function of the Federal Power Commission, or of the members, officers, or components thereof" except as provided in subchapter IV of the act. 42 U.S.C. § 7151(b). Because 42 U.S.C. § 7172(a)(1)(B) explicitly excludes emergency interconnection from FERC's authority, the authority over emergency interconnection has historically been delegated to DOE. However, the delegation of this emergency authority to DOE has not been consistently applied. In *Richmond Power & Light v. FERC*, 574 F.2d 610 (1978), a petitioner objected to FERC's (not DOE's) failure to invoke emergency powers under 16 U.S.C. § 824a(c) and order utilities with excess capacity to supply the petitioner with energy. The court did not address whether FERC had the authority to declare an emergency to begin with. *Id*. Thus, whether FERC or DOE has the power to declare an emergency is inconclusive.

> transmission of electric energy only during hours necessary to meet the emergency and serve the public interest, and, to the maximum extent practicable, is consistent with any applicable Federal, State, or local environmental law or regulation and minimizes any adverse environmental impacts.

Id. at § 824(c)(2).

The applicable regulations define "emergency," as:

> an unexpected inadequate supply of electric energy which may result from the unexpected outage or breakdown of facilities for the generation, transmission or distribution of electric power. Such events may be the result of weather conditions, acts of God, or unforeseen occurrences not reasonably within the power of the affected "entity" to prevent. An emergency also can result from a sudden increase in customer demand, an inability to obtain adequate amounts of the necessary fuels to generate electricity, or a regulatory action which prohibits the use of certain electric power supply facilities. Actions under this authority are envisioned *as meeting a specific inadequate power supply situation*.

10 C.F.R. § 205.371[19] (emphasis added).

III. Statement of Issues

Issue A: Did DOE have substantial evidence for the Orders' declaration of an emergency, and did it exercise reasoned decision-making in declaring that an actual emergency exists?

No. DOE relied on evidence that did not identify any likelihood or probability that there would be a shortfall during the relevant timeframe of the Orders' requirements—December 23, 2025, to March 23, 2025. Further, DOE failed to consider substantial countervailing evidence, including the MISO States' Integrated Resource Plans and MISO's assessment of surplus capacity for the summer of 2026. The Orders fail to identify any reasoned basis for concluding an actual emergency exists or is imminent, much less one that will occur between December 23,

[19] DOE issued 10 C.F.R. §§ 205.370-379 pursuant to the Department of Energy Organization Act's transfer of emergency responsibilities to the Secretary of Energy.

2025, and March 23, 2026. Instead, the Orders explicitly contemplate longer-term resource planning for the summer of 2027 and even into the 2030 timeframe—more than a year after the term of the Orders expires. Exs. A-B at 2-3.

Issue B: Section 202(c)(1) allows DOE to issue temporary emergency orders in times of actual or impending emergencies such as war, sudden demand for electric energy, shortage of fuel or water, or other similar conditions creating a specific inadequate power supply situation. Did DOE exceed this authority where the Orders are based on the nonspecific possibility that such a situation might occur over a period of several months—or in the 2027-2030 timeframe, well outside of the Orders' applicability?

Yes. An actual "emergency" is a sudden occurrence requiring immediate response action or a concrete need for energy to be produced; conversely, it is not the mere potential that an emergency might occur. 16 U.S.C. § 824a(c); 10 C.F.R. § 205.371. Emergency orders must respond to "a specific inadequate power supply situation." 10 C.F.R. § 205.371. The Orders do not address any sudden occurrence needing imminent response, nor do they identify any actual and specific insufficient supply situation. Instead, the Orders focus on vague non-summer needs and the potential for shortfalls several years away. The Orders are not directed to any emergency at all, much less one occurring in the December 23, 2025-March 23, 2026 timeframe. They are contrary to law.

Issue C. Section 202(c)(1) allows DOE to issue emergency orders requiring the "generation, delivery, interchange, or transmission of electric energy." Did DOE exceed this authority where the Orders require the coal plants to take steps to be "available" to generate electricity and require MISO to employ economic dispatch?

Yes. DOE's emergency powers allow it to order the generation, delivery, interchange, or transmission of electric energy. Section 202(c)(1) does not give the DOE the authority to order that a plant be available (absent a showing of why that is needed), nor does it give the DOE authority to order MISO to engage in potential economic dispatch. 42 U.S.C. §16432(b). Because the Orders do not adhere to the types of actions allowed under section 202(c)(1), they are without authority and contrary to law.

Issue D. If DOE issues an order pursuant to 202(c)(1), then 202(c)(2) requires it to set limits on hours of operation and ensure that environmental impact is minimized. Did DOE exceed its authority by invoking section 202(c) to issue Orders that set no specific hours of operation, places no limits on hours of operation, and adopts no specific requirements to minimize environmental impact?

Yes. The statutory language requires an emergency order be limited to only those hours necessary to meet the emergency and minimize adverse environmental impacts. 16 U.S.C. § 824a(c)(2). The Orders do not establish any limited hours for operation, instead deferring to MISO. The Orders also do not meaningfully take steps to minimize adverse environmental impacts. Because the Orders do not set any specific hours the plants must run, and do not meaningfully minimize adverse environmental impacts, the Orders violate the requirements of section 202(c)(2). They are without authority and contrary to law.

Issue E: The Federal Power Act reserves resource adequacy planning to the individual states. Did DOE exceed its authority where its Orders directly compel plants slated for retirement to take steps to be available to operate?

Yes. Section 201(a) of the Federal Power Act explicitly provides that federal regulation over generation and transmission is related to matters of interstate commerce and extends "only to those matters which are not subject to regulation by the States." 16 U. S. C. § 824(a). States retain jurisdiction "over facilities used for the generation of electric energy." 16 U.S.C. § 824(b)(1). DOE's Orders exceed its authority by contradicting existing resource plans. It also exceeds DOE's authority by purporting to engage in long-term resource planning for the years 2027-2030, which is a role reserved to the states. For both of these reasons, the Orders are contrary to law.

Issue F: Even if DOE were correct that an emergency exists and that it had the authority to issue the Orders, will the Orders' requirements rationally meet the emergency?

No. Section 202(c) contemplates emergency orders that are precisely tailored to "best" meet the specific emergency. 16 U.S.C. § 824a(c). The Orders' specific requirement for MISO to take steps to effectuate "economic dispatch" of the respective plants is not rationally related to the

emergency the Orders purport to address. The Orders do not explain how keeping the coal plants available to run will meet any particular need when MISO has adequate resources at its disposal without the output of the subject plants. The Orders, therefore, are without substantial evidence and lack reasoned decision-making.

Issue G: Federal law prohibits agencies from prejudging the outcome of an action. Did the Secretary of Energy and the federal administration improperly prejudge the need for the Orders to the Schahfer and Culley coal units?

Yes. As evidenced by public statements, the purported emergency is pretext for an improperly-prejudged outcome to preserve coal as a fuel for electrical generation.

IV. MISO's Robust Capacity and Planning Projections, in Tandem with State-Level Regulatory Processes, are Adequate to Ensure Reliability.

MISO is a regional transmission organization (RTO), an independent, non-profit, membership-based organization responsible for optimizing generation and transmission of electricity and ensuring the reliability of the electric power system within its region, consisting of nearly 3,000 generating units.[20] 18 C.F.R. § 35.34(a), (j)(1). MISO administers bulk or wholesale power markets that centrally commit and dispatch power to facilitate least-cost and reliable power production and delivery throughout the region. The wholesale markets within MISO signal and value power needs and identify the most economically efficient way—the least-cost approach where demand for energy equals the cost supplied—to meet them across the system.[21] MISO also

[20] MISO, *Fact Sheet* (July 2024), available at https://www.misoenergy.org/meetmiso/media-center/2024/corporate-fact-sheet.
[21] MISO, *Electric Grid 101*, available at https://www.misoenergy.org/meet-miso/grid-operations-basics

works to coordinate generation and transmission of electricity with other RTOs, exporting power at times and at others allowing electricity to be imported to MISO.[22] MISO uses advanced modeling and thorough research to coordinate short and long-term planning for the benefit of generating units and consumers.[23]

MISO planned for adequate capacity in 2025 and 2026—the timeframe of the Orders: MISO's Planning Resource Auction ["PRA"] for the 2025-2026 Planning Year "demonstrated sufficient capacity for all zones within the MISO Region." Ex. H at 2. It reports: "it is important to recognize existing processes have *cleared sufficient electric generating capacity across MISO for the periods of time covered by the Order*." *Id*. (emphasis added). And it goes on to describe its confidence that it has already ensured "sufficient capacity to meet anticipated demand across the MISO Region for the 2025-2026 Planning Year." *Id*.

The long-planned retirement of the plants subject to the Orders is not an impediment to reliability in the MISO region. Since 2010, MISO has experienced the retirement of 30.8 gigawatts (GW) of generation capacity, a large proportion of which (21.9 GW) was coal-fired generating

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[22] MISO, *Interregional Coordination*, available at https://www.misoenergy.org/planning/interregional-coodination/; see also MISO, Historical Net Scheduled Interchange (NSI), at https://www.misoenergy.org/markets-and-operations/real-time--marketdata/ market-reports/ (data found under "Summary" Market Reports).

[23] MISO, *Transmission and Generation Planning 101*, available at https://www.misoenergy.org/meet-miso/grid_planning_basics.

units.[24] That trend is shown below in the bar graph (from MISO's 2023 Transmission Expansion Plan Report,[25] Ex. I at 35), which displays the retired capacity by generation type over time:

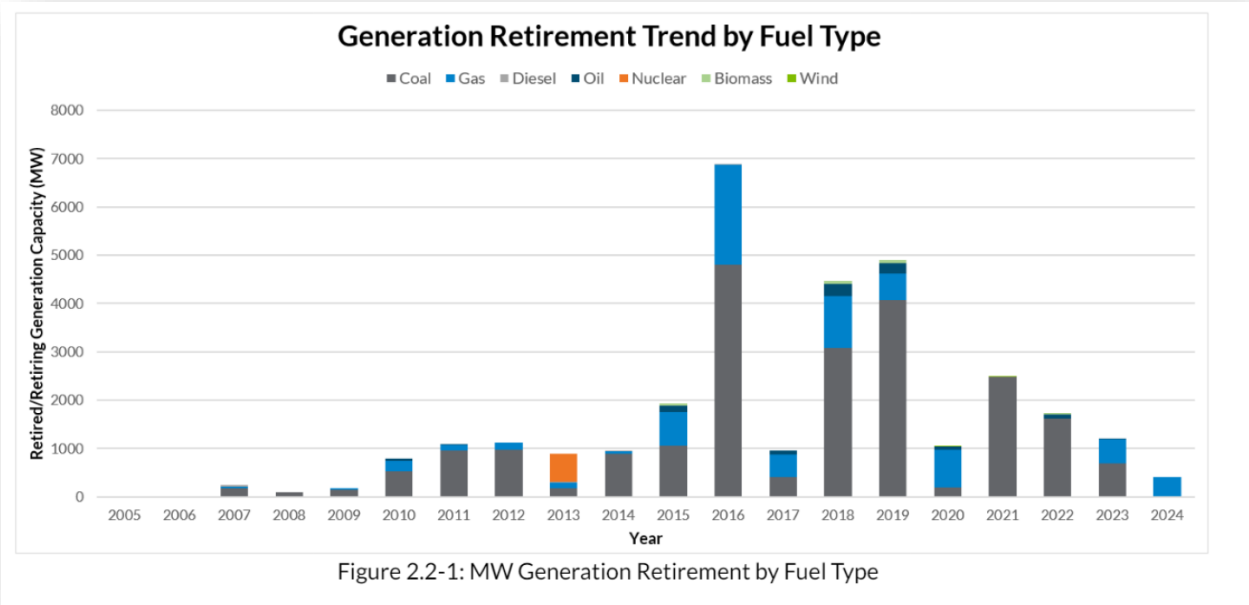


Figure 2.2-1: MW Generation Retirement by Fuel Type

Through use of generation capacity and transmission infrastructure planning, the addition of new capacity—in particular renewables, and the implementation of the other measures discussed above, MISO has been able to absorb these retirements and maintain overall system reliability. *Id*. at 34-35. The sufficiency of MISO's planning was recently affirmed in MISO's Answer to NIPSCO's Complaint in FERC Docket EL26-38-000, with the grid operator stating that:

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[24] *See also* MISO, *Approved Generator Retirements (Public) as of June 28, 2024* ("*Approved Retirements 2024*"), https://www.oasis.oati.com/woa/docs/MISO/MISOdocs/OASIS_Posting_of_Approved_Generator_Retirements_(Public)_2024-06-28.pdf).

[25] MISO, *2023 Transmission Expansion Plan*, available at https://cdn.misoenergy.org/MTEP23%20Executive%20Summary630586.pdf.

> [I]t is important to recognize existing processes have cleared sufficient electric generating capacity across MISO for the periods of time covered by the Order. The clearing of sufficient capacity to meet anticipated demand across the MISO Region for the 2025- 2026 Planning Year reflects the diligent efforts of MISO's members, Market Participants, Relevant Electric Retail Regulatory Authorities ("RERRA") and the Federal Energy Regulatory Commission ("FERC") to establish policies and processes that address both immediate and future capacity requirements. MISO continues to work with these parties in the context of anticipated growing demand for electricity, planned electric generating facility retirements, and an evolving mix of new electric generating resources to refine processes that address the challenges ahead. MISO is confident that these collaborative efforts do not require further intervention and will help ensure the region continues to procure sufficient capacity to meet demand.[26]

The sufficiency of resource planning here has further been subject to review through Indiana's Integrated Resource Plan (IRP) processes; both NIPSCO and Centerpoint have acknowledged that the planned retirements of the coal units at issue were subject to IRP review before the Indiana Utility Regulatory Commission.[27] Indiana's statute governing the contents of IRP submissions requires that utilities include a breadth of analysis and forecasting as to resource planning.[28] Utilities in Indiana's MISO transmission area are further required to submit to the IURC their annual resource adequacy assessment as reported to MISO.[29] Thus, through these

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[26] Answer of the Midcontinent Independent System Operator, Inc., FERC Docket EL26-36-000 at 2 (January 20, 2026).

[27] *See, e.g.*, Complaint and Request for Fast Track Processing of Northern Indiana Public Service Company LLC, FERC Docket EL26-36-000 at 7 (December 29, 2025) ("NIPSCO's 2021 Integrated Resource Plan ("IRP") included a retirement analysis to assess retirement dates for different generating units of its existing generation fleet"); *See also, e.g.*, Complaint Requesting Fast Track Processing, FERC Docket EL26-38-000 at 9 – 10 (January 5, 2026).

[28] *See*, 170 Ind. Admin. Code 4-7-4 (The required "[i]ntegrated resource plan contents" including, to provide just a few examples of many, "[a]t least a twenty (20) year future period for predicted or forecasted analyses," "[a]n analysis of historical and forecasted levels of peak demand and energy usage in compliance with section 5(a) of this rule," and "[a] description of the candidate resource portfolios and the process for developing candidate resource portfolios in compliance with section 8(a) and 8(b) of this rule.").

[29] *See*, 170 Ind. Admin. Code 4-7-2.3(a).

processes, extensive planning for the retirement of the Schahfer and Culley units at issue has been conducted,[30] in conjunction with the grid-operator's resource adequacy planning.

V. Argument

A. The Orders are not supported by substantial evidence demonstrating the existence of an actual emergency and they do not demonstrate any reasoned decision-making.

The DOE failed to provide substantial evidence that an unexpected emergency presently exists, as required by 16 U.S.C. § 824a(c)(5). The relevant standard is whether the DOE's determination is supported by substantial evidence. 16 U.S.C. § 824a(c)(5) refers to the possibility of judicial review under 16 U.S.C. § 825l. After an objection has been brought before DOE, the Court may consider it with the understanding that "[t]he finding of the Commission as to the facts, if supported by substantial evidence, shall be conclusive." 16 U.S.C. § 825l. Substantial evidence means "such relevant evidence as a reasonable mind might accept as adequate to support a conclusion." *Duke Energy Corp. v. FERC*, 892 F.3d 416, 420 (2018). This standard implies deference to an agency's factual determinations. See, e.g., id.

DOE failed to point to substantial evidence of a current and unexpected emergency in the December 23, 2025, to March 23, 2026, timeframe during which the Orders are in effect. The evidence DOE provided does, however, prove that there is currently no energy emergency and that there will not be an "unexpected emergency" that warrants these Orders. MISO is well situated to

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[30] *See, e.g.*, Integrated Resource Plan, NIPSCO 2024 Summary (Including at page 9, for example, that "NIPSCO will continue to complete and place in service wind, solar, and solar plus storage replacement resources previously approved by the Commission for the scheduled 2025 retirement of all coal units at Schahfer….") (accessible at https://www.nipsco.com/docs/librariesprovider11/rates-and-tariffs/irp/nipsco_2024-irp.pdf).

deliver reliable power throughout its area in the winter, spring, and summer of 2026. Longer-term resource needs are the subject of resource planning, not emergency action.

In declaring the contrary, DOE relied on a 2024 long-term reliability assessment by NERC, (Exs. A-B at 2), but that assessment identified an "elevated" risk for potential capacity exceedance if an extreme weather event were to occur. Ex. J at 6 (defining "elevated risk"). Indeed, the assessment explicitly shows that there will be more than enough anticipated reserve margin every summer through 2031, and every winter through 2032:

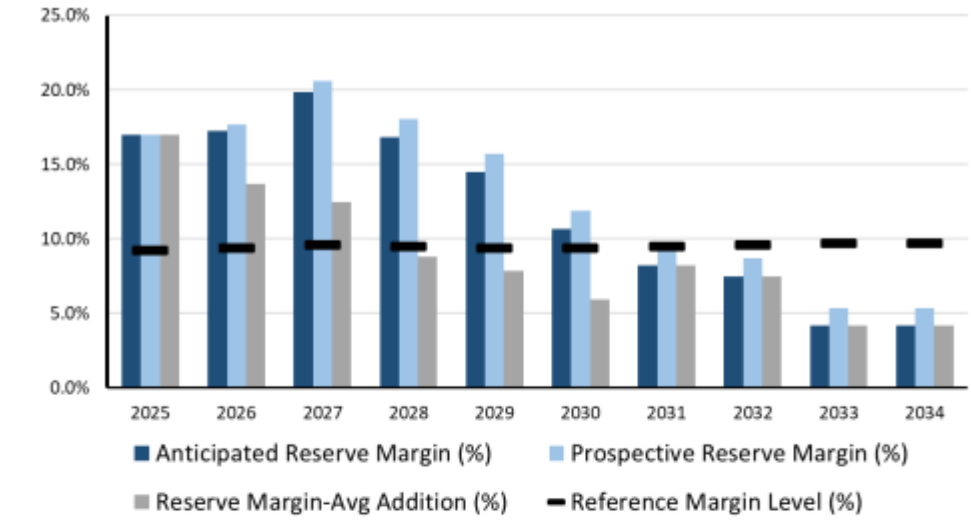


Figure 3: MISO Planning Reserve Margin–Summer

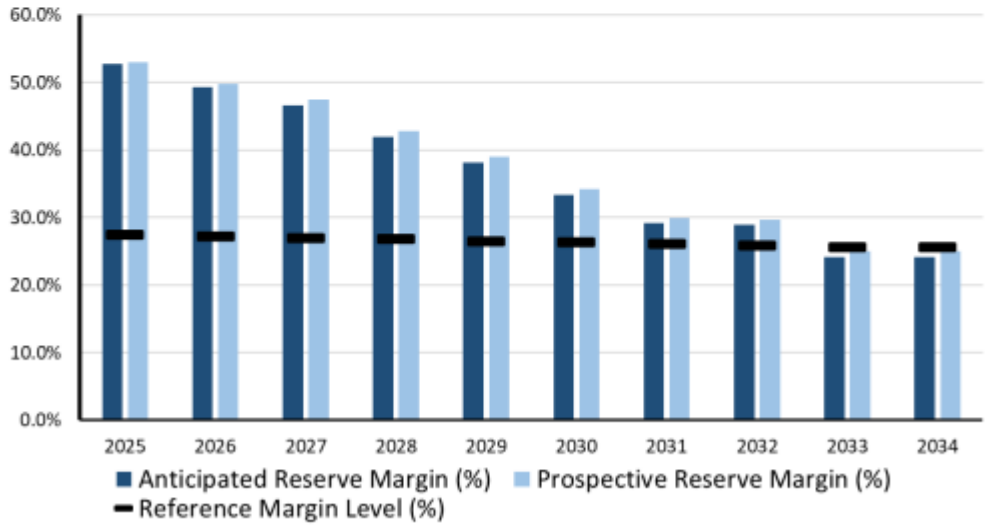


Figure 4: MISO Planning Reserve Margin–Winter

Id. at 13. Thus, the Orders make too much out of too little—the "elevated" category is hardly a call for immediate and unnecessary emergency action when there will be adequate reserve margins for years to come. As the long-term NERC assessment points out, MISO expects to have adequate capacity even factoring in the longstanding plant retirement plans that it approved. Indeed, the

LTRA Executive Summary makes a host of recommendations to ensure system reliability, not one of which is for DOE to issue emergency orders requiring old, unreliable, and expensive coal plants to continue running. Ex. J at 10. While retirements and fewer suppliers meant that MISO would have fewer firm resources and dispatchable generation, that was no cause for alarm. And nothing in the NERC assessment determined that MISO's interconnection with other RTOs would be insufficient to cover any needs that could arise.

The "elevated risk" category is not tantamount to an emergency. Even though NERC used the term "elevated risk" for the possibility that there could be an operating reserve shortfall, NERC did not apply the "high risk" category to MISO, and did not call for any retired plants to be brought back online. Moreover, the "elevated risk" designation means that MISO is projected to meet resource adequacy criteria and have energy and capacity for normal forecasted conditions and is only "at risk of supply shortfall in extreme conditions." *Id*. at 12. NERC concluded that its probabilistic assessments for MISO "indicate above-normal generator outages during extreme weather can result in unserved energy or load loss…. [w]ith uncertainty around new resource additions and existing generator retirements, MISO is also at risk of falling below RMLs within the next five years." Thus, there is no emergency. An extreme weather event could cause unserved energy or load loss. But the Orders do not identify any extreme weather event occurring during their timeframe. And even then, the NERC long-term assessment does not say that there would be inadequate methods to address such outages, such as system interconnections.

Perhaps most simply, the "elevated risk" designation is far from unusual; it has never required an emergency order before, and the grid has remained stable. MISO has been designated an "elevated" risk in every NERC Summer Reliability Assessment since NERC initiated the

practice of designating regions as "high," elevated," or "normal" risk in 2021.[31] NERC has also designated MISO as "elevated" risk in the 2021-2024 Winter Reliability Assessments since 2021. *Id*. Yet no energy shortage has occurred and DOE has never imposed an emergency declaration until now (see *infra* regarding prejudgment and pretext). And more pertinent here, the latest NERC 2025-2026 Winter Reliability Assessment actually shows MISO as "normal risk" for the winter months—the lowest category of risk designation—as opposed to "elevated risk."[32]

In fact, the evidence before DOE cuts against the Orders. This includes MISO's PRA for 2025-2026, which found sufficient capacity throughout the region. Exs. K-L. The press release announcing the PRA, (*id*.), confirms "adequate resources are available to maintain reliability during the upcoming planning year (June 2025 – May 2026)." Ex. L. And while "the 2025 auction prices reflect a tightening supply-demand balance during the summer months, there is sufficient capacity throughout the MISO footprint." *Id*. The PRA was based on NERC's standard BAL-502-RF-03 (Ex. M), requiring assessment of "one day in ten year" loss of load expectation principles. In short, the NERC standard that MISO applied to conduct the PRA demonstrated that MISO will have sufficient capacity through the summer of 2025. *Id*. MISO's PRA results show that there will be enough capacity in the summer planning year, and MISO notes that the summer auction price provides a signal to the market to add more capacity for future auction years. DOE appears to have cherry-picked certain phrases from the PRA but does not give it full consideration.

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[31] *See* NERC*, Reliability Assessments,* https://www.nerc.com/pa/RAPA/ra/Pages/default.aspx (last visited January 20, 2025).

[32] North American Electric Reliability Corporation, 2025-2026 Winter Reliability Assessment (November 2025), https://www.nerc.com/globalassets/our-work/assessments/nerc_wra_2025.pdf, at 6 fig. 1.

And beyond the lack of supporting evidence, DOE also acted arbitrarily and capriciously by ignoring well-known and readily-accessible contrary information. For example, DOE failed to consider recent comments by MISO's Independent Market Monitor to the Markets Committee of the MISO Board of Directors dispelling NERC's purported concerns. Ex. N. The Independent Market Monitor is charged with ensuring adequate supply markets for the MISO region. He criticized a separate NERC long-term reliability assessment (which has since been revised[33]) that included capacity shortfalls in 2025, noting that NERC's assessment compared the wrong numbers. In doing so, the Independent Market Monitor declared MISO capacity to be "more than adequate," and that he had "no material concerns" over MISO's resource adequacy for the upcoming summer. *Id*. Resource sufficiency for the period of the DOE Orders is reinforced by the recent finding of merely "normal risk" in MISO per NERC's 2025-2026 Winter Reliability Assessment.[34] That assessment likewise finds that MISO's anticipated and projected resources exceed the reference margin level.[35]

DOE also failed to consider MISO's history of strong performance through several extreme weather events including Winter Storms Elliot and Uri, and did not credit MISO's proven track record of engaging in a variety of mechanisms to ensure grid reliability.

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[33] NERC, *Statement of NERC's Long-term Reliability Assessment*, (June 17, 2025) https://www.nerc.com/news/Pages/Statement-on-NERC%E2%80%99s-2024-Long-Term-Reliability-Assessment.aspx?utm_source=substack&utm_medium=email.

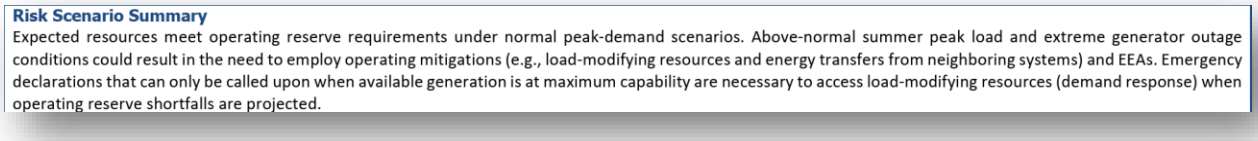
[34] North American Electric Reliability Corporation, 2025-2026 Winter Reliability Assessment (November 2025), https://www.nerc.com/globalassets/our-work/assessments/nerc_wra_2025.pdf, at 6 fig. 1.

[35] *See, id*. at 42 fig. 4. The reference margin level varies by region; it is used by system planners to quantify the amount of reserve capacity in the system above the forecasted peak demand that is needed to ensure sufficient supply to meet peak loads." *Id*. at 41. MISO's reference margin level is substantially higher than that of any other region in North America. *See, id*. at 42.

DOE further failed to acknowledge that no part of MISO is currently afflicted by any unexpected outage or extreme weather event, and the entire system is running as planned with no outages, unexpected demand, lack of fuel or water, or other such emergencies in place at the time of the Orders.

The evidence cited in the Orders does not support the conclusions that DOE draws. For example, the NERC Long Term Reliability Assessment does not identify any war, fuel shortage, or natural disaster. Ex. J. Rather, it evaluates generation resource and transmission system adequacy as well as energy sufficiency to meet projected summer peak demands and operating reserves. Id. at 42-44.

A later assessment for the summer of 2025 concluded that all areas were projected to have "adequate anticipated resources for normal summer peak load conditions." Ex. O. Indeed, the "elevated risk" designation means the probabilistic indices are low but not negligible. *Id*. at 10, Table 1. And further, the MISO-specific "dashboard" concludes that MISO's expected resources meet operating reserve requirements under normal peak-demand scenarios. At worst, operating mitigations "could" be necessary for above-normal summer peak load and extreme generator outage conditions:


Risk Scenario Summary
Expected resources meet operating reserve requirements under normal peak-demand scenarios. Above-normal summer peak load and extreme generator outage conditions could result in the need to employ operating mitigations (e.g., load-modifying resources and energy transfers from neighboring systems) and EEAs. Emergency declarations that can only be called upon when available generation is at maximum capability are necessary to access load-modifying resources (demand response) when operating reserve shortfalls are projected.

Id. at 16.

Second, the Orders describe a sequence of resource retirements without acknowledging the replacement capacity that came online (or that is/was planned to come online) to offset those

retirements. Exs.A-B. In any event, NERC's long-term analysis already factored in an assumption that included those retirements. Ex J.

Third, the Orders cite NERC's "elevated risk" determination. But the retirements of Schahfer and Culley coal operations were already known to, and approved by, MISO operators who accounted for the retirement in their robust resource planning processes (described in further detail herein). Exs. P-Q.

Indeed, the Orders acknowledge that the retirement was already factored into MISO's own supply forecasts. Exs. A-B at 2. MISO's PRA (Exs. H, L) confirm adequate margin. *Id*. In fact, for the fall 2025 timeframe, the auction results exceeded MISO's Reserve Margin Requirement by 2.6%. That means MISO entered the fall with more resources than necessary to ensure grid reliability. Ex. H at 19.

Indeed, for Schahfer, the relevant IRP confirms that NIPSCO would "continue to complete and place in service wind, solar, and solar plus storage replacement resources previously approved by the Commission for the scheduled 2025 retirement of all coal units."[36]

And as the States' Petitions for Rehearing on the three Campbell Orders explain, the "elevated risk" designation that DOE cites is relatively common and has never presented an emergency before. And nothing in the NERC assessment determined that MISO's interconnection with other RTOs would be insufficient for additional capacity if needed. Nonetheless, the Orders to the Schahfer and Culley coal units rely on the NERC long-term assessment to claim that "additional dispatch" of the coal plants is "necessary." Exs. A-B at 2. DOE drew that improper

[36] *See, e.g.*, Integrated Resource Plan, NIPSCO 2024 Summary (accessible at https://www.nipsco.com/docs/librariesprovider11/rates-and-tariffs/irp/nipsco_2024-irp.pdf).

conclusion even though the retiring Schahfer and Culley plants were not included in any of the MISO forecasts finding sufficient capacity.

Fourth, the Orders misstate the conclusions of the PRA by cherry-picking reference to capacity offset while simultaneously acknowledging its conclusion that the results "demonstrated sufficient capacity" for the planning year, which covers 2025-2026. Exs. A-B at 2; contra Ex. H at 12 ("The 2025 PRA demonstrated sufficient capacity"). Sufficient capacity, by definition, is not an emergency.

Fifth, the summer of 2025 is instructive. Even in the peak-demand timeframe of June (Ex. M) and July (Ex. N.), when actual demand reached 120 GW on June 23, MISO had more than enough offered capacity: Ex R at 25, 33; Ex. S at 24, 32. This does not include more than 7000MW in headroom available to MISO beyond the offered capacity shown.[37] The Orders do not indicate that the December 23, 2025, through March 23, 2026, timeframe is likely to come anywhere near such demand, or that there would be insufficient capacity to meet it, or that the additional available headroom would not be enough to address any such demand.

Sixth, the Order cites MISO's attributes roadmap from December 2023. Exs. A-B at 2; Ex. T. But that document is not only relatively old compared to the other information DOE cites, it does not speak to the Winter of 2026. DOE notes that it refers to the potential for risk of loss of load in the summer fand fall beginning in 2027. The document does not support the existence of any emergency during the term of the Orders. *Id*. The Orders do not explain how a Section 202(c) order directed to Winter 2026 timeframe will address any emergency in that timeframe-the issue

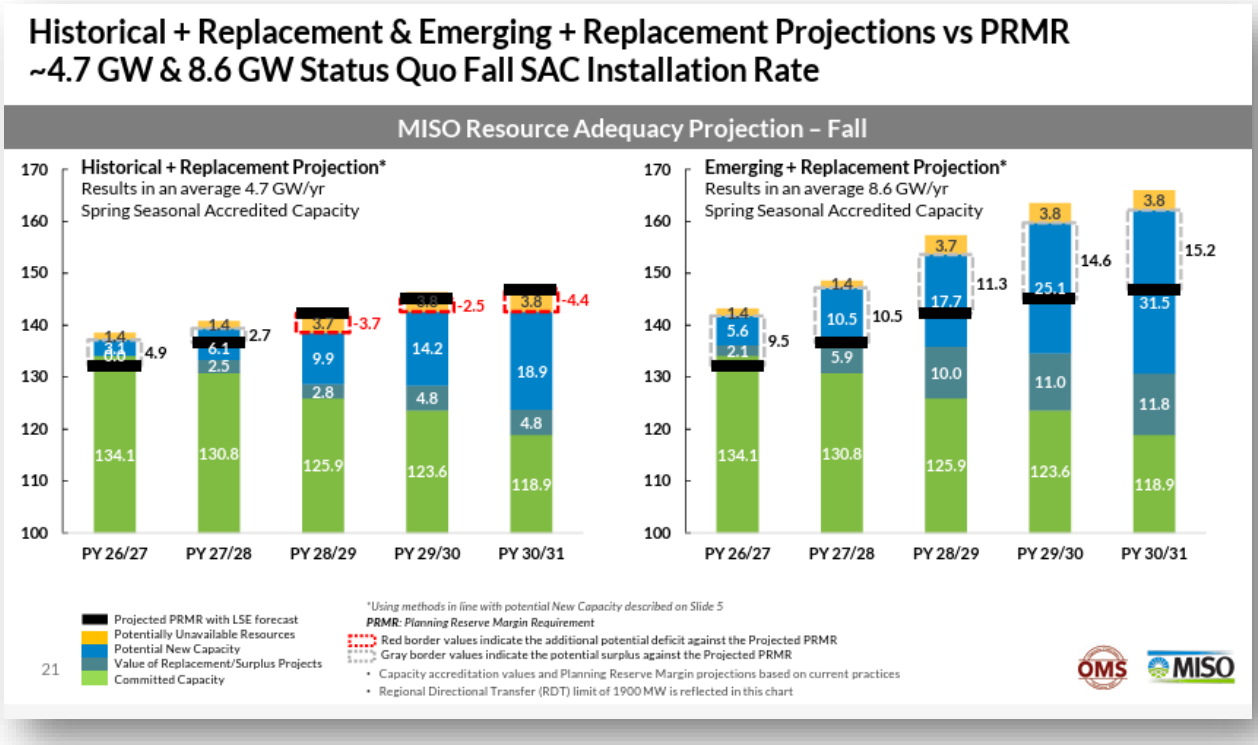
[37] *See* Public Interest Organization's Petition for Rehearing submitted to DOE on September 8, 2025, Exhibit 70 at ¶¶ 16-19.

identified is not until 2027 at the earliest. And as discussed above, the most recent NERC winter assessment, applicable during the period of the Orders, does not foresee any such emergency.

Seventh, the Orders cite MISO's Response to the Reliability Imperative, concluding that MISO purportedly has "resource reliability concerns" and quotes a passage acknowledging "risks in non-summer months" that were not historically of concern. Ex. A-B at 2. But the Orders fail to identify how generalized discussion of non-summer "concerns" and potential "risks" demonstrate any particular emergency, much less a specific one that is posed for the Winter 2026 timeframe. To the contrary, the MISO Response to the Reliability Imperative describes the risks posed by non-summer operations in the context of explaining the steps it is taking to address these risks in order to ensure adequate capacity and overall system reliability. Ex. U at 11. It specifically describes four pillars of approaches that MISO intends to deploy, (Ex. U at 12-24), and concludes with a "Roadmap" for how it will deploy its strategy. Ex. U at Appendix A-1. The Orders do not contend that MISO's approach will adequate, or that there is an emergency despite MISO's robust efforts. *Id*.; *contra* Exs. A-B.

Eighth, the Orders again discuss the 2025-2026 PRA results, which included a statement that "new capacity additions were insufficient to offset the negative impacts of decreased accreditation, suspensions/retirements and external resources." Ex. A-B at 2-3; *contra* Ex H. Again, the actual document, in its full context, confirms adequate margin for reliability. *Id*.

Ninth, the Orders cites the Organization of MISO states and MISO's joint publication of a survey dated June 6, 2025. Exs. A-B at 3. But that survey confirms a surplus through the summer of 2026, well beyond the scope of the Orders' timeframe. In fact, the survey shows a fall 2026 surplus using seasonally-accredited capacity against the planning reserve margin requirement:



Ex. V at 21. The Orders rely on the survey results to identify potential forecast deficits (which are not emergencies) in the 2027-2030 timeframe—but that is well outside the Winter 2026 timeframe in which the Orders will be in effect, and fails to account for the "Emerging + Replacement Projection" metrics throughout the document showing surpluses against the projected Planning Reserve Margin Requirement. *Id*. at 7, 9, 19-26.

Tenth, Orders further cite Executive Orders directed to building out energy capacity and supporting artificial intelligence. But the Orders do not discuss how these Executive Orders demonstrate any inadequate approach to meeting the projected needs on MISO's system, much less one that presents an emergency of any sort.

In total, none of this evidence demonstrates that there is any emergency, much less one that might occur in the December 23, 2025, to March 23, 2026, timeframe. To be sure, there are normal capacity considerations including some that pose some degree of potential risk, but not one of the

sources cited in the Orders evidence any lack of adequate planning to address those risks, much less any likelihood of a shortfall between August 20 and November 19, 2025.

Instead, the robust and comprehensive planning processes undertaken by the prime authorities—the individual states, the utilities, and MISO—have comprehensively planned for resource adequacy and system reliability during the period of the Orders and beyond.

Given all of these countervailing considerations, and the full context of the sources that DOE purports to cite, DOE did not have substantial evidence supporting its emergency determination. It did not exercise reasoned decision-making in declaring that an emergency exists. The Orders compelling the Schahfer and Culley coal units to operate is arbitrary and capricious.

The States have already documented all of these flaws in three separate requests for rehearing on DOE's equally flawed orders compelling the J.H. Campbell plant to operate (DOE Orders 202-25-3, 202-25-7, and 202-25-9). These requests are hereby incorporated and adopted herein, including their discussion of materials not cited in the Orders subject to this request. These include the comments of Jennifer Curran and the MISO independent market monitor which DOE previously relied upon but has now dropped. The States' prior submissions put DOE on notice of the flawed analysis of its prior orders. Exs. W-X.

Rather than identifying and responding to an actual emergency, both the Orders demonstrate that DOE instead started with a desired result (keeping a coal-fired plant online), and worked backwards to justify that outcome.

B. The Orders exceed DOE's authority because they are not limited to a specific inadequate power supply situation as required by Section 202(c) and 10 C.F.R. § 205.371.

DOE exceeds its authority because the Orders do not address any actual emergency or sudden occurrence needing imminent response, and because they have not identified any actual

and specific insufficient supply situation in the Winter 2026 timeframe. Thus the Orders are without authority and contrary to law.

As the statutes make clear, an actual "emergency" is a sudden occurrence requiring immediate responsive action; conversely, it is not the mere potential that an emergency might occur. 16 U.S.C. § 824a(c). And Department regulations define "emergency" to mean an unexpected inadequate supply of electric energy which may result from the unexpected outage or breakdown of facilities for the generation, transmission, or distribution of electric power. "Such events may be the result of weather conditions, acts of God, or unforeseen occurrences not reasonably within the power of the affected 'entity' to prevent." 10 C.F.R. § 205.371. Further, emergency orders must meet "a specific inadequate power supply situation," and although emergencies with extended periods of insufficient supply could qualify, the impacted entity is supposed to firm up commitments for supply "so that a continuing emergency order is not needed." *Id.*

These requirements have been demonstrated by DOE's historic use of 202(c) authority to address natural disasters and specific capacity crises. The most common reason to invoke Section 202(c) authority has been to address natural disasters like hurricanes, cold weather events, and extreme heat. *See* DOE Order Nos. 202-05-1 & -2 (Sept. 28, 2005) (Hurricane Rita); DOE Order No. 20208-1 (Sept. 14, 2008) (Hurricane Ike); DOE Order No. 202-20-1 (Aug. 27, 2020) (Hurricane Laura); DOE Order No. 202-24-1 (Oct. 9, 2024) (Hurricane Milton); DOE Order No. 202-21-1 (Feb. 14, 2021) (Winter Storm Uri); DOE Order No. 202-22-3 (Dec. 23, 2022) (Winter Storm Elliot – Texas ERCOT); DOE Order No. 202-22-4 (Dec. 24, 2022) (Winter Storm Elliot – PJM); DOE Order No. 202-20-2 (Sept. 6, 2020) (extreme heat in California); DOE Order No. 202-21-2 (responding to extreme heat, wildfires and drought in California); DOE Order Nos. 20222-1

& 2 and amendments (same). Indeed, during Winter Storm Elliot, MISO exported power to neighboring regions.[38]

Past practice further confirms the impropriety of these Orders. While DOE's emergency powers have occasionally been used to address retirements, it has done so only when requested by the operator or local government and there was a specific need demonstrated for the units to operate due to an unexpected emergency. DOE Order No. 202-05-3 (Dec. 20, 2005) (Mirant to supply Washington D.C. when transmission lines were out of service); DOE Order No. 202-17-1 at 2 (Grand River Energy to operate Unit 1 due to lighting strike to Unit 2 and delay in construction for Unit 3); DOE Order No. 202-17-2 (need to operate Yorktown to avoid imminent risk of load-shedding).

The plain text, prior regulatory interpretation, judicial precedent, and longstanding practice all confirm a limited power applicable only to sudden, imminent conditions. Context makes that all the more plain. *See Food & Drug Admin. v. Brown & Williamson Tobacco Corp*., 529 U.S. 120, 133 (2000) (The "words of a statute must be read in their context and with a view to their place in the overall statutory scheme.").

A memorandum by the Congressional Research Service, Ex. Y, confirms that DOE's use of Section 202(c) to order coal plants to remain generally available is wholly novel. Ex. S at 3 (Department engaging in "seemingly new interpretations of the emergency authority"). That novelty violates well-settled law prohibiting agencies from asserting novel, transformational, and impactful authorities that congress did not intend.

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[38] MISO, *Overview of Winter Storm Elliott December 23, Maximum Generation Event* (Jan. 17, 2023) ("*Winter Storm Elliott Overview*") at 7, https://cdn.misoenergy.org/20230117%20RSC%20Item%2005%20Winter%20Storm%20Elliott%20Preliminary%20Report627535.pdf.

The Orders impose a transformative and illegal use of section 202(c): as a means to intervene in the regulatory landscape, displacing both state law and sections 205 and 206 of the FPA, under which FERC regulates regional grid operators' resource adequacy requirements. Had Congress intended to vest such a broad power in section 202(c) it would have stated so clearly. Indeed, it defies logic that Congress would grant DOE general authority over which power plants may retire across the country—a function with profound implications for rates, state sovereignty, and a broad array of stakeholder interests—without any obligation to assess the effect on ratepayers or seek public input.

The Supreme Court has emphatically rejected statutory interpretations whereby an agency "claim[s] to discover in a long-extant statute an unheralded power representing a transformative expansion in its regulatory authority." *W. Virginia v. Env't Prot. Agency*, 597 U.S. 697, 724-25 (2022) (internal quotations omitted); *cf. Whitman v. Am. Trucking Associations*, 531 U.S. 457, 468 (2001) ("Congress . . . does not alter the fundamental details of a regulatory scheme in vague terms or ancillary provisions . . . ."). Yet what DOE issued here is exactly that "extraordinary case[]," *W. Virginia*, 597 U.S. at 721 (cleaned up): the discovery—in a 90-year-old statutory provision used seldomly and only for limited purposes—of unheralded yet broad authority to transform the regulatory environment underpinning the electricity system by commanding the amount and type of generation on the grid. All without "clear congressional authorization," *id*. at 724, and notwithstanding that such authority has been reserved to and exercised by the States and, at their election, RTOs, for decades. *Cf. Biden v. Nebraska*, 600 U.S. 477, 501 (2023) ("The question here is not whether something should be done; it is who has the

authority to do it"); *W. Virginia*, 597 U.S. at 744 (Gorsuch, J., concurring) (agency overreach "also risks intruding on powers reserved to the States").

Indeed the statutory structure of the federal power act confirms the short-term nature of emergency approaches. That is because long-term planning authority appears in an entirely different Section of the Federal Power Act – Section 215—which indicates that the emergency authority of Section 202(c) is a different authority altogether. 16 U.S.C. § 824o. Given all of the procedures attendant to resource planning, this statutory structure confirms that emergency orders are not the proper mechanism to engage in resource planning five years into the future. *See FDA v. Brown & Williamson Tobacco Corp*., 529 U.S. 120, 142 & 149 (2000); s*ee also Cal. Indep. Sys. Operator Corp. v. FERC*, 372 F.3d 395, 401–02 (D.C. Cir. 2004) (DOE's authority in one Section of the Federal Power Act "is strong evidence" that a separate Section does not confer the same authority on the agency).

Courts have also recognized Section 202(c)'s limitation to actual or imminent crises. For example, in *Richmond Power and Light v. FERC*, the D.C. Circuit noted that the statute "speaks of 'temporary' emergencies, epitomized by wartime disturbances, and is aimed at situations in which demand for electricity exceeds supply." 574 F.2d 610, 615 (D.C. Cir. 1978). And in *Otter Tail Power Co. v. Fed. Power Comm'n*., the Eighth Circuit noted that 202(c) provides authority to "react to a war or national disaster and order immediate interconnection. . . to maintain electrical service during such emergency." 429 F.2d 232, 234 (8th Cir. 1970). In *Otter Tail*, the Eighth Circuit distinguished between an emergency that is likely to occur and one that is actually

occurring, concluding that a separate provision, section 202(b)[39] applies to the former, while section 202(c) applies to the latter:

> On its face, § 202(c) enables the Commission to react to a war or national disaster and order immediate interconnection of the facilities to maintain electrical service during such emergency. . . On the other hand, § 202(b) applies to a crisis which is likely to develop in the foreseeable future but which does not necessitate immediate action on the part of the Commission.

Otter Tail Power Co., 429 F.2d at 234. In that case, a power company challenged the FPC's order issued under § 202(b) of a temporary connection between the power company and a small municipally owned power producer that was "dangerously close to eroding its firm power supply" due to the proximity between the generator load capacities and the peak load demand. *Id.* It claimed that because the ordered connection was temporary, the order could only be issued under section 202(c), and only in emergency conditions. *Id.* The court disagreed that section 202(c) only applies to temporary orders but agreed that a potential crisis in the foreseeable future was not an emergency, making it "just the type of situation to fit into a § 202(b) hearing rather than § 202(c)." *Id.* The caselaw is therefore clear—emergency orders cannot be used to address longer-term potential future risks that are properly addressed through ordinary planning approaches.

[39] Section 202(b) refers to 16 U.S.C. § 824a(b), which states "[w]henever the Commission, upon application of any State commission or of any person engaged in the transmission or sale of electric energy, and after notice to each State commission and public utility affected and after opportunity for hearing, finds such action necessary or appropriate in the public interest it may by order direct a public utility" if the utility would not face an undue burden. The DOE's authority is much more limited in these situations. Further, 42 U.S.C. § 7172(a)(1)(B) vests this power in FERC, not the Secretary.

Statutory text and structure, past practice, and caselaw are therefore all clear: for DOE to have any authority under section 202(c), the emergency must be actual and not merely a broadly asserted future risk. With no such actual or imminent emergency, the Orders are unlawful.

C. The Orders exceed DOE's authority because they requires actions not listed in Section 202(c)(1).

The Orders are unlawful because they purport to require actions not within DOE's statutory authority.

DOE's authority is limited to issuing orders that require connections or the generation, delivery, interchange, or transmission of electric energy. 16 U.S.C. § 824a(c). This authority does not cover mandating general plant availability untethered to meeting any specific need, nor does it allow for potential economic dispatch (which is not an apt solution for an actual emergency anyway—more on this in Section G below). Section 202(c)(1) does not allow for preemptive measures just in case an emergency might occur, and specifically does not allow for the Department to order availability without a specific need to be available.[40] Plus, "economic dispatch" is not equivalent to the generation of electric energy. Economic dispatch is constrained by statute to mean only the lowest-cost option under the Energy Policy Act of 2005 Section 1234(c). 42 U.S.C. §16432(b). MISO's determination of lowest-cost sources may not result in the Schahfer or Culley coal units producing *any* generation whatsoever during the Winter 2026

[40] Before these two Orders and the three Campbell orders, DOE had issued Section 202(c) emergency orders only 19 times in history. Only once, for Mirant in 2005, did it require a plant to supply as-needed additional capacity—but even then it was based on a specific application demonstrating a concrete and specific need. DOE Order No. 202-05-3 (Dec. 20, 2005). That is not the case here.

timeframe. (Or if it does, it could be as a result of the Orders rather than an external need.) Thus, the Orders are without authority and contrary to law.

D. The Orders exceed DOE's authority because they do not set hours of operation, limit hours of operation, or minimize environmental impact as required by Section 202(c)(3).

Any emergency order issued under Section 202(c) must be limited to only those hours necessary to meet the emergency. 16 U.S.C. § 824a(c)(2).

But the Orders at issue here address only the potential for an emergency, they do not identify a need for the Schahfer or Culley coal units to generate electricity to meet it. By the same token, the Orders do not establish any limited hours or other parameters for the Schahfer or Culley coal units to follow to ensure their usage is what actually meets the purported emergency, only that they be available at all times. Thus the Orders are without authority and contrary to law, and allow the Schahfer and Culley coal units to generate electricity during times there are not even "elevated risks." Allowing a coal plant to generate electricity and pollute beyond the purported emergency needs would increase the environmental impacts that, by law, the Orders must strive to minimize. 16 U.S.C. § 824a(c)(2). Thus the Orders are without authority and contrary to law.

E. The Orders exceed DOE's authority because Section 201(b)(1) reserves decisions about plant retirements to the states.

Section 201(a) of the Federal Power Act explicitly provides that federal regulation over generation and transmission is related to matters of interstate commerce and extends "only to those matters which are not subject to regulation by the States." 16 U. S. C. § 824(a). Decisions over what plants should be constructed or retired is traditionally subject to state regulation. States retain jurisdiction "over facilities used for the generation of electric energy." 16 U.S.C. § 824(b)(1). "The states are thus authorized to regulate energy production . . . and facilities used for the generation of electric energy" *Coal. for Competitive Elec., Dynergy Inc. v. Zibelman*, 906 F.3d 41, 50 (2d Cir.

2018). What facilities to build, whether they remain feasible, and utility rates are areas governed by the states. *Pac. Gas & Elec. Co. v. State Energy Res. Conservation and Dev. Comm'n*, 461 U.S. 190, 205 (1983).

The energy market is governed by longstanding principles of cooperative federalism encouraged in Section 209(b) of the Federal Power Act—which explicitly declares that the Federal Energy Regulatory Commission may consult with states "regarding the relationship between rate structures, costs, accounts, charges, practices, classifications, and regulations of public utilities subject to the jurisdiction of such State commission and of the Commission.") 16 U.S. Code § 824h(b). Indeed, FERC has embraced these cooperative federalism principles and developed long-standing consultation practices with the states, including through creation of a Joint Federal-State Task Force. Ex. T. And more recently, a Federal-State Current Issues Collaborative. Ex. U.

Section 103 of the Department of Energy Organization Act, also applicable, mandates due consideration to state retirement plans and requires, where practicable, consultation with relevant state officials. 42 U.S.C. § 7113.

States are responsible for developing and approving power generation plans, typically through public commissions like the Public Utilities Commission[41] in Minnesota, the Wisconsin Public Service Commission, and the Indiana Utility Regulatory Commission (IURC).[42] These bodies oversee the development of Integrated Resource Plans ("IRPs"), or Strategic Energy Assessments, which are the blueprints for how a utility plans to generate sufficient electric power to meet its expected demand. *E.g.*, Minn. Stat. § 216B.2422 (Minnesota's IRP statute). An IRP can

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[41] Minnesota Public Utilities Commission, *Utility Planning*, https://mn.gov/puc/activities/economic-analysis/planning/ (last visited June 23, 2025).
[42] Wis. Stat. Ann. § 196.491 (West).

consider and adopt plans with myriad inputs and considerations and impact overall electricity rates, the specific communities or areas where power plants are located, determinations of which power plants might be built or retired and the fuels that they will use, overall electric system reliability (like the likelihood of power outages and how quickly the lights come back on), and the environment.[43] Such processes can be rigorous and commissions will open a docket to publicly vet a proposed plan, receive comments, and make an informed decision that is in the best interest of the states and its ratepayers.[44] As discussed above, the planned retirements of the Schahfer and Culley units at issue were subject to such a process before the IURC.[45]

MISO, in turn, is one of the country's largest regional transmission organizations (RTOs), which were formed to develop transmission systems, trading markets, and attendant procedures.[46] MISO works collaboratively with its member states to ensure resource adequacy throughout its service area.[47] This means that it ensures there is sufficient generation capacity to meet future electricity demands, including forecasting demand growth, assessing existing generation assets, and planning for new generation resources.[48] MISO works with utilities during their development of submissions to state regulators for the IRPs that that the regulators ultimately approve. And

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[43] *Id*.
[44] Minnesota Public Utilities Commission, *Electric Integrated Resource Planning (EILRP)*, https://mn.gov/puc/activities/economic-analysis/planning/irp/ (last visited June 23, 2025).
[45] *See, e.g.*, Complaint and Request for Fast Track Processing of Northern Indiana Public Service Company LLC, FERC Docket EL26-36-000 at 7 (December 29, 2025) ("NIPSCO's 2021 Integrated Resource Plan ("IRP") included a retirement analysis to assess retirement dates for different generating units of its existing generation fleet"); *See also, e.g.*, Complaint Requesting Fast Track Processing, FERC Docket EL26-38-000 at 9 – 10 (January 5, 2026).
[46] FERC, *Energy Primer*, https://www.ferc.gov/sites/default/files/2024-01/24_Energy-Markets-Primer_0117_DIGITAL_0.pdf
[47] MISO, *System Planning*, https://www.misoenergy.org/meet-miso/about-miso/industry-foundations/grid_planning_basics/ (last visited June 23, 2025).
[48] *Id*.

MISO then accounts for the final IRPs in its planning and analyses forecasting the balance between load and capacity. MISO also operates a capacity auction where utilities and other load-serving entities can procure the necessary generation capacity to meet projected demand. This incentivizes the development and maintenance of adequate generation resources.[49] MISO works with utilities, local regulators, and other stakeholders to maintain resource adequacy, including through its annual PRA, which procures sufficient resources and allows market participants to buy and sell capacity via an auction. MISO determines the capacity requirements in its region for each season covering the June 1 to May 31 time period.[50]

The Schahfer and Culley coal units' planned retirement is subject to precisely such state regulation and MISO integration. The plan to retire the plant received intense scrutiny over years before being approved and worked into MISO's projections—all under the auspices of state law including Indiana's IRP processes, state regulatory proceedings, state judicial proceedings, and state participation in MISO. MISO also reviews planned plant retirements to ensure resource adequacy and grid reliability. Section 38.2.7 of MISO's Open Access Transmission, Energy, and Operating Reserve Markets Tariff requires an operator to provide 26 weeks of advance notice of a planned retirement. MISO then performs a Reliability Study to determine whether the retirement will pose any concern for grid reliability. [51]

Both CenterPoint and NIPSCO submitted relevant Attachment Y forms to provide notice that they planned to suspend generation at these plants. MISO approved of such retirements. Ex.

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[49] *Id*.
[50] MISO, *Resource Adequacy*, https://www.misoenergy.org/planning/resource-adequacy2/resource-adequacy/#t=10&p=0&s=FileName&sd=desc (last visited June 23, 2025).
[51] If MISO does identify a threat to grid reliability if the resource retires, the MISO tariff provides a mechanism to retain that resource until the constraint can be alleviated.

E. In making its approval, MISO determined that such retirements "would not result in violations of applicable reliability criteria." Ex. E at 9.

DOE did not adequately consult with the States, much less account for or incorporate the findings of MISO when it approved these Attachment Y submissions. The Orders are wholly silent as to any consultation with the State of Indiana in which all three coal units are located. Yet State regulators have primary jurisdiction over IRPs, siting, and cost recovery for utilities operating in their states. *Zibelman*, 906 F.3d at 50. DOE's failure to consult violates the principles behind FERC and DOT policies to involve the states in light of the statutory reservation of state authority in federal-state regulatory balance, 16 U.S.C. § 824(b)(1). It avoids 209(b) of Federal Power Act regarding federal-state collaboration and upends FERC's historic practice of seeking to develop a robust dialogue between regulators. 16 U.S. Code § 824h(b). And it flouts Section 103 of the Department of Energy Organization Act which requires consultation with relevant state officials—consultation was absolutely "practicable" here given the lack of an imminent emergency. The Orders did not give <u>any</u> consideration (much less due consideration) to Indiana's IRP in violation of law. 42 U.S.C. § 7113.

In the Orders' focus on longer-term risks, including the growth of data centers and the projections out into the 2027-2030 timeframe, DOE is improperly inserting itself into long-term resource planning, usurping a role belonging to the respective states and MISO. The DOE cannot use short-term emergency orders to serve a purpose for which DOE's emergency authority was not designed: to supplant the states' primary authority in the long-term resource planning arena, or to reject the carefully considered work that MISO puts into planning resources.

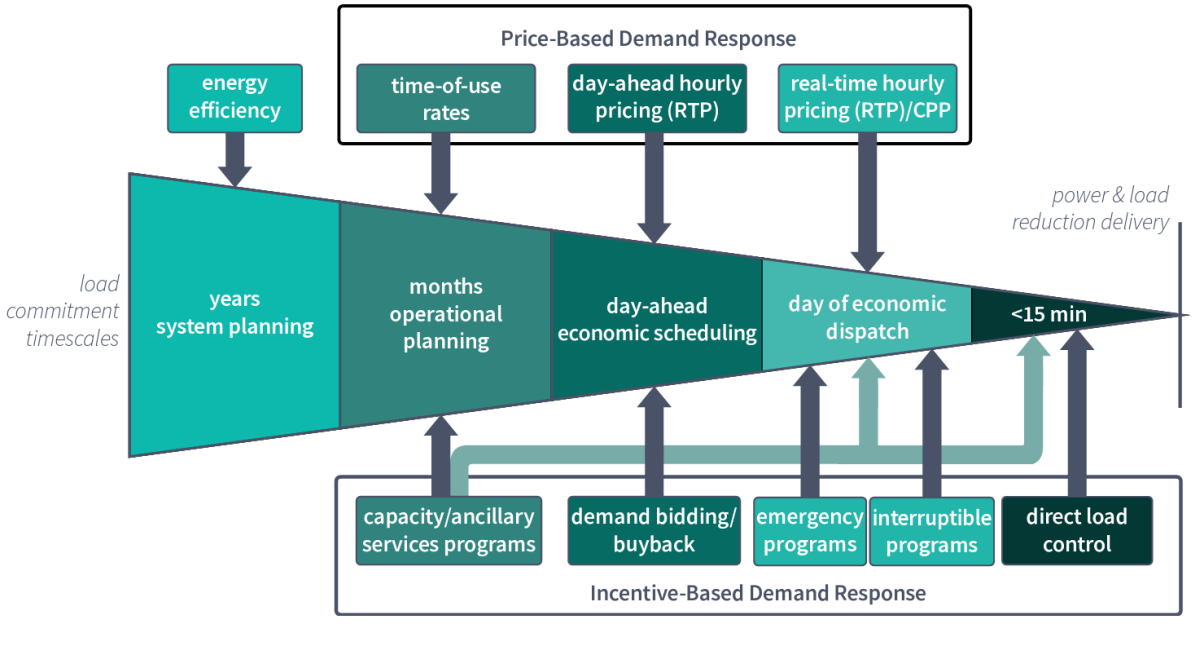
The Orders usurp the States' and MISO's primary rule in resource planning and development; it is contrary to law.

F. The Orders are unreasoned, arbitrary, and capricious because their directive for "economic dispatch" is inherently contradictory with the needs to meet an actual emergency.

Section 202(c) contemplates emergency orders that are tailored to the specific emergency—they must "best meet the emergency and serve the public interest." 16 U.S.C. § 824a(c). Even if an emergency did exist and DOE had the legal authority to issue an order, these two Orders are not rationally related to address the emergency that the Orders identify.

The Orders' specific requirement for MISO to take steps to effectuate "economic dispatch" of the Schahfer and Culley coal units undermines their determination that an emergency exists and cannot "best meet" the purported emergency. Economic dispatch is a term of art for the procedure by which MISO selects generators to add electric energy to the grid. It is designed to ensure that the electricity generated matches the demand in its service area in the most cost-effective way. "Economic dispatch," by definition, is awarded to the lowest-cost option (all else being equal). Ex. Z. That is because much of the base load planning takes place years or months ahead of time and is comprised of the must-run units. Additional capacity is then called upon in the day-ahead or day-of markets for which additional generation is required:

Figure 2-2: Demand Response and Energy Efficiency in Electric System Planning and Operations



Source: U.S. Department of Energy[82]

Ex. Z at 43. Most of the generation available to meet load in real time for economic dispatch is identified and scheduled the day before, based upon the day-ahead load forecast used in the security-constrained unit commitment process. Ex. AA at 6-7, 13, 51. As recently as 2021, the vast majority of peaking plants operated on natural gas and oil which can be dispatched in much shorter order; only 3.3 percent of all peakers nationwide burned coal. See Ex. BB at 2.

Taken together, economic dispatch considers a variety of factors including (1) the cost of generation, (2) the standby condition of the generator, (3) ramp-up time to provide the needed capacity, and (4) whether electric energy can be transmitted to the area of need.

The Orders' proposed solution for "economic dispatch" of the Schahfer and Culley coal units is thus inherently incompatible with addressing emergency operation (likely because there is no emergency in the first place). In a true emergency, even uneconomic plants receive cost-of-

service payments when they are required to run to alleviate the emergency condition. The RTO does not require the emergency generator to bid into the market and *then* make a determination about whether it will be selected to run as with economic dispatch. Rather, the emergency generator becomes a "price taker" using MISO's "must run" classification. Thus, the Orders' directive to use "economic dispatch" is irrational: actual emergencies are not addressed with economic dispatch, and economic dispatch is a necessarily ineffective method to address an actual emergency.[52]

Moreover, the Orders' requirement that the Schahfer and Culley coal units be "available to operate" does not accord with 202(c)(1)'s requirement that DOE select the temporary measure that will "best meet the emergency and serve the public interest." Section 202(c)(1)'s use of the term "best" shows that the Commission cannot require temporary power generation from the Schahfer and Culley coal units when better means are available to meet the alleged emergency and serve the public interest. *Entergy Corp. v. Riverkeeper, Inc.*, 556 U.S. 208, 218 (2009) ("Best" means what is "most advantageous." (Quoting Webster's New International Dictionary 258 (2d ed.1953))). DOE's decision to require the plants to be available disregarded its obligation to consider alternatives and select the best one.

Although DOE need not consider every conceivable alternative, it must consider those that are obvious and viable. *See Dep't of Homeland Sec. v. Regents of the Univ. of Calif.*, 591 U.S. 1, 30 (2020); *Motor Vehicle Manufs. Ass'n of the U.S. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 51 (1983); *Nat'l Shooting Sports Found., Inc. v. Jones*, 716 F.3d 200, 215 (D.C. Cir. 2013).

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[52] Campbell's situation illustrates this inefficiency. Coal is an expensive fuel type in our current energy mix. The inefficiency of running a coal plant makes it uneconomic in general, which is one of the reasons why this specific Campbell plant was slated for retirement. *See In re Application of Consumers Energy*, No. U-21090, 2022 WL 2915368, at *73.

Intervenors and the public may also introduce information that requires the Department to evaluate alternatives and reconsider its decision to impose or maintain a requirement. *See, e.g.*, *Chamber of Com. of the U.S. v. Secs. & Exch. Comm'n*, 412 F.3d 133, 144 (D.C. Cir. 2005) (evaluating agency failure to consider alternative raised by dissenting Commissioners and introduced by commenters); *cf.* 10 C.F.R. § 205.370 (stating ability to cancel, modify, or otherwise change an order). Indeed, DOE's regulations specify information it shall consider when deciding to issue an order under section 202(c). 10 C.F.R. § 205.373. The specified information includes "conservation or load reduction actions," "efforts . . . to obtain additional power through voluntary means," and "available imports, demand response, and identified behind-the-meter generation resources selected to minimize an increase in emissions." *Id*. § 205.373(g)–(h); Ex. CC at 4 (DOE Order No. 202-22-4). DOE has not explained why ordering the Schahfer and Culley coal units to remain "available" meets any of these criteria, especially in light of alternatives such as power pooling and utility coordination.

Even if there were an emergency, DOE has not explained why its Orders "best" meets the emergency. That is because they do not. Again, the Orders allege only that the Schahfer and Culley coal units should remain available because a need for additional capacity *might* arise in the future (and even then, most likely years from now, not in the Winter 2026 timeframe). Given the speculative nature of the alleged emergency, it is incorrect as a matter of fact that ordering the Schahfer and Culley coal units to remain available is the best means of addressing it. DOE's failure to consider alternatives other than the inefficient and incapable Schahfer and Culley coal units does not meet section 202(c) requirement for DOE to use its judgment to choose the best temporary source of emergency energy.

First, if an emergency need occurs in the day-of or real-time markets, the Schahfer and Culley coal units will not be able to spool up in time to meet that need. That is because it takes hours or days for coal plants like Schahfer and Culley coal units to reach peak load.[53]

Second, even if there were adequate notice for the Schahfer and Culley coal units to deliver energy in an emergency, their age and unreliability make them a poor choice to rely on for emergency services.[54] Their age and need for repair/maintenance were key among the reasons they were slated for retirement.

Third, even if there were adequate transmission and lead time, the Schahfer and Culley coal units use an expensive fuel source, which means that their bid to provide electricity would be higher than other lower-cost dispatchable alternatives (natural gas, storage, or renewables), which would prevent it from being selected as the most economic resource to meet the need. The Schahfer units are together responsible for a maximum of 847MW of nameplate generation (when they are operational and capable of achieving peak load).[55] Schahfer Unit 18 is not even available to run during the timeframe of the Orders; and Culley Unit 2 is responsible for only 100 MW. *Id*. That represents a small fraction of the remaining margin that MISO had available in the summer of 2025 and demonstrates that these coal plants are not an efficient means of meeting an emergency energy demand.

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[53] *See* Forms EIA-860 and EIA923, *available at* https://www.eia.gov/electricity/data/eia860/; https://www.eia.gov/electricity/data/eia923/.
[54] *See* Public Interest Organization's Petition for Rehearing submitted to DOE on September 8, 2025, Exhibits 103-104.
[55] *Sourced from* https://campd.epa.gov/data/custom-data-download

Finally, if, for example, there were a need for additional electricity in North Dakota in March of 2026, it is unlikely that there would be sufficient transmission infrastructure across the Great Lakes to deliver electricity from the Schahfer and Culley coal units to meet that need.

Rather than order the Schahfer and Culley coal units to remain available, DOE was required to consider obvious alternatives that MISO has available and uses as part of its role as a regional transmission grid operator. The Department has long recognized that power pools and utility coordination "are a basic element in resolving electric energy shortages." *Emergency Interconnection of Elec. Facilities and the Transfer of Elec. to Alleviate an Emergency Shortage of Elec. Power,* 46 Fed. Reg. 39,984, 39,985–86 (Aug. 6, 1981). And recent history bears out the important role of transmission connectivity along with imports and exports.[56]. The fact that DOE has intruded on MISO's role of planning for and meeting fluctuations in demand without considering these viable and obvious alternatives shows that it did not comply with section 202(c).

Section 202(c)(2) requires the emergency measures to be tailored the actual need; yet here, the Orders improperly impose measures that are not tailored to anything. All the while, the Orders impose costs on the States to bring the Schahfer and Culley coal units to operational status beyond their planned retirements, add potentially expensive generation to the mix if the Schahfer and Culley coal units were to run in the Winter 2026 timeframe, and generate harmful pollution at the

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[56] *See, e.g.*, Public Interest Organization's Petition for Rehearing submitted to DOE on September 8, 2025, Exhibit 43 at § III.A.3.b (Winter Storm Elliott System Operations Inquiry) ("Despite tightening conditions on the MISO system . . . MISO maintained steadily increasing exports to TVA throughout the day."); Exhibit 44 at 43 (PJM Elliott Report) (describing PJM exports of between 8 and 11 GW to TVA and other neighboring regions), 83–84 (describing PJM power exports to MISO and graphically depicting those exports over time); Exhibit 36 at 6 (MISO Elliott Max. Gen. Event Overview) ("MISO consistently exported power to southern neighbors with a maximum value of nearly 5 GW."); *and* Exhibit 7 at 1 (DOE Order No. 202-02-1) (providing for usage of interregional transmission).

same time. Thus, the Orders requiring the Schahfer and Culley coal units to remain available and for MISO to take steps to use the Schahfer and Culley coal units for economic dispatch is irrational and arbitrary where the Schahfer and Culley coal units are unlikely to be a good candidate to serve either economic dispatch or emergency-need functions—especially where it is unclear what need they is supposed to meet in the first place.

Therefore, the Orders are not rationally related to meeting the need of the purported emergency that they identify.

G. The purported emergency is pretext for a prejudged outcome.

The two Orders are not a good faith effort to carry out DOE's duties under the Federal Power Act. Rather, the materials supporting the Orders demonstrate a pretextual effort to further the administration's policy support for fossil fuels, and in particular coal electricity generation.

Where the conduct of the agency shows an "unalterably closed mind on matters critical to the disposition of th[is] proceeding," it requires either disqualification of the administrator or withdrawal of the proposal. *Ass'n of Nat'l Advertisers v. FTC*, 627 F.2d 1151, 1170 (D.C. Cir. 1979); *Nehemiah Corp. of Am. v. Jackson*, 546 F.Supp. 2d 830, 847 (E.D. Cal. 2008) (describing the appropriate remedies when an agency official has prejudged the outcome of a particular matter). A preexisting internal directive to reach a particular result is strong evidence that the official is not "free, both in theory and in reality, to change his mind" in the agency proceedings. *Nat'l Advertisers*, 627 F.2d at 1172; *see Int'l Snowmobile Mfrs. Ass'n v. Norton*, 340 F. Supp. 2d 1249, 1260 (D. Wyo. 2004).

The Orders cite to a bevy of Executive Orders declaring an energy emergency. Even if these Executive Orders are taken at face value, they are incoherent with the President's other actions to reduce capacity of new energy generation, such as from ongoing and nearly-completed

wind projects. *Temporary Withdrawal of All Areas on the Outer Continental Shelf From Offshore Wind Leasing and Review of the Federal Government's Leasing and Permitting Practices for Wind Projects* 90 Fed. Reg. 8,363 (Jan. 20, 2025); *Ending Market Distorting Subsidies for Unreliable, Foreign-Controlled Energy Sources*, 90 Fed. Reg. 30,821 (Jul. 10, 2025).

Further, the administration has declared a preference for coal energy. *Executive Order 14261: Reinvigorating America's Beautiful Clean Coal Industry and Amending Executive Order 14241*, 90 Fed. Reg. 15,517 (Apr. 8, 2025). The express mandate of Executive Order 14261 declared it to be the national policy "to support the domestic coal industry by removing Federal regulatory barriers that undermine coal production, encouraging the utilization of coal to meet growing domestic energy demands, increasing American coal exports, and ensuring that Federal policy does not discriminate against coal production or coal-fired electricity generation."

But this was not a simple policy preference—the administration had already predetermined that it would resort to emergency authority to reopen or forestall closure of coal plants before it ever issued these Orders. On April 8, 2025, President Trump gave remarks during the signing ceremony for Executive Order 14261. In those remarks, he noted that the administration would take action to reopen coal plants.[57] Also on April 8, 2025, the Department of Energy announced several initiatives directed to increasing coal production.[58]

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[57] https://www.presidency.ucsb.edu/documents/remarks-domestic-coal-production ("And all those plants that have been closed are going to be opened if they're modern enough." And "From now on, we'll ensure that our Nation's critically needed coal plants, as an example, remain online and fully operational. They're always going to be operational.")

[58] https://www.energy.gov/articles/energy-department-acts-unleash-american-coal-strengthening-coal-technology-and-securing

During a Bloomberg TV interview in February 2025, Secretary Wright declared that the United States should stop the closure of coal power plants, and asserted that DOE had the authority to do so.[59]

On July 7, 2025, Secretary Wright was quoted as saying, "I think our biggest impact by far is going to be — there are like 40 coal plants that are supposed to close this year — and our biggest impact is going to be to stop the closure of most of those."[60]

On July 11, 2025, the DOE posted a video Secretary Wright to the department's social media accounts with the chyron, "BIG BEAUTIFUL CLEAN COAL. This is the largest source of global electricity and third largest source of electricity in the U.S."[61]

The DOE's social media feeds are full of clips from Secretary Wright media appearances extoling coal plants, promising to increase the use of coal for energy production, and asserting that DOE had the authority to forestall closures.

The administration, and DOE in particular, engaged in prejudgment of the Orders. Knowing that it needed to effectuate the administration's policy preference to keep coal plants open, DOE worked backwards from that preferred result and justified it using post-hoc rationalizations. Secretary Wright demonstrated an "unalterably closed mind on matters critical to the disposition" of the use of emergency authority, requiring the Orders to be set aside. *Nat'l Advertisers*, 627 F.2d at 1170; *Nehemiah Corp.*, 546 F.Supp. 2d at 847.

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[59] https://www.bloomberg.com/news/articles/2025-02-11/us-should-stop-closure-of-coal-fired-power-plants-wright-says.
[60] https://www.wvnews.com/statejournal/news/top_story/energy-secretary-chris-wright-future-of-u-s-coal-is-long-and-bright/article_4ffcdad0-9030-4e6f-8ca7-0816e1786cbc.html
[61] *E.g.*, https://www.facebook.com/energy/videos/big-beautiful-clean-coal-this-is-the-largest-source-of-global-electricity-and-th/1468968367585884/.

CONCLUSION

For all of the foregoing reasons, the Department should rescind the Orders directing Schahfer and Culley coal units to operate.

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UNITED STATES DEPARTMENT OF ENERGY

Midcontinent Independent System Operator	Order Nos. 202-26-19 & 202-26-20

MOTION TO INTERVENE AND PETITION FOR REHEARING OF THE STATES OF MINNESOTA, ILLINOIS, AND WISCONSIN AND THE PEOPLE OF THE STATE OF MICHIGAN

Pursuant to section 202(c) of the Federal Power Act, 16 U.S.C. §§ 824a(c), 825l, the States of Minnesota, Illinois, Wisconsin, and the People of the State of Michigan ("the States") move to intervene and apply for rehearing of the Department of Energy's ("DOE") March 23, 2026, Order No. 202-26-19 (Ex. A)[1] and March 23, 2026, Order No. 202-26-20 (Ex. B) (together, "Orders"), directing the Midcontinent Independent System Operator ("MISO"), Northern Indiana Public Services Company ("NIPSCO"), and CenterPoint Energy to take all measures necessary to ensure that the coal-burning Schahfer Plant ("Schahfer") in Wheatfield, Indiana and coal-burning Unit 2 of the F.B. Culley Generating Station ("Culley 2") in Warrick County, Indiana are "available to operate" and "to take every step to employ economic dispatch of [Schahfer and Culley 2] to minimize cost to ratepayers." The Orders are in effect from March 24, 2026, until June 21, 2026.[2] The Orders are the second round of directives requiring MISO to take the same actions for the same facilities based on the same alleged statutory authority and factual circumstances.

The States have an interest in and are aggrieved by the Orders. *FDA v. R.J. Reynolds Vapor*

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[1] All Exhibits are lettered and attached.

[2] This petition is being submitted to DOE's AskCR <askcr@hq.doe.gov> account as DOE instructs.

Co., 606 U.S. 226, 232–36 (2025) (defining an "adversely affected or aggrieved" party within the APA as "anyone even 'arguably within the zone of interests to be protected or regulated by the statute . . . in question.'" (quoting *Ass'n of Data Processing Svc. Orgs. v. Camp*, 397 U. S. 150, 153 (1970))).

The Orders continue the pattern established by DOE Orders 202-25-12 and 202-25-13 ("Prior Schahfer and Culley 2 Orders"), which also directed MISO, NIPSCO and CenterPoint Energy to keep Schahfer and Culley 2 available to provide economic dispatch from their planned retirement dates of December 31, 2025, through March 23, 2026. These Orders follow a long line of executive emergency power overreach, including numerous orders directing the J.H. Campbell Plant to remain similarly "available to operate" where the States have also requested rehearing and judicial review. *See* Order Nos. 202-25-3, 202-25-7, 202-25-9, & 202-26-16.

Multiple undersigned States requested rehearing of the Prior Schahfer and Culley 2 Orders and described the applicable facts, with record support, in those challenges. Ex. C (nested exhibits omitted). The Orders here are almost identical to the Prior Schahfer and Culley 2 Orders. Because the legal and factual issues here directly overlap and repeat the same matters previously raised, the States hereby incorporate by reference the petitions for rehearing of the Prior Schahfer and Culley 2 Orders, including all applicable arguments, exhibits, and other referenced materials, and assert them as grounds for rehearing of the Orders here.

The Orders will adversely affect the undersigned States in the same ways the Prior Schahfer and Culley 2 Orders harmed the States challenging those Orders, but the current Orders increase

those harms through ongoing, cumulative emissions and related impacts. The negative effects on the States were described in the prior challenges and are hereby incorporated by reference.[3]

The Orders compound the errors of the Prior Schahfer and Culley 2 Orders for all of the reasons set forth in the States' Petitions for Rehearing filed January 22, 2026. As with the Prior Schahfer and Culley 2 Orders, the Orders here should be rescinded because they lack reasoned decisionmaking, exceed DOE's authority, are not rationally tailored to meet the purported emergency, and demonstrated impermissible prejudgment of the relevant issues.

In addition to the grounds laid out in the requests for rehearing on the Prior Schahfer and Culley 2 Orders, NIPSCO's parent company NiSource filed its most recent 10-K report with the Securities and Exchange Commission on February 11, 2026. Ex. D. NiSource reported:

> Although we had previously intended to retire them by the end of 2025, the two coal units at R.M. Schahfer Generating Station are currently subject to a federal directive to remain open. These units are being replaced with a diverse, flexible, and scalable mix of incremental resources, including short-term contracted capacity resources, expanded demand side management programs, wind, solar, battery energy storage, and new natural gas peaking resources . . . . U.S. federal policy actions, **such as additional federal directives preventing the retirement of these or other assets and the duration of such directives**, could create uncertainty around the timing and availability of key input materials necessary to develop and place our electric generation projects in service.
>
> We expect renewable generation, battery energy storage and natural gas generation to be the primary ways in which we will meet our electric generation capacity and reliability obligations to the MISO market and reliably serve our customers when we retire our coal generation capacity . . . . An inability to secure and deliver on electric generation projects has negatively impacted, and could in the future negatively impact, our generation transition timeline and could negatively impact our achievement of decarbonization goals and reputation. **Our electric generation strategy may require additional investment to meet our MISO obligations and**

[3] The harms include economic harm to ratepayers in the States who are saddled with the increased costs associated with operating the inefficient, coal-burning Campbell Plant, the environmental harms of operating the coal plant, and the harm caused by usurping the States' role in planning resource adequacy and generation.

> **may require significant future capital expenditures, operating costs and charges** to earnings that may negatively impact our financial position, financial results and cash flows.

Id. at 22 (emphasis added). NIPSCO's SEC filing confirms that DOE's exercise of emergency authority to wade into the waters of long-term resource planning is hindering regional suppliers' ability to efficiently participate in the generation market.

CenterPoint Energy filed their most recent 10-K reports with the Securities and Exchange Commission on February 19, 2026. Ex. E. CenterPoint Energy reported:

> While Indiana Electric's 2025 IRP (similar to previous IRPs) preferred portfolios included the retirement of F.B. Culley Unit 2, a coal-fired generation unit, by the end of 2025, the U.S. Department of Energy issued an emergency 202(c) order in December 2025 directing Indiana Electric to continue operating the unit through March 23, 2026. Indiana Electric has filed a complaint with the FERC to request creation of a cost recovery/cost allocation mechanism. If created, a separate filing will be made at a later date with the FERC to seek recovery of all costs incurred to comply with the U.S. Department of Energy's emergency 202(c) order. Indiana Electric has also filed an application with the IURC in Cause No. 46350 to recover any compliance costs associated with the emergency 202(c) order that are not recovered through the FERC proceedings.

Id. at 72. The additional costs NIPSCO and CenterPoint Energy describe in their SEC filings have already come to pass in other cases. Consumers Energy, the operator of the J.H. Campbell Plant in Michigan has asserted a $135 million "net financial impact" for the continued operation of the plant to comply with 202(c) orders from May through December of 2025. Ex. F at 117–118. And Consumers Energy is already seeking to recover a portion of those costs from MISO ratepayers.[4] Here too NIPSCO filed a complaint at FERC seeking a modification of the MISO Tariff to establish a mechanism for recovery and allocation of the cost to comply with the federal emergency orders. Ex. D at 97. The real-world consequences of these types of orders show that requiring coal plants

[4] FERC Docket ER26-1138.

to remain available to operate when no emergency exists is incredibly inefficient, and they confirm that continued operation cannot "minimize the cost to ratepayers" as the Orders require. Ex. A at 8–9; Ex. B at 8–9.

Tellingly, CenterPoint Energy itself asked DOE not to issue its most recent Order as to Culley 2. In a letter dated February 17, 2026, CenterPoint Energy made clear that the unit, which it described as "inefficient and increasingly unreliable," was not necessary for reliability purposes, asserting that "current industry data shows sufficient capacity without Unit 2." Ex. G at 1. It further noted that "extending the life of Unit 2 is neither practical nor financially responsible . . . ." *Id.* at 2. CenterPoint Energy thus requested that DOE "abstain from issuing subsequent 202 Orders for Unit 2." *Id.* DOE should listen to CenterPoint Energy and rescind or vacate its March 23, 2026, Orders.

Rescinding or vacating the Orders would be a step toward normalcy. As noted in the request for rehearing of the Prior Schahfer and Culley 2 Orders, DOE's use of section 202(c) to require coal plants to remain generally available is novel. Ex. C at 35–36. Recent scholarship confirms that the executive branch has a long history of relying on experts to regulate the power grid, which it has abandoned in its attempt to take over long-term planning through emergency orders like the ones at issue here. Ex. H. DOE's exercise of emergency authority to require outdated energy sources to operate is not only novel, it relies on fundamental misunderstandings of what constitutes an emergency and uses that misunderstanding to saddle ratepayers with the cost of inefficient energy production. *Id.* at 25.

The latest Schahfer and Culley 2 Orders misapprehend NERC's 2025 Long-Term Reliability Assessment (LTRA) to reach their findings. Ex. A at 4; Ex. B at 4. As a starting point, the LTRA categorizes MISO as "normal" risk—the lowest risk designation—for 2026, and only

"elevated" risk in 2027.[5] Ex. I. Further, the Order's description of the LTRA's long-term MISO forecasts omits reference to the large amounts of resources planned to be added in MISO pursuant to the "recently approved Expedited Resource Addition Study (ERAS) process" that "is expected to result in additional resources in the MISO system beginning in 2028 that are not included in the model for the 2025 LTRA." *Id.* at 8. The assessment further provides the following context and explanation as to how it considers those resources in the context of its other evaluations:

> The timing of FERC's approval of MISO's ERAS process in July meant that the generator additions that MISO plans as part of that process were not included in the resource adequacy modeling for the 2025 LTRA. ERAS is already expected to result in considerable new resource additions to the MISO system in the near term. The additional summer on-peak capacity from ERAS is expected to grow to over 20 GW by summer 2030. These expedited resource additions are expected to reduce the shortfall risk identified in this year's ProbA. Furthermore, the timing of the ERAS additions would mitigate an identified winter ARM shortfall if the approximately 8.6 GW of winter on-peak capacity anticipated by 2028–29 reaches operation as projected. The latest ERAS projects, along with current load forecasts and resource projections as of July 2026, will be included in the input data for the 2026 LTRA . . . .

Id. at 16.

The LTRA likewise concludes that "if ERAS projects come in as currently planned, the projected reserve margin shortfall would be eliminated." *Id.* at 15. Thus, not only does the Order omit the finding of merely "normal" risk during the period of the Order—which in itself rebuts any "emergency" designation[6]—the Order arbitrarily ignores key evidence from the LTRA contradicting the Department's assertions as to long-term planning.

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[5] NERC's "elevated risk" designation in no way signifies an emergency condition, falls below the highest risk designation of "high risk," and is far from unusual. This point was addressed at length in the challenge to the Prior Schahfer and Culley 2 Orders. Ex. C. at 25–26.

[6] Even without the planned ERAS resources, the LTRA estimates only that MISO would "fall below reserve margin targets to become a high-risk area beginning Winter 2028" (the end of 2028). *Id*. This would not be a sudden or unexpected emergency during the period of the Orders.

Finally, although the Orders purport to rely on the occurrence of Winter Storm Fern to justify a need for increased power generation, the Orders do not identify any emergency during the time period governed by the Orders, between March 24, 2026 and June 21, 2026. Further, to the extent DOE attempts to rely on the events of Fern to support its Orders, the Orders fail to identify any actual shortfalls, brownouts, or blackouts during Winter Storm Fern that would have required the specific additional capacity from Schahfer or Culley 2 versus other more cost-effective and less-polluting alternatives. Thus, DOE's reliance on Winter Storm Fern does not identify any particular need for which operating coal-burning units at Schahfer or Culley 2 would be an appropriate or even reasonable response, much less one that "best-meets" the purported emergency. To the contrary, forcing inefficient and outdated coal plants to remain online does not "best-meet" any purported emergency because of their slow response time, lack of reliability and high cost. Ex. C at 48–49.

DOE is already in possession of the exhibits the States submitted in support of their petitions for rehearing of the Prior Schahfer and Culley 2 Orders. The States are not resubmitting those same documents since they are incorporated by reference into the record for this petition. If DOE needs additional copies of any documents, please contact any of the signatories to this request.

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UNITED STATES DEPARTMENT OF ENERGY

Midcontinent Independent System Operator	Order Nos. 202-26-29 & 202-26-30

MOTION TO INTERVENE AND PETITION FOR REHEARING OF THE STATES OF MINNESOTA, ILLINOIS, AND WISCONSIN AND THE PEOPLE OF THE STATE OF MICHIGAN

Pursuant to section 202(c) of the Federal Power Act, 16 U.S.C. §§ 824a(c), 825l, the States of Minnesota, Illinois, Wisconsin, and the People of the State of Michigan ("the States") move to intervene and apply for rehearing of the Department of Energy's ("DOE") June 18, 2026, Order No. 202-26-29 (Ex. A)[1] and June 18, 2026, Order No. 202-26-30 (Ex. B) (together, "Orders"), directing the Midcontinent Independent System Operator ("MISO"), Northern Indiana Public Services Company ("NIPSCO"), and CenterPoint Energy to take all measures necessary to ensure that the coal-burning Schahfer Plant ("Schahfer") in Wheatfield, Indiana and coal-burning Unit 2 of the F.B. Culley Generating Station ("Culley 2") in Warrick County, Indiana are "available to operate" and "to take every step to employ economic dispatch of [Schahfer and Culley 2] to minimize cost to ratepayers." The Orders are in effect from June 22, 2026, until September 19, 2026.[2] The Orders are the third round of directives requiring MISO to take the same actions for the same facilities based on the same alleged statutory authority and factual circumstances.

The States have an interest in and are aggrieved by the Orders. *FDA v. R.J. Reynolds Vapor*

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[1] All Exhibits are lettered and attached.

[2] This petition is being submitted to DOE's AskCR <askcr@hq.doe.gov> account as DOE instructs.

Co., 606 U.S. 226, 232–36 (2025) (defining an "adversely affected or aggrieved" party within the APA as "anyone even 'arguably within the zone of interests to be protected or regulated by the statute . . . in question.'" (quoting *Ass'n of Data Processing Svc. Orgs. v. Camp*, 397 U. S. 150, 153 (1970))).

The Orders continue the pattern established by DOE Orders 202-25-12, 202-25-13, 202-26-19, and 202-26-20 ("Prior Schahfer and Culley 2 Orders"), which also directed MISO, NIPSCO and CenterPoint Energy to keep Schahfer and Culley 2 available to provide economic dispatch from their planned retirement dates of December 31, 2025, through June 21, 2026. These Orders follow a long line of executive emergency power overreach, including numerous orders directing the J.H. Campbell Plant to remain similarly "available to operate" where the States have also requested rehearing and judicial review. *See* Order Nos. 202-25-3, 202-25-7, 202-25-9, & 202-26-16.

Multiple undersigned States requested rehearing of the Prior Schahfer and Culley 2 Orders and described the applicable facts, with record support, in those challenges. Exs. C & D (nested exhibits omitted). The Orders here are almost identical to the Prior Schahfer and Culley 2 Orders. Because the legal and factual issues here directly overlap and repeat the same matters previously raised, the States hereby incorporate by reference the petitions for rehearing of the Prior Schahfer and Culley 2 Orders, including all applicable arguments, exhibits, and other referenced materials, and assert them as grounds for rehearing of the Orders here.

The Orders will adversely affect the undersigned States in the same ways the Prior Schahfer and Culley 2 Orders harmed the States challenging those Orders, but the current Orders increase

those harms through ongoing, cumulative emissions and related impacts. [3]The negative effects on the States were described in the prior challenges and are hereby incorporated by reference.[4]

The Orders compound the errors of the Prior Schahfer and Culley 2 Orders for all of the reasons set forth in the States' Petitions for Rehearing filed January 22, 2026 and April 22, 2026. As with the Prior Schahfer and Culley 2 Orders, the Orders here should be rescinded because they lack reasoned decisionmaking, exceed DOE's authority, are not rationally tailored to meet the purported emergency, and demonstrated impermissible prejudgment of the relevant issues.

The latest Schahfer and Culley 2 Orders misapprehend NERC's 2025 Long-Term Reliability Assessment (LTRA) to reach their findings. Ex. A at 5; Ex. B at 5. As a starting point, the LTRA categorizes MISO as "normal" risk—the lowest risk designation—for 2026, and only "elevated" risk in 2027.[5] Ex. E. Further, the Order's description of the LTRA's long-term MISO

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[3] In February, the Northern Indiana Public Service Company (NIPSC) sent a letter to NIPSCO detailing the harms from coal combustion residuals caused by continuing to run the Schahfer Plant in an emergency capacity. NIPSC, *Letter to NIPSCO*, (Feb. 13, 2026) *available at* https://www.nipsco.com/docs/librariesprovider11/rates-and-tariffs/ccr/r.m.-schahfer/r.m.-schahfer-generating-station-closure-and-post-closure-care/2026-r-m-schahfer-generating-station-no-alternative-disposal.pdf?sfvrsn=83f1f751_3.

[4] The harms include economic harm to ratepayers in the States who are saddled with the increased costs associated with operating the inefficient coal plants, the environmental harms of operating the coal plants, and the harm caused by usurping the States' role in planning resource adequacy and generation. The extraordinary costs continue to accumulate, harming ratepayers generally. *See*, Seth Feaster, *Cost of Coal Plant Emergency Orders Already More than $300 Million*, INST. FOR ENERGY ECON. (June 10, 2026), https://ieefa.org/resources/cost-coal-plant-emergency-orders-already-more-300-million; Mackenzi Klemann, *Trump Administration Renews Order Keeping Indiana Coal Plants Open for the Third Time* INDIANA CAP. CHRON. (June 22, 2026), https://indianacapitalchronicle.com/2026/06/22/trump-administration-renews-order-keeping-indiana-coal-plants-open-for-the-third-time/.

[5] NERC's "elevated risk" designation in no way signifies an emergency condition, falls below the highest risk designation of "high risk," and is far from unusual. This point was addressed at length in the challenge to the Prior Schahfer and Culley 2 Orders. *See* Ex. C. at 25–26.

forecasts omits reference to the large amounts of resources planned to be added in MISO pursuant to the "recently approved Expedited Resource Addition Study (ERAS) process" that "is expected to result in additional resources in the MISO system beginning in 2028 that are not included in the model for the 2025 LTRA." *Id.* at 8. The LTRA likewise concludes that "if ERAS projects come in as currently planned, the projected reserve margin shortfall would be eliminated." *Id.* at 15. Thus, not only does the Order omit the finding of merely "normal" risk during the period of the Order—which in itself rebuts any "emergency" designation[6]—the Order arbitrarily ignores key evidence from the LTRA contradicting the Department's assertions as to long-term planning.

Four months after projecting that ERAS projects could eliminate the projected longer-term reserve margin shortfall, NERC published a sensitivity case for the 2025 LTRA that refined and confirmed this conclusion. Ex. F. NERC reported its results as follows:

> The limited-scope sensitivity analysis confirmed 2025 LTRA findings: Timely implementation of ERAS resources would eliminate reserve margin shortfalls in MISO and improve expected unserved energy metrics. Based on MISO's updated probabilistic analysis, the MISO assessment area was found to remain at elevated risk to system reliability for the 2027 year and fall to normal risk for the 2028–2030 period with the on-time addition of all ERAS projects. Furthermore, the probabilistic analysis shows that the risk of load loss and unserved energy in 2027 is reduced with the addition and operation of these projects.

Id. at iv.

Finally, the 2026 NERC Summer Reliability Assessment demonstrates that no emergency is anticipated this summer and that MISO's capacity position has improved. Ex. G. NERC designates MISO at normal risk, defined as "sufficient operating reserves expected." *Id.* at 3.

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[6] Even without the planned ERAS resources, the LTRA estimates only that MISO would "fall below reserve margin targets to become a high-risk area beginning Winter 2028" (the end of 2028). *Id*. This would not be a sudden or unexpected emergency during the period of the Orders.

NERC projects that MISO will have positive reserve margins in all scenarios, including typical outage conditions and even in a scenario with higher demand, outages, and derates in extreme conditions. *Id.* at 10. NERC notes that the plants and units subject to 202(c) orders are not incorporated into the anticipated resources used to make these projections. *Id.* at 9. And nowhere does DOE mention FERC's 2026 Summer Energy Market and Electric Reliability Assessment, which anticipates a 6% increase to MISO's 2025 capacity and identifies no anticipated energy shortfalls. Ex. H at 24. Indeed, FERC's presentation materials demonstrate MISO is not at elevated risk for Summer 2026. Ex. I at 8.

DOE is already in possession of the exhibits the States submitted in support of their petitions for rehearing of the Prior Schahfer and Culley 2 Orders. The States are not resubmitting those same documents since they are incorporated by reference into the record for this petition. If DOE needs additional copies of any documents, please contact any of the signatories to this request.

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Dated: July 17, 2026

2026 OMS-MISO Survey Results

June 4, 2026

Executive Summary

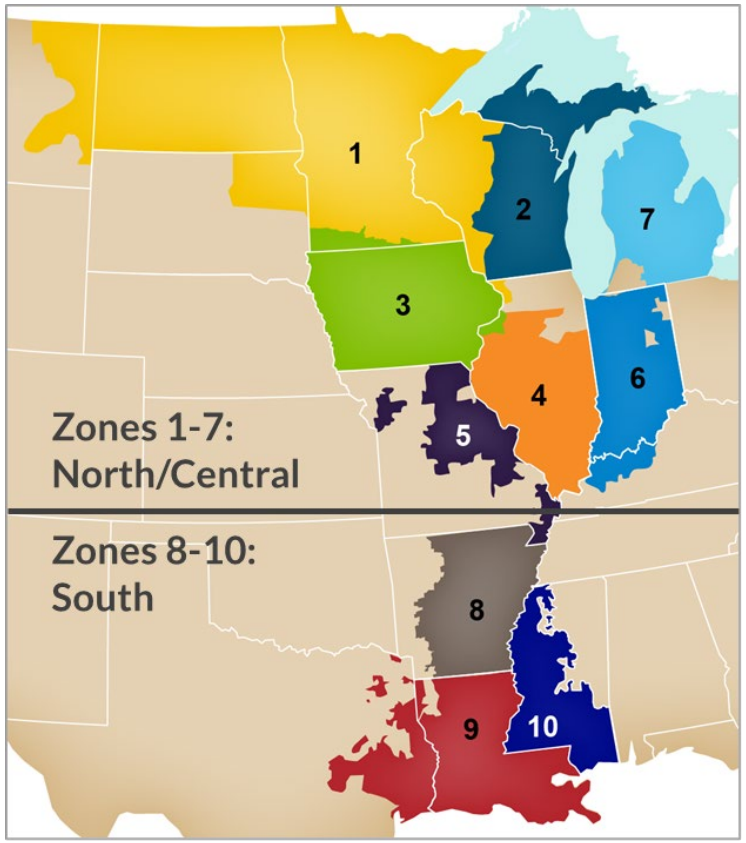
All references to capacity in this presentation indicate seasonal accredited capacity (SAC), unless noted otherwise.

The 2026 OMS-MISO Survey* results show an adaptive response to increasing demand through generation additions that sustain near-term resource adequacy

- The region is projected to maintain sufficient capacity to meet demand across the next five years, based upon current load forecasts and anticipated load growth.
- Load growth as submitted by LSEs continues to accelerate, with a CAGR projected between 3.1% and 5.1% over five years.
- To support rising demand, the region needs to maintain the increased pace of capacity additions; timely generation builds, Queue improvements and the Expedited Resource Adequacy Study (ERAS) will help meet this need.
- Seasonal reliability risk is shifting away from summer and toward winter as the resource mix evolves.
- The 2026 OMS-MISO Survey was completed with **99.5 %** participation from resource owners in MISO.

*The survey serves as a point-in-time analysis based on data collected April 2026. LSE – Load Serving Entity. CAGR – Compound Annual Growth Rate.

The OMS–MISO Survey provides a five-year view of resource adequacy, indicating if expected capacity meets planning reserve margins and yields a surplus or deficit



- Load Serving Entities (LSEs) are expected to have adequate resources to meet load reserve requirements in each zone.
- Various projected capacity scenarios and large load additions highlight increasing uncertainty and evolving risk.
- MISO zonal views are not included this year as the annual capacity import limit and capacity export limit study will provide value updates and be reported in the Loss of Load Expectation report in November.

Additional factors can impact projected deficits or surpluses observed in the survey

UPSIDE POSSIBILITIES

- Continued, collaborative effort of region to align timing of new generation and new load
- Improved accuracy and confidence in resource forecasting due to methodology enhancements recognizing all Interconnection pathways
- Ongoing queue reform efforts successfully reduce speculative projects and streamline resource integration processes
- Market reforms, including Reliability-Based Demand Curve and Direct Loss of Load (DLOL)-based accreditation updates, provide clearer and stronger investment and retirement signals
- Potential improvement in resource deployment timelines if supply-chain bottlenecks, labor shortages and permitting hurdles ease

DOWNSIDE RISKS

- Winter reliability risks intensify based on resource availability/performance, exacerbating seasonal reliability vulnerabilities
- Persistent supply-chain disruptions, labor constraints and permitting challenges delay new resource deployments
- Resource adequacy pressures continue from load growth driven by data centers, new industrial, and commercial development
- Continued backlog and uncertainty related to resources with signed Generator Interconnection Agreements (GIA)
  - *87 GW of signed* Generation Interconnection Agreements *(GIAs) not yet online*
  - *192 GW of active* Generation Interconnection Agreements *(GIAs) still under study*

*As reported on MISO's COD Tracker as of May 26, 2026.

Summer Seasonal Accreditation Values

Resource Category	2026 Survey	2025 Survey	
	Member Plans Projection	Historical Projection	Emerging Projection
Potential New Capacity (excludes ERAS projects)	○ **11.0 GW/yr average** • Informed by member responses to Survey; represents 99% of footprint load • Fuel mix of new resources indicated by OMS-MISO Survey member responses	○ **3.5 GW/yr average** • Driven by 2022-2024 actuals	○ **6.2 GW/yr average** • Informed by member responses to Survey; 97% of footprint load • Fuel mix of new resources indicated by Survey responses
Special Callout Project Impact	**ERAS Only** ○ **4.0 GW/yr average** • Commercial Operation Dates determined by member submittal	**Replacement Impact*** ○ **1.2 GW/yr average** • 50% replacement & surplus queue adoption	**Replacement Impact*** ○ **2.4 GW/yr average** • 100% replacement & surplus queue adoption
	• All Approved / Active ERAS projects as of April 15th are included in this projection	• Replacement impact highlighted; results in additional "new resources" to offset retirement impacts	
TOTALS	**15.0 GW/yr**	**4.7 GW/yr**	**8.6 GW/yr**
Committed Capacity	• **No Changes**	• Existing generation resources • External resources with firm contracts to MISO load	
Potentially Unavailable Resources	• **No Changes**	• Indicated as "Low Certainty" in survey by market participants	

New Term – Same Emerging Projection methodology as 2025 Survey

Committed Capacity: Resources committed to serving MISO's load. Potentially Unavailable Resources: May be available to serve MISO's load but may not have firm commitments.
*Replacement Impact for 2026 Survey is included in the Potential New Capacity category.

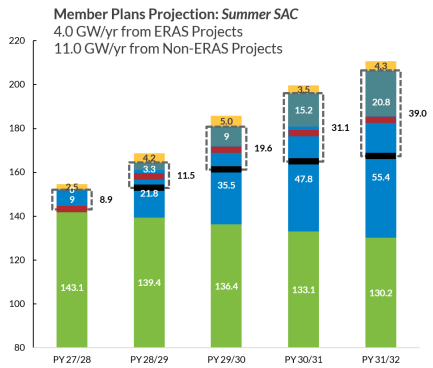
Winter Seasonal Accreditation Values

Resource Category	2026 Survey	2025 Survey	
	Member Plans Projection	Historical Projection	Emerging Projection
Potential New Capacity (excludes ERAS projects)	○ **8.0 GW/yr average** • Informed by member responses to Survey; represents 99% of footprint load • Fuel mix of new resources indicated by OMS-MISO Survey member responses	○ **1.4 GW/yr average** • Driven by 2022-2024 actuals	○ **4.1 GW/yr average** • Informed by member responses to Survey; 97% of footprint load • Fuel mix of new resources indicated by Survey responses
Special Callout Project Impact	**ERAS Only** ○ **4.4 GW/yr average** • Commercial Operation Dates determined by member submittal	**Replacement Impact*** ○ **1.0 GW/yr average** • 50% replacement & surplus queue adoption	**Replacement Impact*** ○ **2.1 GW/yr average** • 100% replacement & surplus queue adoption
	• All Approved / Active ERAS projects as of April 15th are included in this projection	• Replacement impact highlighted; results in additional "new resources" to offset retirement impacts	
TOTALS	**12.4 GW/yr**	**2.4 GW/yr**	**6.2 GW/yr**
Committed Capacity	• **No Changes**	• Existing generation resources • External resources with firm contracts to MISO load	
Potentially Unavailable Resources	• **No Changes**	• Indicated as "Low Certainty" in survey by market participants	

New Term – Same Emerging Projection methodology as 2025 Survey

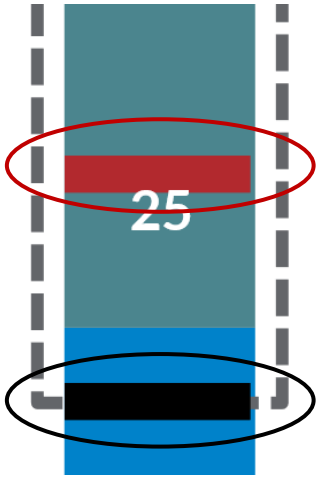
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PRMR Forecasts: LSE Forecast vs Current Trajectory



LSE Forecast

- The black bars represent load forecasts submitted by MISO Load Serving Entities (LSE) in November 2025 with a PRM % added*
- Reflects annual snapshot
- Forecast aligns with the PY26/27 MECT forecast
  - MISO will use same data set to report load forecast for the 2026 NERC Long-Term Reliability Assessment



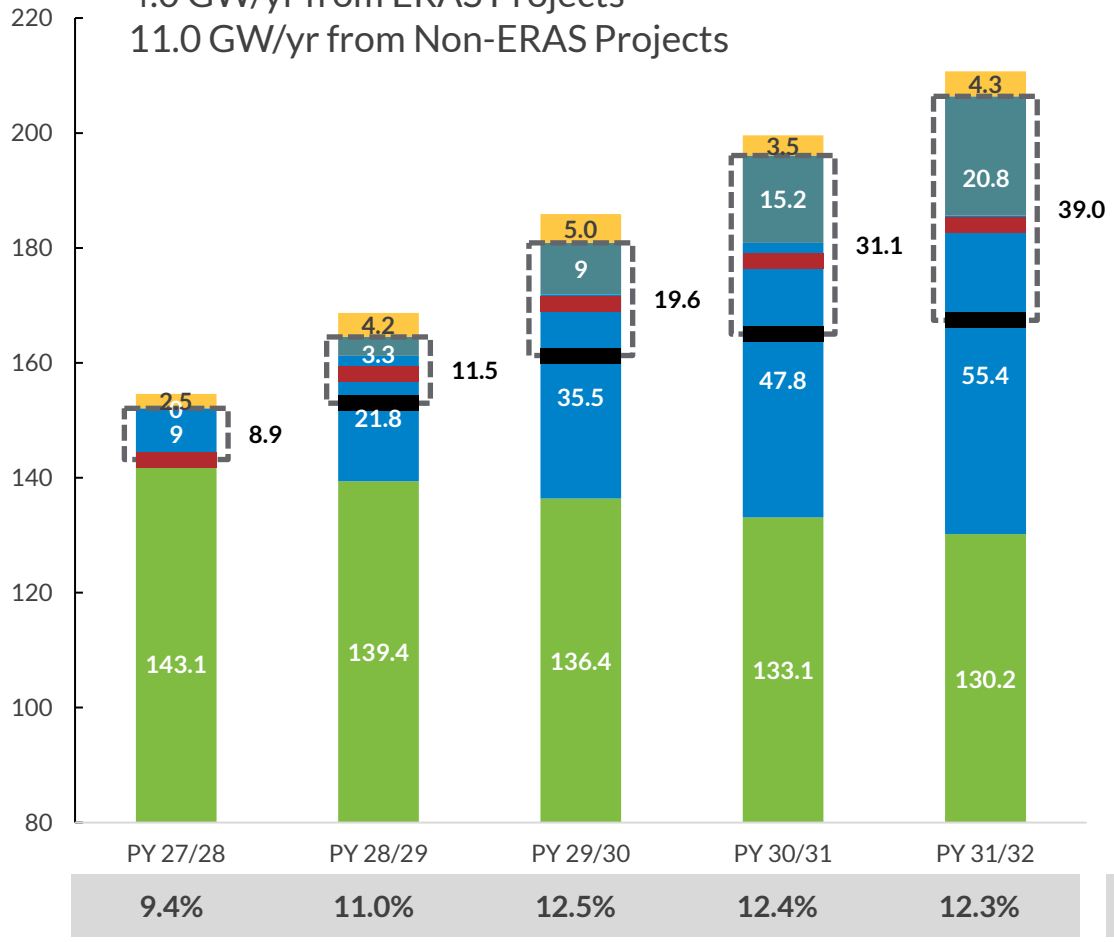
Current Trajectory

- The red bars are based on the forecasts represented in the LSE Forecast, plus any load additions approved through MTEP26 projects as of April 2026**
- Reflects fast pace of load growth consistent with MISO 2026 Long Term Load Forecast methodology***
- The PRM %s are kept consistent with those used for the LSE Forecast*

PRM – Planning Reserve Margin. PRMR – Planning Reserve Margin Requirement. *See Section D.3 from the 2026-27 LOLE Study Report for UCAP PRM % values.
**See the April 7, 2026, Expedited Project Review Technical Study Task Force Presentation, Slide 9 for description of Current Trajectory load representation.
***Current Trajectory is described in the MISO 2026 Long Term Load Forecast Whitepaper.

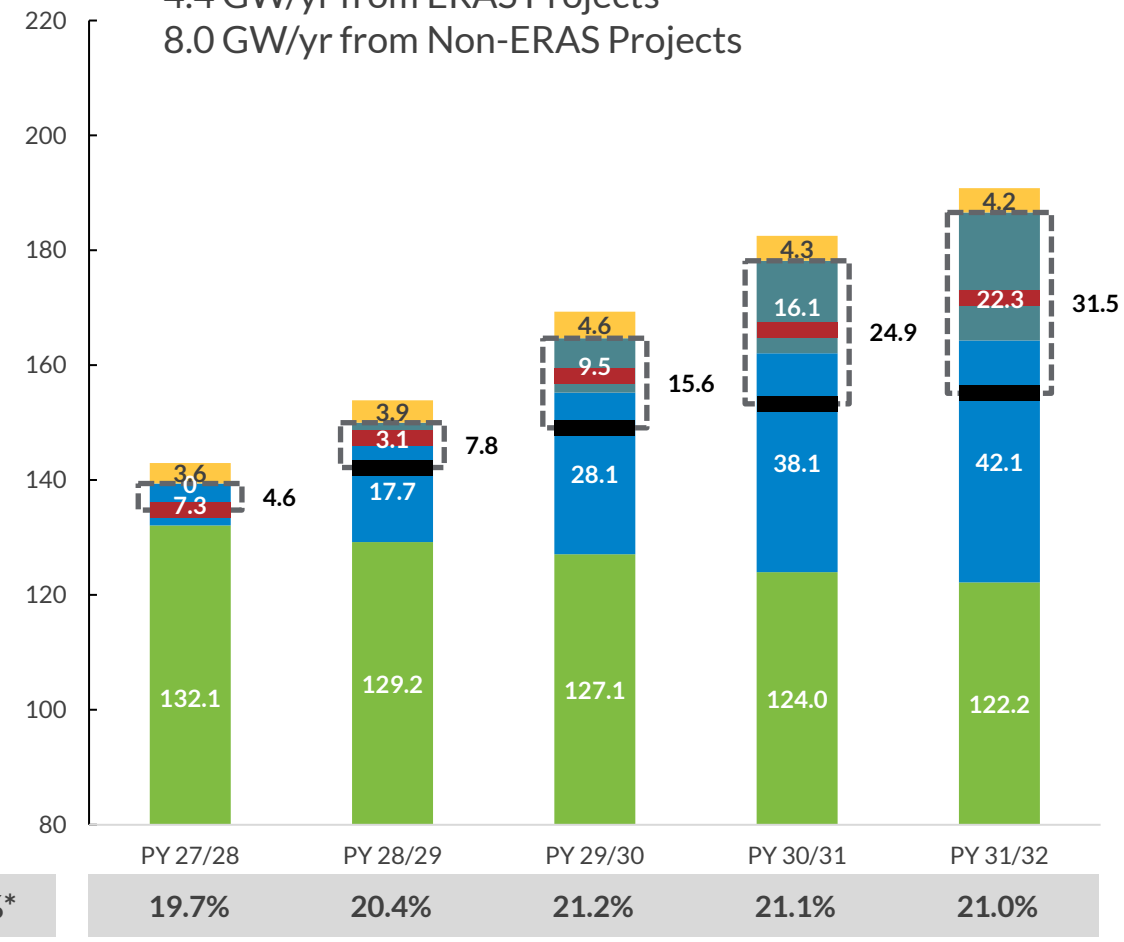
Status Quo Summer & Winter SAC
Comparison of Seasonal Forecasts

Member Plans Projection: *Summer SAC*
4.0 GW/yr from ERAS Projects
11.0 GW/yr from Non-ERAS Projects



PRM %*

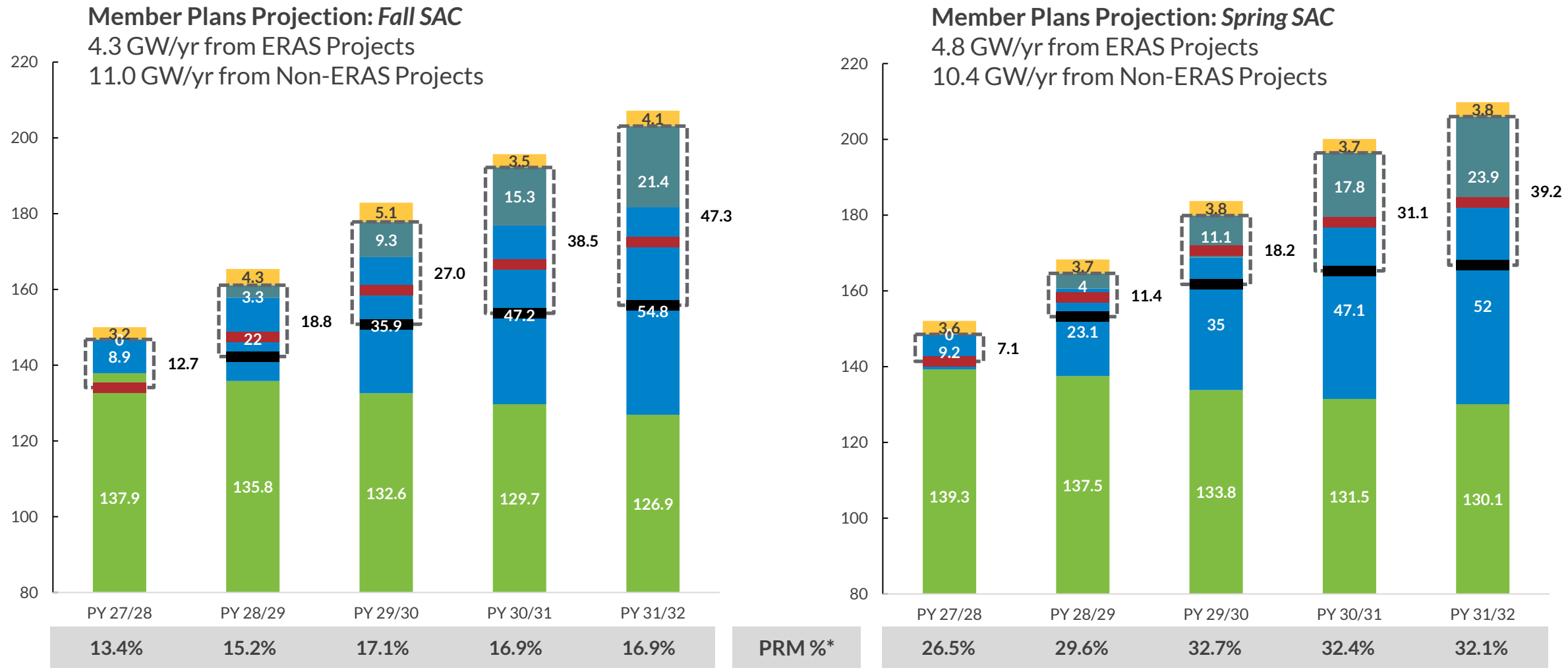
Member Plans Projection: *Winter SAC*
4.4 GW/yr from ERAS Projects
8.0 GW/yr from Non-ERAS Projects



Projected PRMR with LSE Forecast | Projected PRMR Current Trajectory** | Committed Capacity | Potential New Capacity | Value of ERAS Projects | Potentially Unavailable Resources | Potential PRMR Surplus

All projection values are averages over five years. *See Section D.3 from the 2026-27 LOLE Study Report for UCAP PRM % values. **Additional Load forecasts align with new information acquired since the 2026 Long Term Load Forecast Projections, as shown in April 7, 2026, Expedited Project Review Technical Study Task Force Presentation.

Status Quo Fall & Spring SAC
Comparison of Seasonal Forecasts



All projection values are averages over five years. *See Section D.3 from the 2026-27 LOLE Study Report for UCAP PRM % values. **Additional Load forecasts align with new information acquired since the 2026 Long Term Load Forecast Projections, as shown in April 7, 2026, Expedited Project Review Technical Study Task Force Presentation.

Accreditation reforms designed to better measure a resource's contribution to reliability include transitioning to Direct Loss of Load (DLOL) methodology, which is targeted for PY 2028/29 implementation

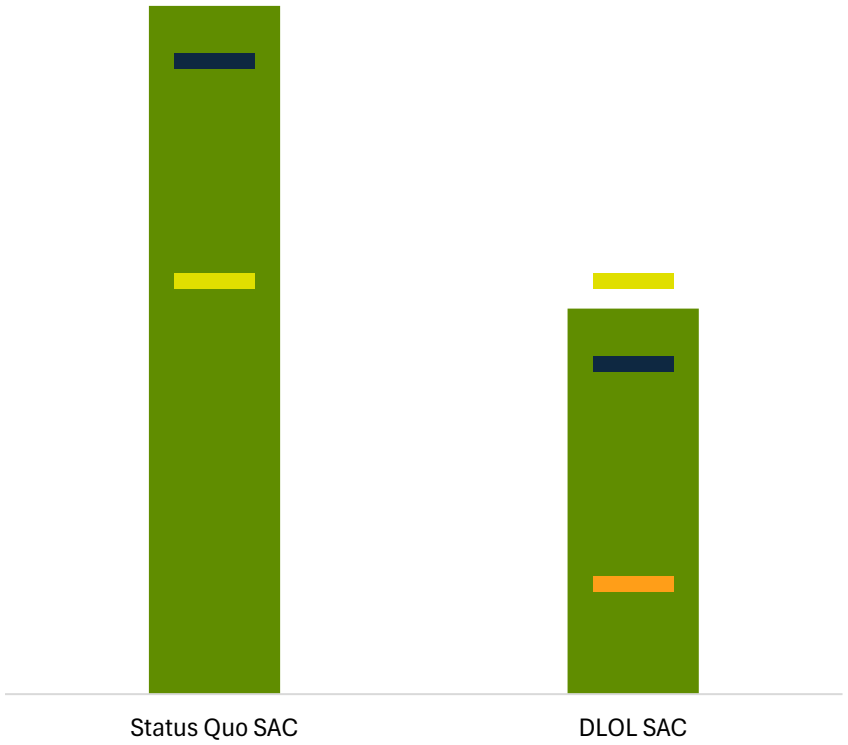
Viewing indicative DLOL results will help the MISO region prepare for Planning Year 2028/29 and beyond

- Increased reliance on wind, solar and storage, projected large-load additions and electrification, and frequent large-scale weather events are decoupling periods of risk from periods of high demand.
- These drivers are upending traditional methods for establishing reliability requirements and resource accreditation, which can overstate a resource's capacity value and understate risk during the highest risk periods.
- MISO's resource accreditation methodology* (Direct Loss of Load) will value a resource's contribution to reliability during the highest risk periods.

*See Resource Accreditation White Paper, published March 2024

High Level Description of Status Quo vs Direct Loss of Load

Comparing Accreditation from Status Quo & DLOL SAC



Peak Load Forecast

- Submitted annually by members

Critical Hours* Load Forecast

- Illustrative only, not collected

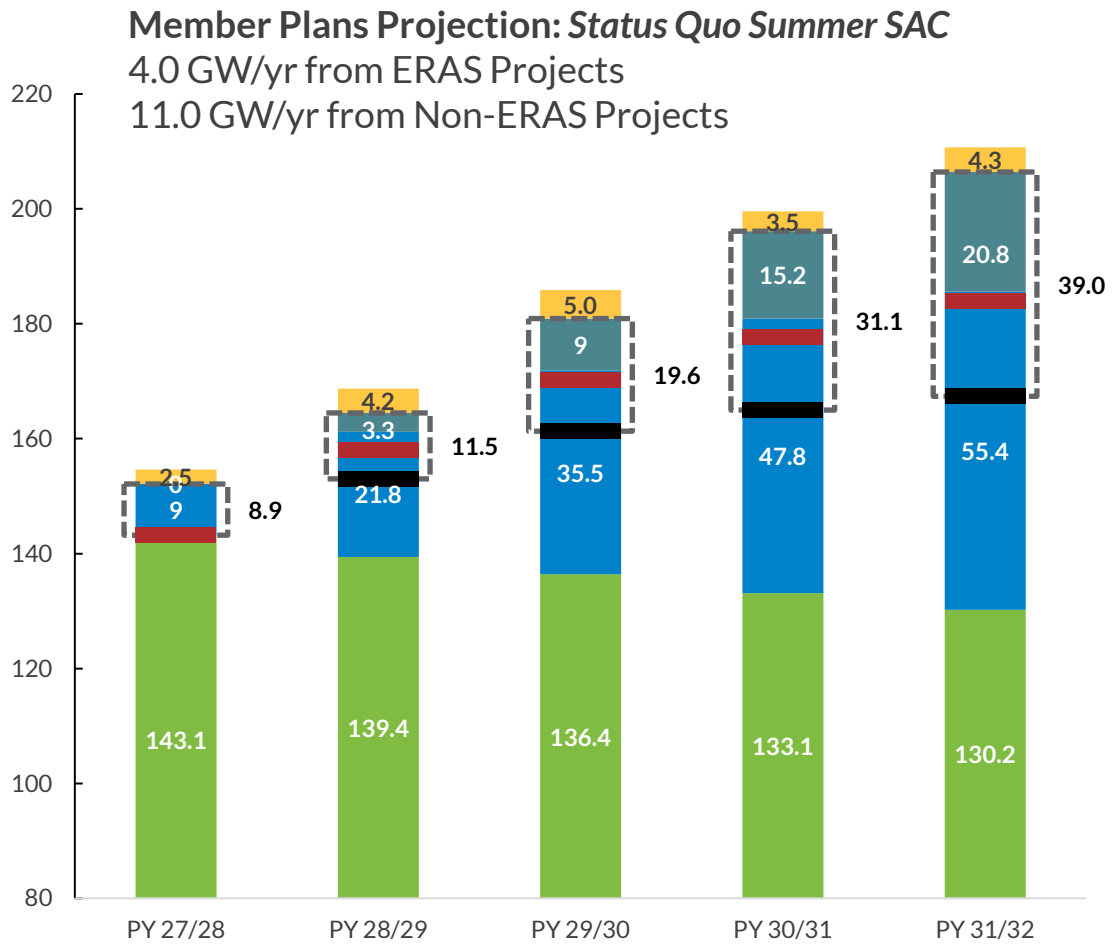
Planning Reserve Margin Requirement (PRMR) at

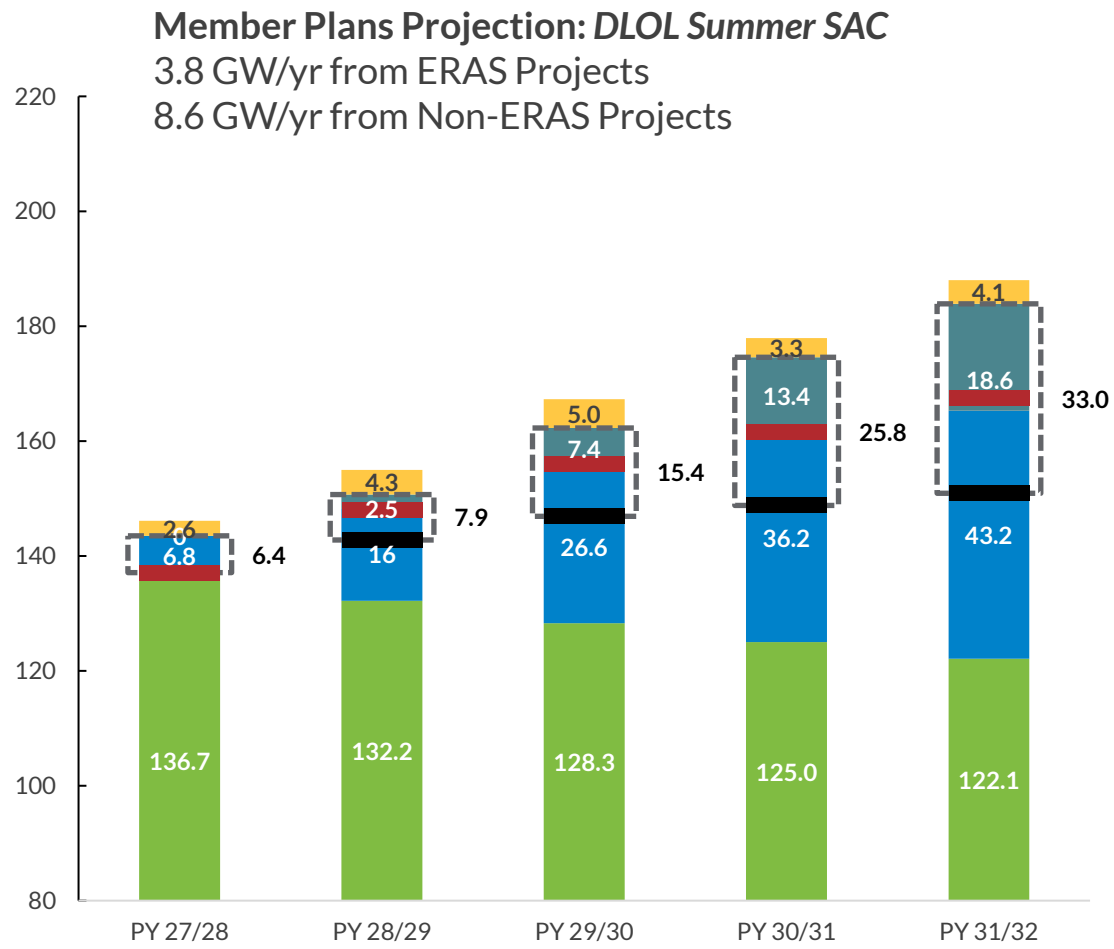
- Status Quo: Peak Load
- DLOL: Critical hours*

Value of Resources at the time of PRMR

*Critical Hours represent the hours in a season where the highest risk of load loss is projected to occur, as opposed to the traditional Resource Adequacy assessment of covering the peak load hour. PRMR is a measurement of how much resource value is needed during those risk hours to retain an annual Loss of Load Expectation of 1 day in 10 years.

Status Quo Summer SAC & DLOL Summer SAC
Comparison of Member Plans Forecasts



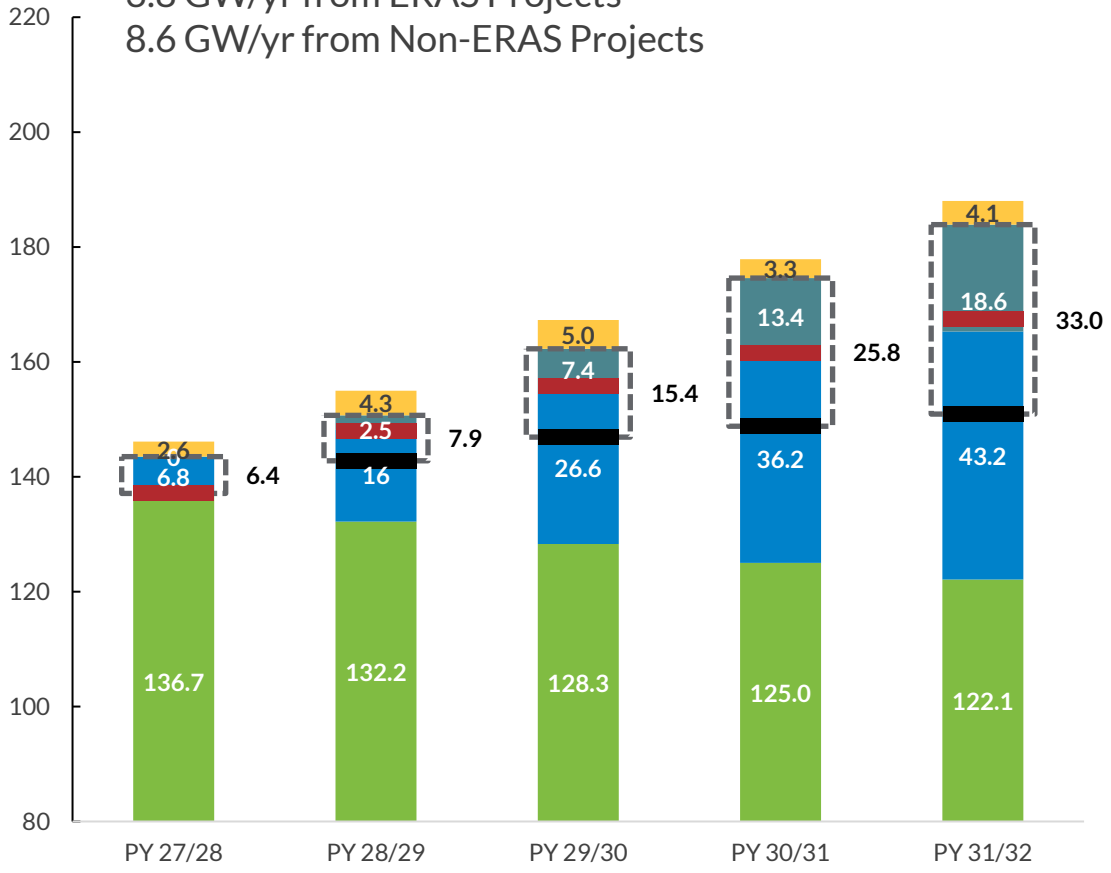


Projected PRMR with LSE Forecast | Projected PRMR Current Trajectory* | Committed Capacity | Potential New Capacity | Value of ERAS Projects | Potentially Unavailable Resources | Potential PRMR Surplus

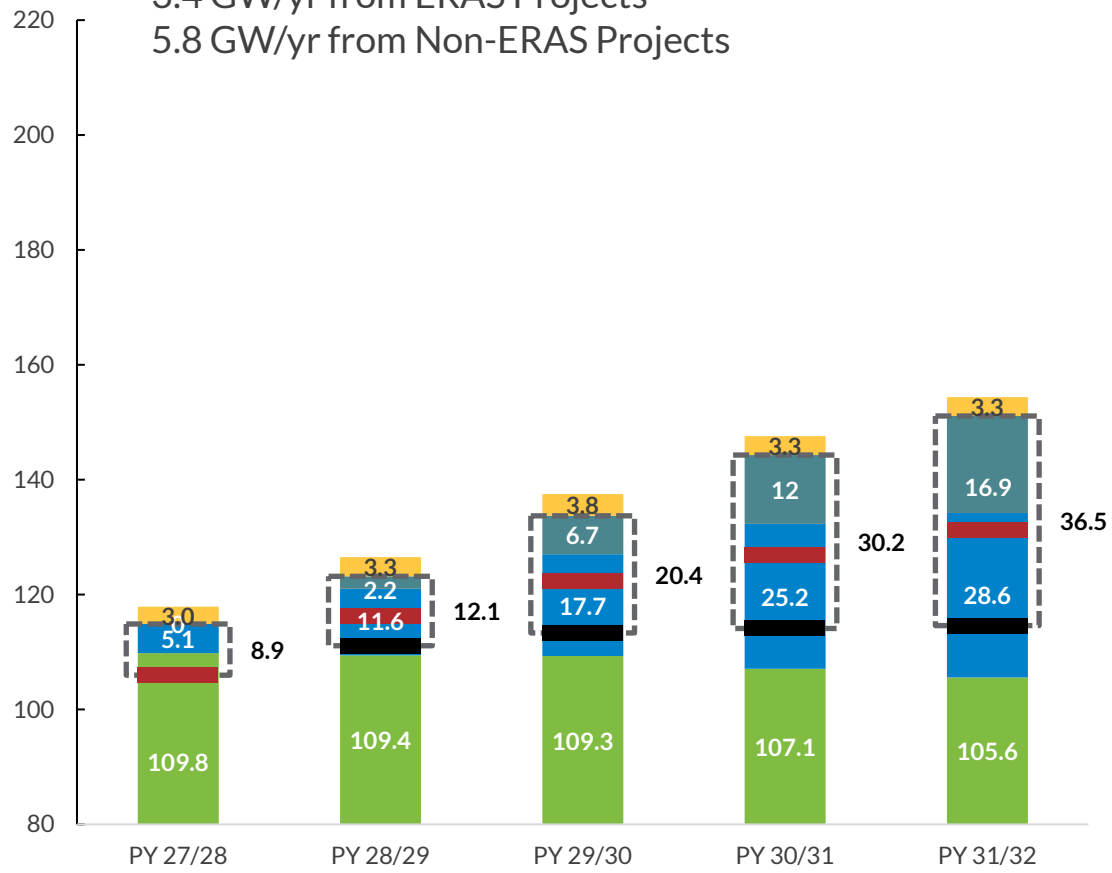
The PRMR will change under the DLOL framework, reflecting the reliability requirements based on periods of highest risk (critical hours) and aligned with resource accreditation.
All projection values are averages over five years. *Additional Load forecasts align with new information acquired since the 2026 Long Term Load Forecast Projections, as shown in April 7, 2026, Expedited Project Review Technical Study Task Force Presentation.

DLOL Summer SAC & DLOL Winter SAC
Comparison of Seasonal Forecasts

Member Plans Projection: *DLOL Summer SAC*
3.8 GW/yr from ERAS Projects
8.6 GW/yr from Non-ERAS Projects



Member Plans Projection: *DLOL Winter SAC*
3.4 GW/yr from ERAS Projects
5.8 GW/yr from Non-ERAS Projects

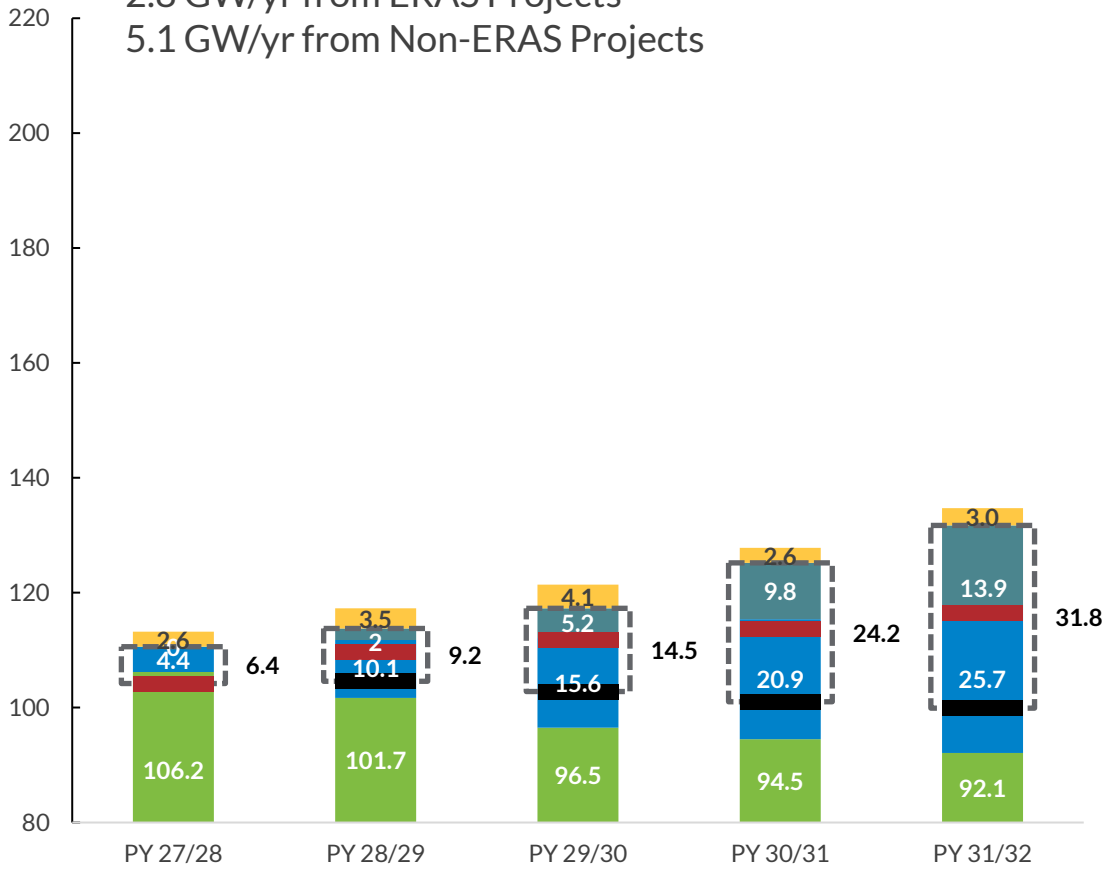


Projected PRMR with LSE Forecast | Projected PRMR Current Trajectory* | Committed Capacity | Potential New Capacity | Value of ERAS Projects | Potentially Unavailable Resources | Potential PRMR Surplus

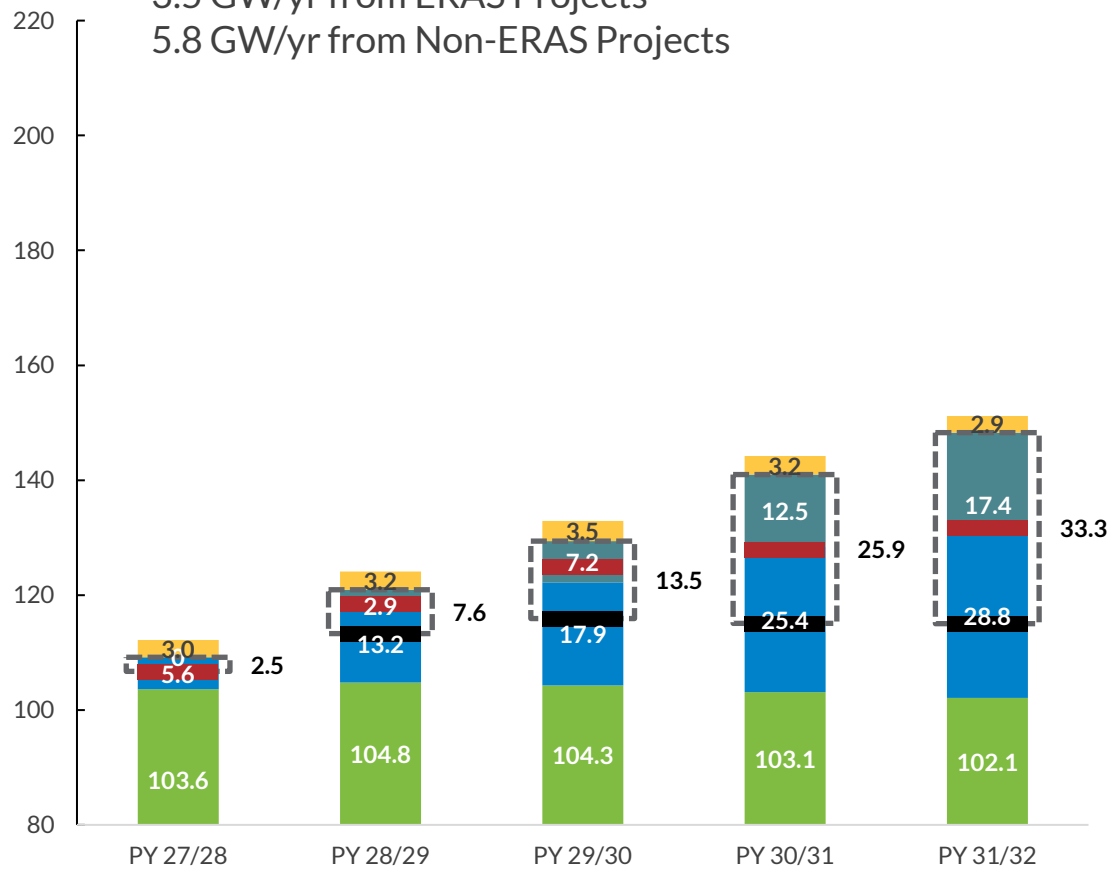
The PRMR will change under the DLOL framework, reflecting the reliability requirements based on periods of highest risk (critical hours) and aligned with resource accreditation
All projection values are averages over five years. *Additional Load forecasts align with new information acquired since the 2026 Long Term Load Forecast Projections, as shown in April 7, 2026, Expedited Project Review Technical Study Task Force Presentation.

DLOL Fall SAC & DLOL Spring SAC
Comparison of Seasonal Forecasts

Member Plans Projection: *DLOL Fall SAC*
2.8 GW/yr from ERAS Projects
5.1 GW/yr from Non-ERAS Projects



Member Plans Projection: *DLOL Spring SAC*
3.5 GW/yr from ERAS Projects
5.8 GW/yr from Non-ERAS Projects



Projected PRMR with LSE Forecast | Projected PRMR Current Trajectory* | Committed Capacity | Potential New Capacity | Value of ERAS Projects | Potentially Unavailable Resources | Potential PRMR Surplus

The PRMR will change under the DLOL framework, reflecting the reliability requirements based on periods of highest risk (critical hours) and aligned with resource accreditation
All projection values are averages over five years. *Additional Load forecasts align with new information acquired since the 2026 Long Term Load Forecast Projections, as shown in April 7, 2026, Expedited Project Review Technical Study Task Force Presentation

Key Takeaways

The 2026 Survey emphasizes that decisions made today by members, regulators, and MISO will help maintain resource adequacy going forward

- Ongoing collaboration between OMS, MISO and members remains essential to address intensifying reliability risks, particularly as seasonal challenges, especially in winter, grow increasingly complex
- Continued actions are required to maintain pace for the addition of new capacity, align resources effectively with new load demands, and thoughtfully manage the pace of resource retirements
- MISO's ongoing Reliability Imperative reforms remain critical and responsive, directly addressing evolving reliability challenges

Members, states and MISO have collaborated on many Reliability Imperative initiatives to address resource adequacy challenges, but there's more to be done

Completed Initiatives

- ✓ Implemented Reliability-Based Demand Curve in 2025 PRA
- ✓ Began interim Expedited Resource Addition Study (ERAS) process *(June 2025)*
- ✓ Implemented Generation Interconnection Queue cap
- ✓ Reduced early phase of interconnection queue process
- ✓ Approved 10,570+ miles of new transmission lines

Initiatives In Progress

- Implement Direct Loss of Load (DLOL)-based accreditation
- Enhance resource adequacy risk modeling
- Improve queue cycle to 373 days
- Demand Response and Emergency Resource reforms
- Enhance allocation of resource adequacy requirements
- Reliability and Market requirements for Large Loads, Generation with Zero-Injection GIAs

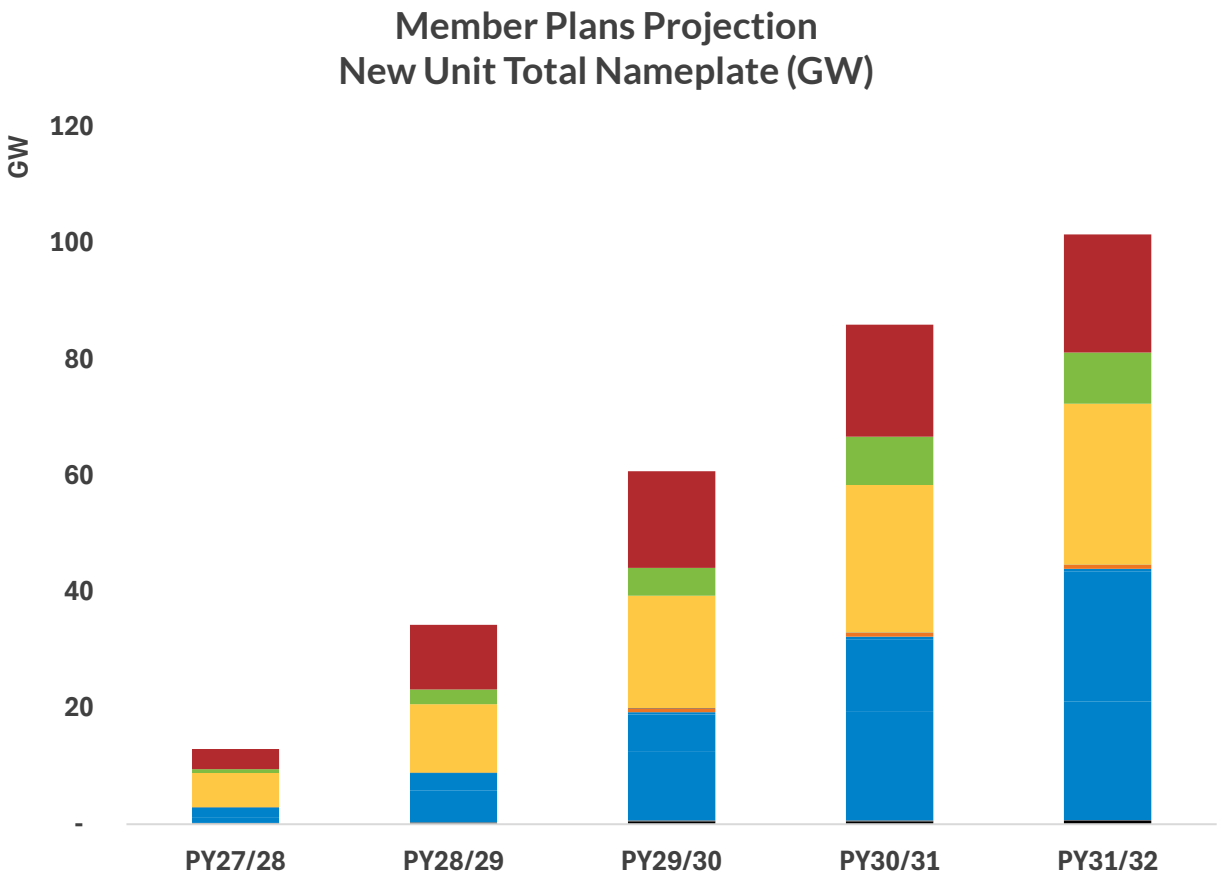
Ongoing Challenges

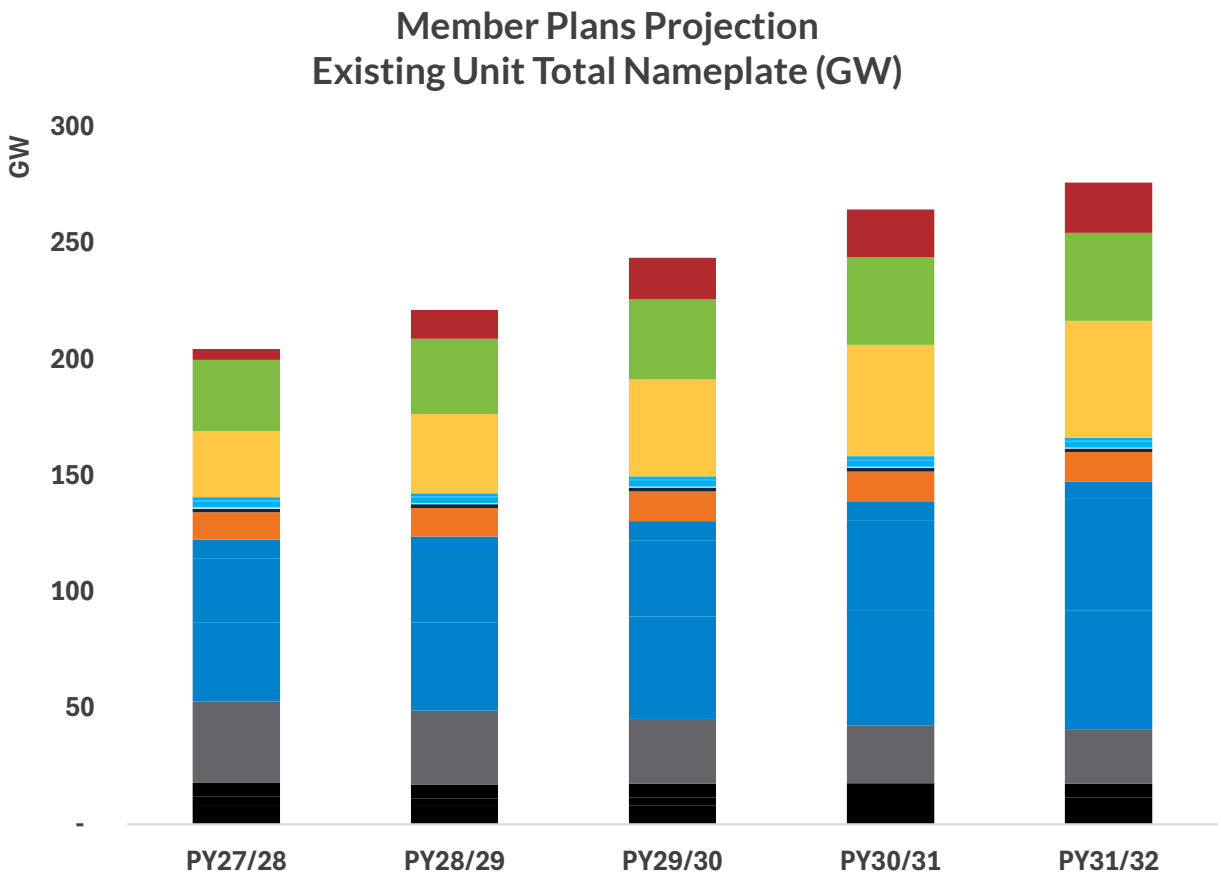
- More frequent extreme weather
- Accelerating demand for electricity and large load interconnections
- Loss of accredited capacity and reliability attributes as resource mix evolves
- Pace of new resources additions
- Address local reliability issues (load pocket)
- Evolve storage participation

APPENDIX

Additions and Fleet Composition by Nameplate (ICAP)

Combined Projections of Fuel Mix







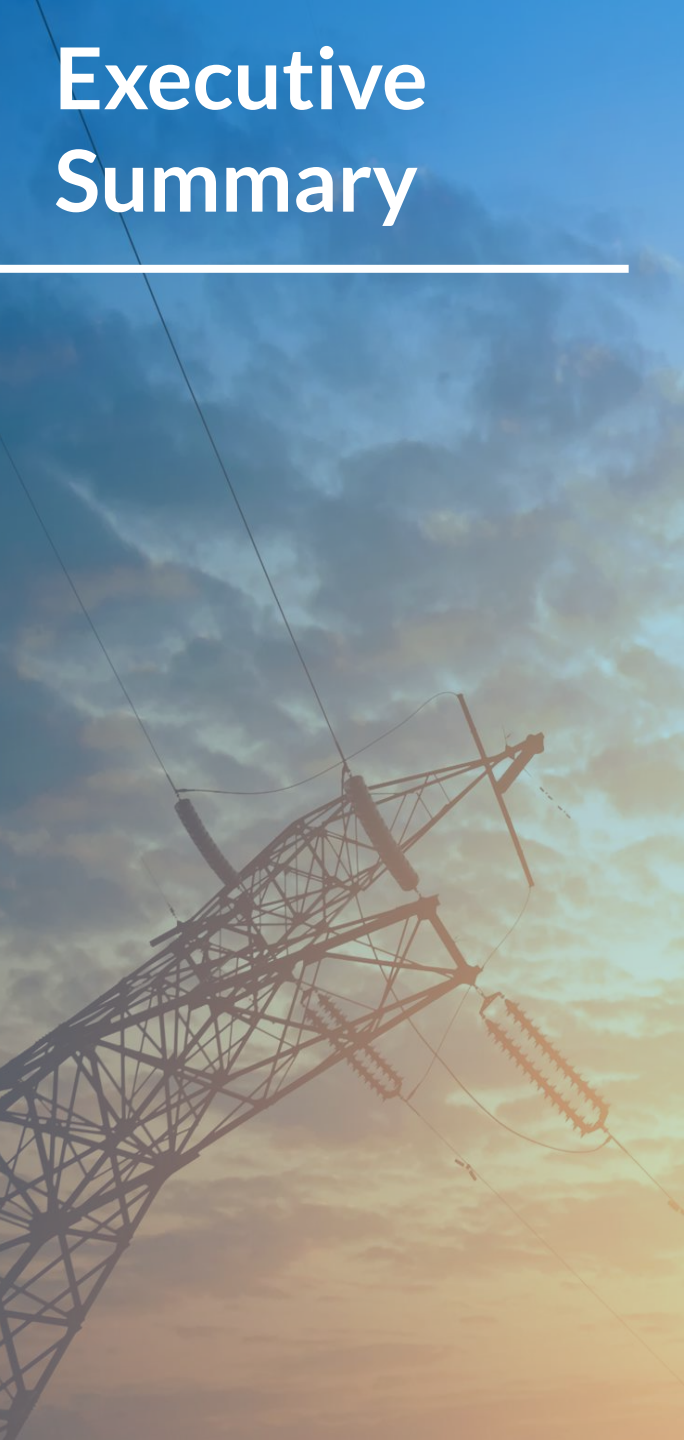


Planning Resource Auction Results for Planning Year 2026/27

April 2026

UPDATED May 22: Slides # 14-30

Executive Summary



- For the 2026 Planning Resource Auction (PRA), all zones show sufficient resources at the regional, subregional, and zonal levels to meet resource adequacy requirements across all four seasons
- The Reliability Based Demand Curve (RBDC) framework ensures a reliability-focused pricing structure that accurately reflects the reliability value of capacity above (and below) resource adequacy targets, while helping with the price stability
- The 2026 PRA has set annualized price in the range of $116 - $126 per MW-day for the 2026-2027 Planning Year
- Capacity offered into the auction increased by as much as 4% compared to last year's PRA
- New generation capacity is coming online, but faster resource additions are still needed to support large-load growth and ensure resource adequacy

MISO met the planning year 2026/27 resource adequacy requirements, with gains in offered capacity outpacing pressure of load growth on increased requirements

Summer

$424.30 (North/Central)
$384.10 (LRZs 8, 10)
$412.10 (LRZ 9)

Annualized

$126.19 (North/Central)
$116.06 (LRZs 8, 10)
$123.12 (LRZ 9)

Fall

$33.92

Winter

$35.97

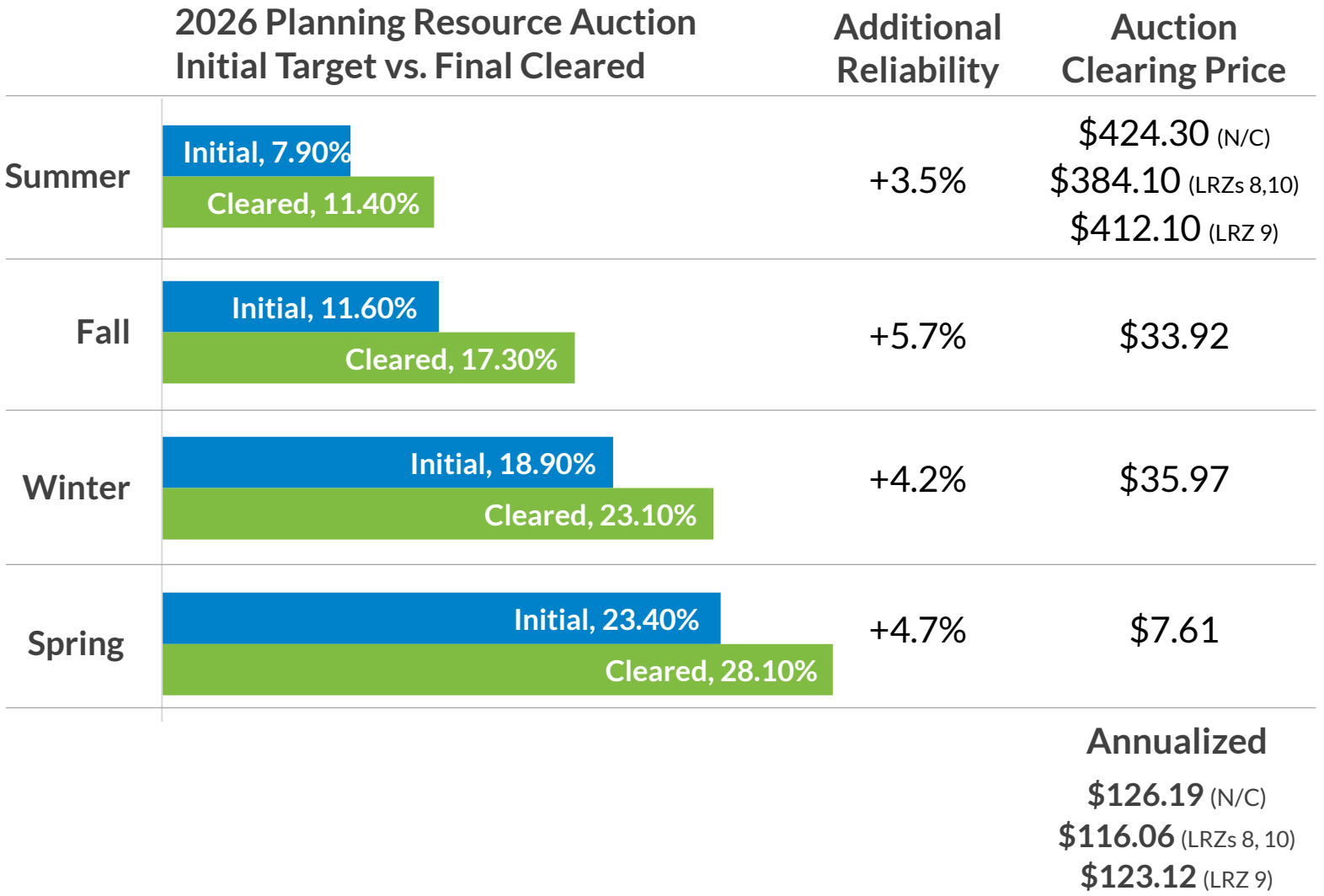
Spring

$7.61

- More capacity was offered than last year, which offset higher demand and improved reliability across seasons
- The summer auction cleared with a reserve margin 3.5 points above the 7.9% target
- Summer remains tight, so prices reflect the limited surplus available
  - Price differences were influenced by transfer limitations between the North and South
  - LRZ 9 needed more local capacity, driving a higher clearing price
- Most customers (~92%) secured capacity ahead of time or self supplied, reducing their sensitivity to auction outcomes
- The surplus above target was 2.0 GW higher than last summer, even with a +2.7 GW increase in required capacity (Initial PRMR)
- New capacity and more imports outweighed lower accreditation and retirements/suspensions
- Capacity additions need to continue, given expected growth from new large loads

MISO's RBDC improves price signals, reflecting the increased value of accredited capacity beyond seasonal reliability targets

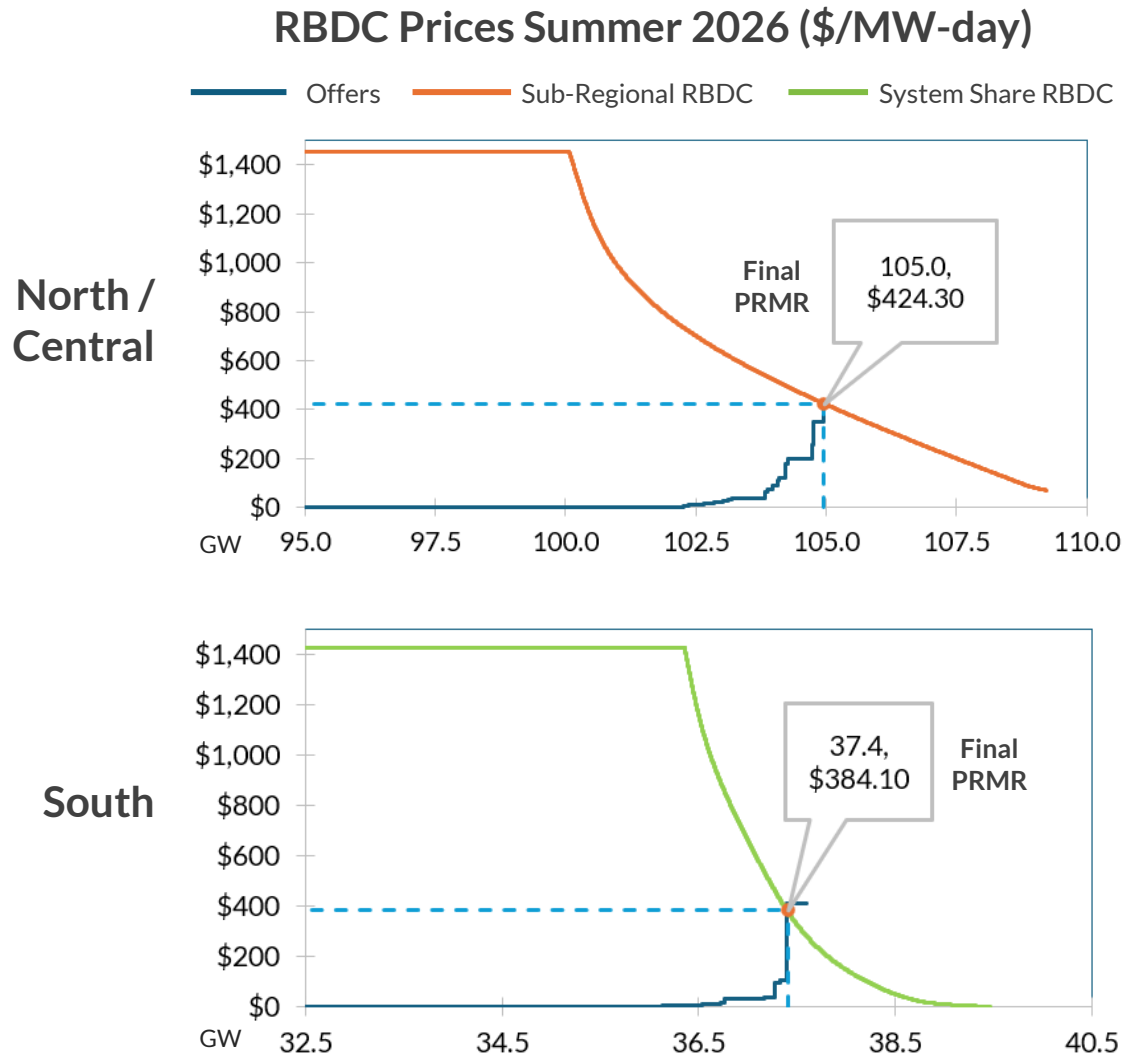
Auction cleared above seasonal initial reliability targets, representing additional reliability value at cost-competitive prices



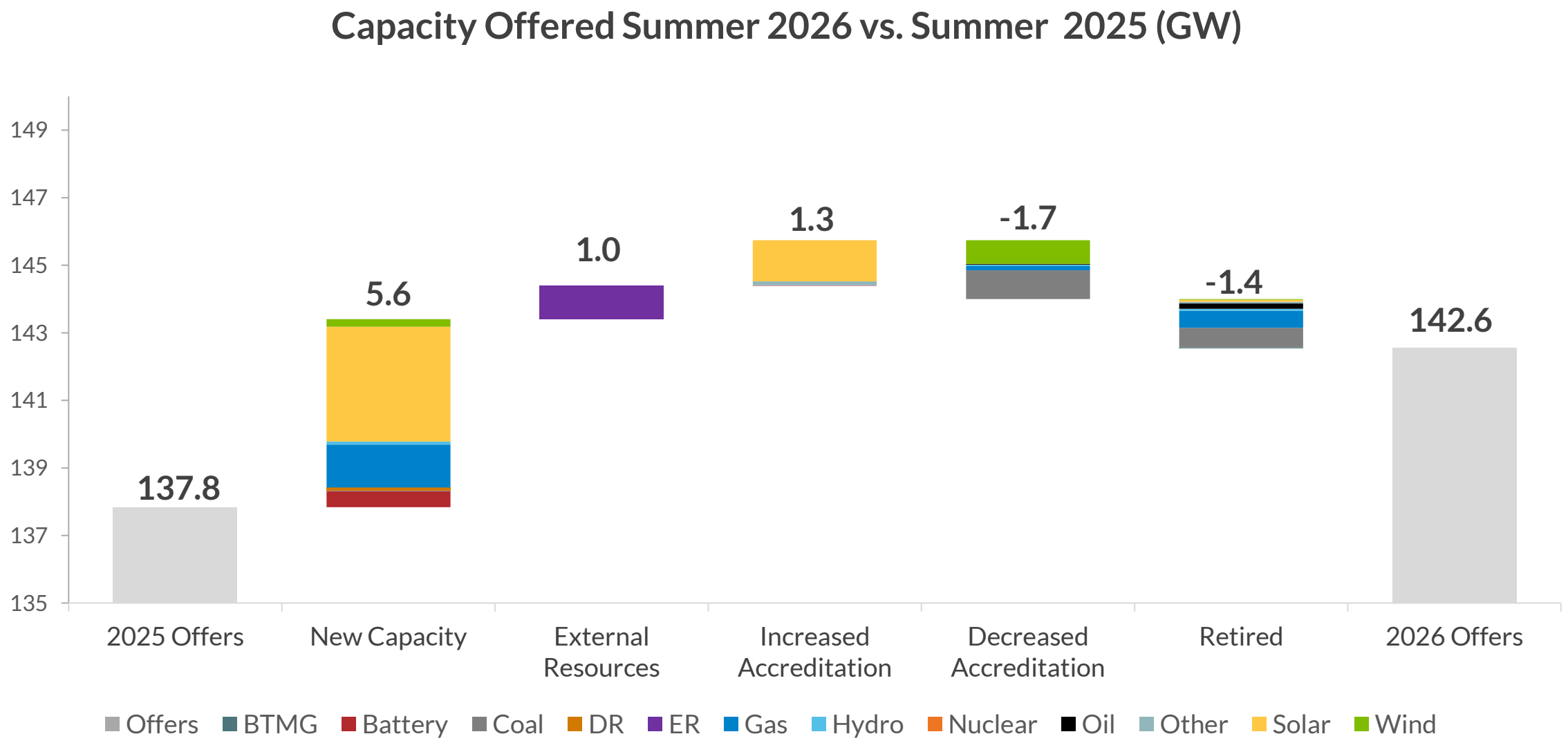
Under RBDC, each season has an initial reliability target (PRM%)

Pricing outcomes with the RBDC reflect both volume and pricing of offered capacity

- Summer clearing of $424.30 reflects highest reliability risk and increasing surplus capacity year-over-year
  - Summer surplus capacity has increased from 2.6 GW in 2025 to 4.6 GW in 2026
- Incremental capacity cleared beyond the target PRM based on the value it adds to reliability
  - Example: North/Central "effective" summer margin at 12.0% and South at 9.7% vs. target 7.9%
  - A small quantity of capacity offered at a price higher than the reliability value indicated through the demand curve did not clear
  - LRZ 9 cleared at $412.10 to satisfy LCR



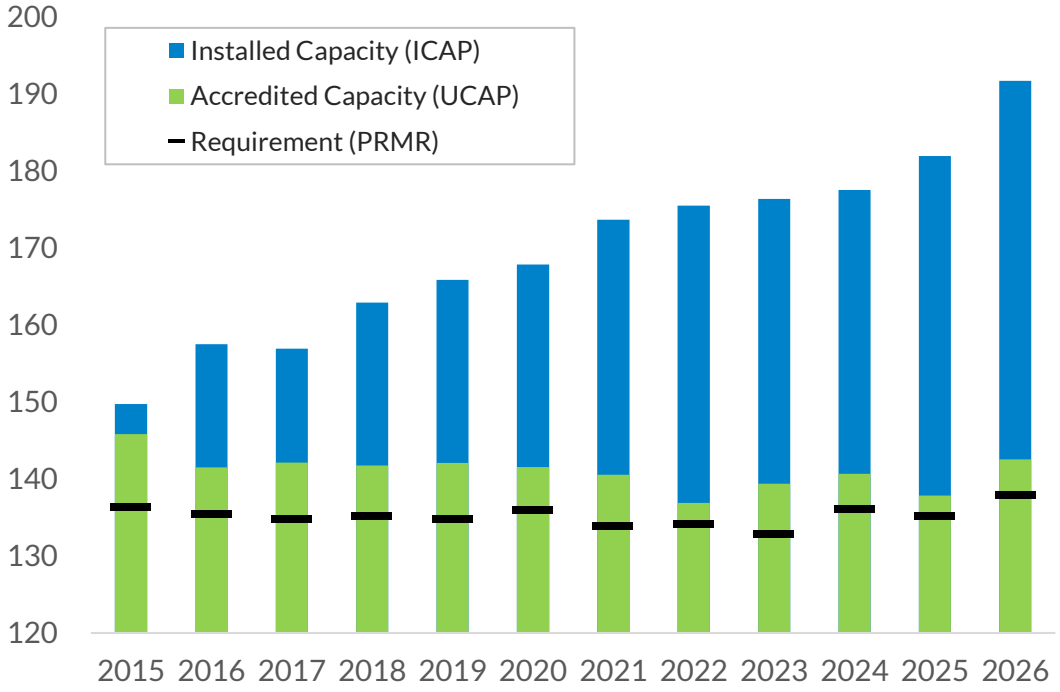
New capacity additions outpaced decreased accreditation and suspensions/retirements



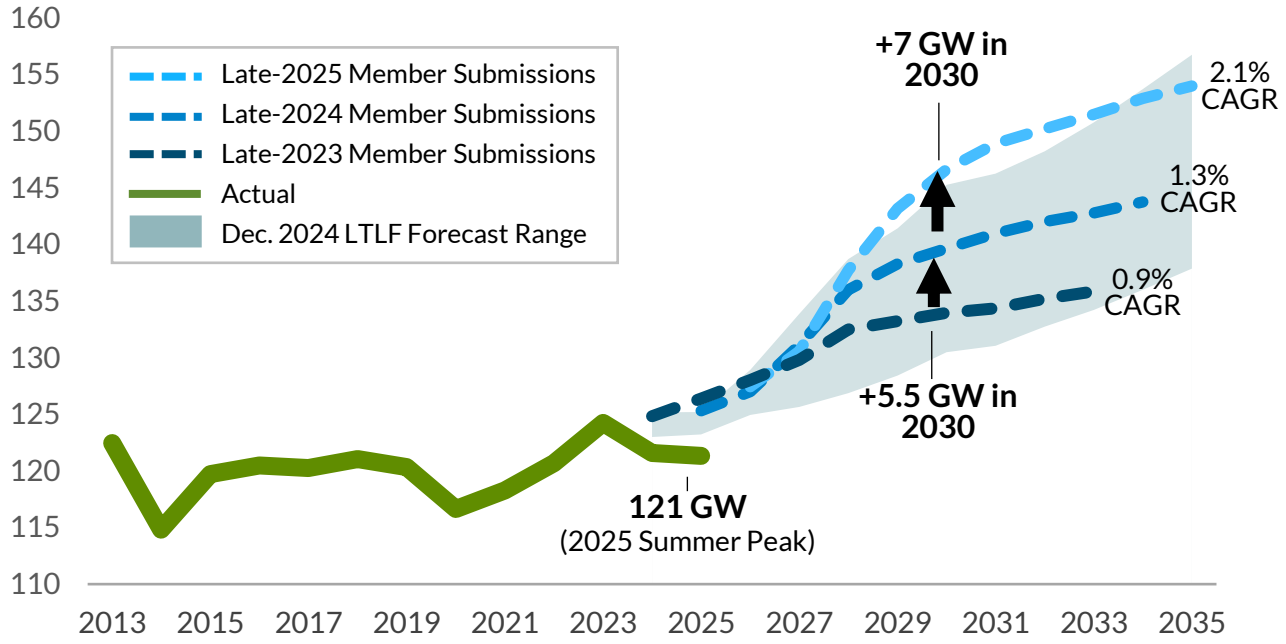
BTMG: Behind the Meter Generation. Capacity indicated is offered accredited value.

While our market reforms have helped hold the line amidst tighter reserve margin compared to the prior decade, resource adequacy remains at risk, especially as demand for large load additions accelerate

Available Capacity and Reliability Requirements from MISO Planning Resource Auctions



Recent Member and MISO Load Forecasts Net Coincident Peak (GW)



MISO has acted on many Reliability Imperative initiatives to address resource adequacy challenges, but continued collaboration on other priorities focused on readiness, speed and transparency is critical

Completed Initiatives

- ✓ Implemented Reliability-Based Demand Curve in 2025 PRA
- ✓ Began interim Expedited Resource Addition Study (ERAS) process *(June 2025)*
- ✓ Implemented Generation Interconnection Queue cap
- ✓ Reduced early phase of interconnection queue process
- ✓ Approved 10,570+ miles of new transmission lines

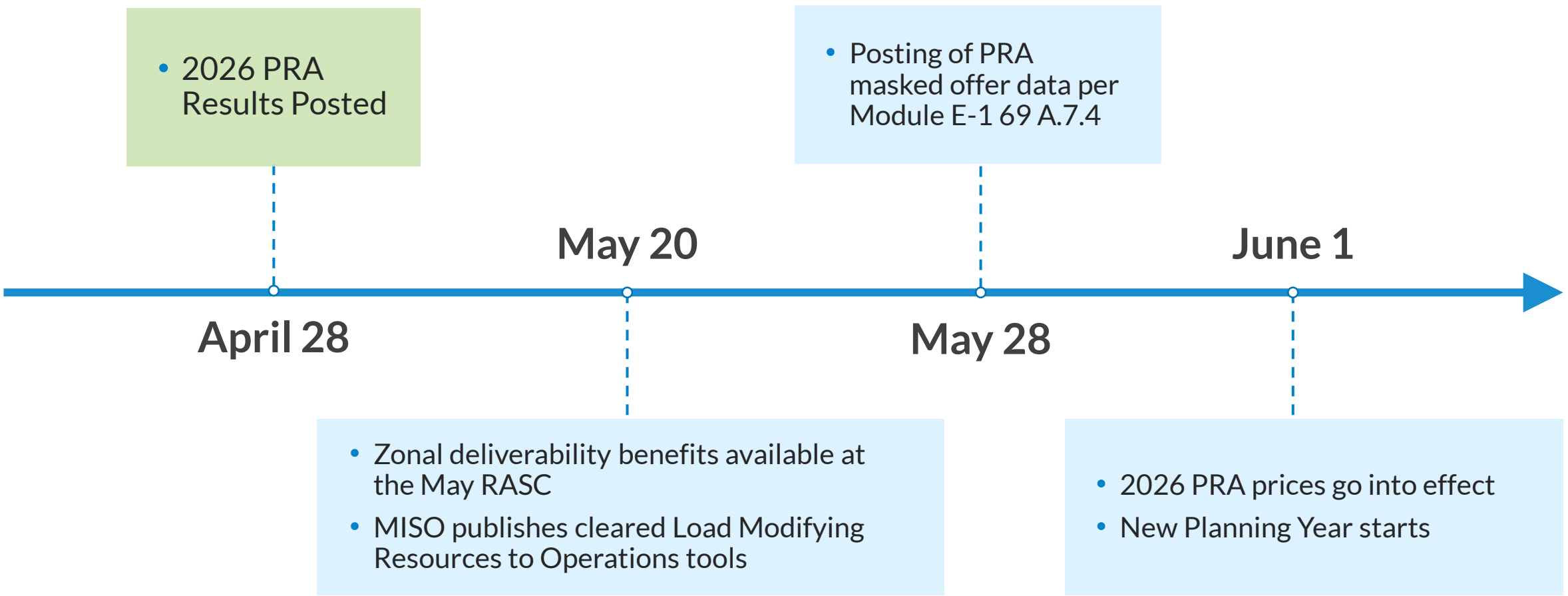
Initiatives In Progress

- Implement Direct Loss of Load (DLOL)-based accreditation
- Enhance resource adequacy risk modeling
- Improve queue cycle to 373 days
- Demand Response and Emergency Resource reforms
- Enhance allocation of resource adequacy requirements
- Reliability and Market requirements for Large Loads, Generation with Zero-Injection GIAs

Ongoing Challenges

- More frequent extreme weather
- Accelerating demand for electricity and large load interconnections
- Loss of accredited capacity and reliability attributes as resource mix evolves
- Pace of new resources additions
- Address local reliability (load pocket) issues
- Evolve storage participation

Next Steps


• 2026 PRA Results Posted
April 28
May 20
• Zonal deliverability benefits available at the May RASC
• MISO publishes cleared Load Modifying Resources to Operations tools
• Posting of PRA masked offer data per Module E-1 69 A.7.4
May 28
June 1
• 2026 PRA prices go into effect
• New Planning Year starts

Appendix

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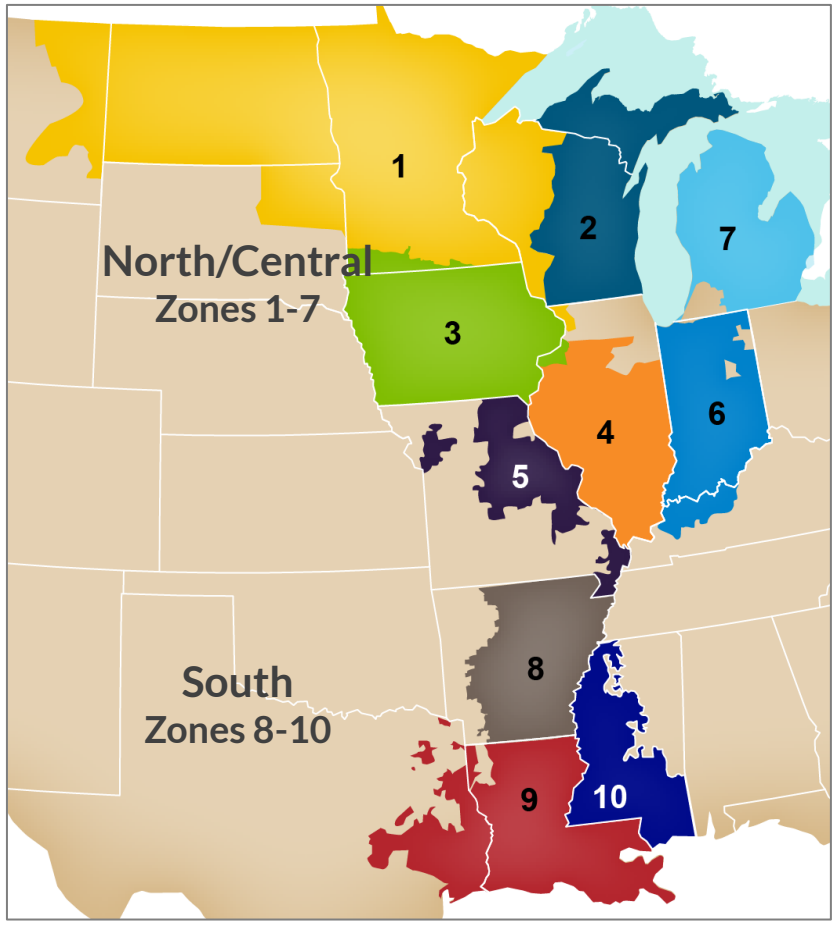
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Acronyms

ACP: Auction Clearing Price
ARC: Aggregator of Retail Customers
BTMG: Behind the Meter Generator
CIL: Capacity Import Limit
CEL: Capacity Export Limit
CONE: Cost of New Entry
CPF: Coincident Peak Forecast
DLOL: Direct Loss-of-Load
DR: Demand Resource
ELCC: Effective Load Carrying Capability
EE: Energy Efficiency
ER: External Resource
ERAS: Expedited Resource Addition Study
ERZ: External Resource Zones
FRAP: Fixed Resource Adequacy Plan
ICAP: Installed Capacity
IMM: Independent Market Monitor
LBA: Load Balancing Authority
LCR: Local Clearing Requirement
LOLE: Loss of Load Expectation
LMR: Load Modifying Resource
LRR: Local Reliability Requirement
LRZ: Local Resource Zone
LSE: Load Serving Entity
OMS: Organization of MISO States
PO: Planned Outage
PRA: Planning Resource Auction
PRM: Planning Reserve Margin
PRMR: Planning Reserve Margin Requirement
RASC: Resource Adequacy Sub-Committee
RBDC: Reliability-Based Demand Curve
SAC: Seasonal Accredited Capacity
SREC: Sub-Regional Export Constraint
SRIC: Sub-Regional Import Constraint
SRPBC: Sub-Regional Power Balance Constraint
SS: Self Schedule
UCAP: Unforced Capacity
ZIA: Zonal Import Ability
ZRC: Zonal Resource Credit

The 2026 PRA demonstrated sufficient capacity at the regional, subregional and zonal levels, with the summer price reflecting the highest risk and a tighter supply-demand balance

MISO Resource Adequacy Zones



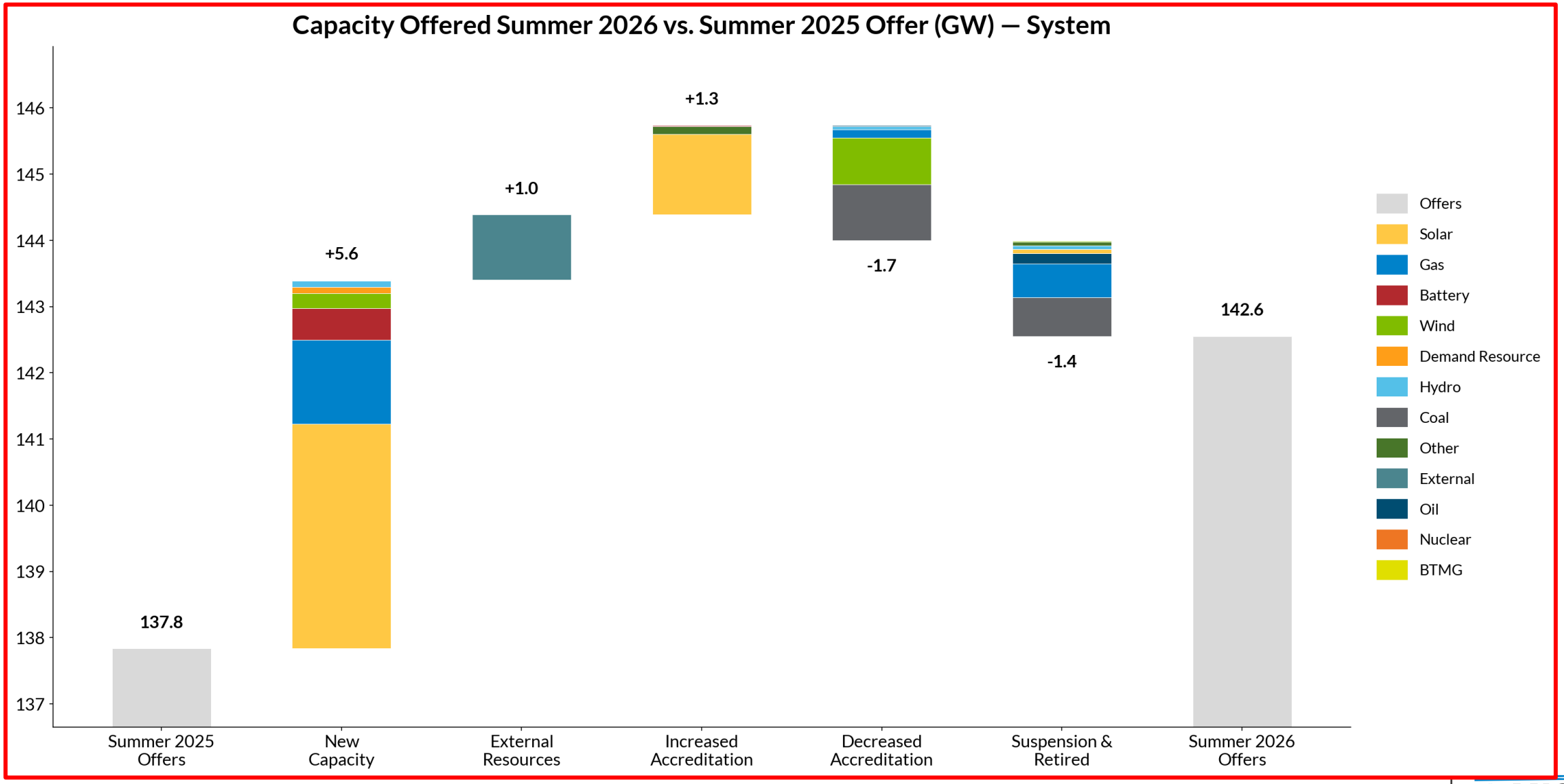
2026 PRA Results

	Price/MW-Day			
	Summer	Fall	Winter	Spring
1	$424.30	$33.92	$35.97	$7.61
2				
3				
4				
5				
6				
7				
8	$384.10			
9	$412.10			
10	$384.10			

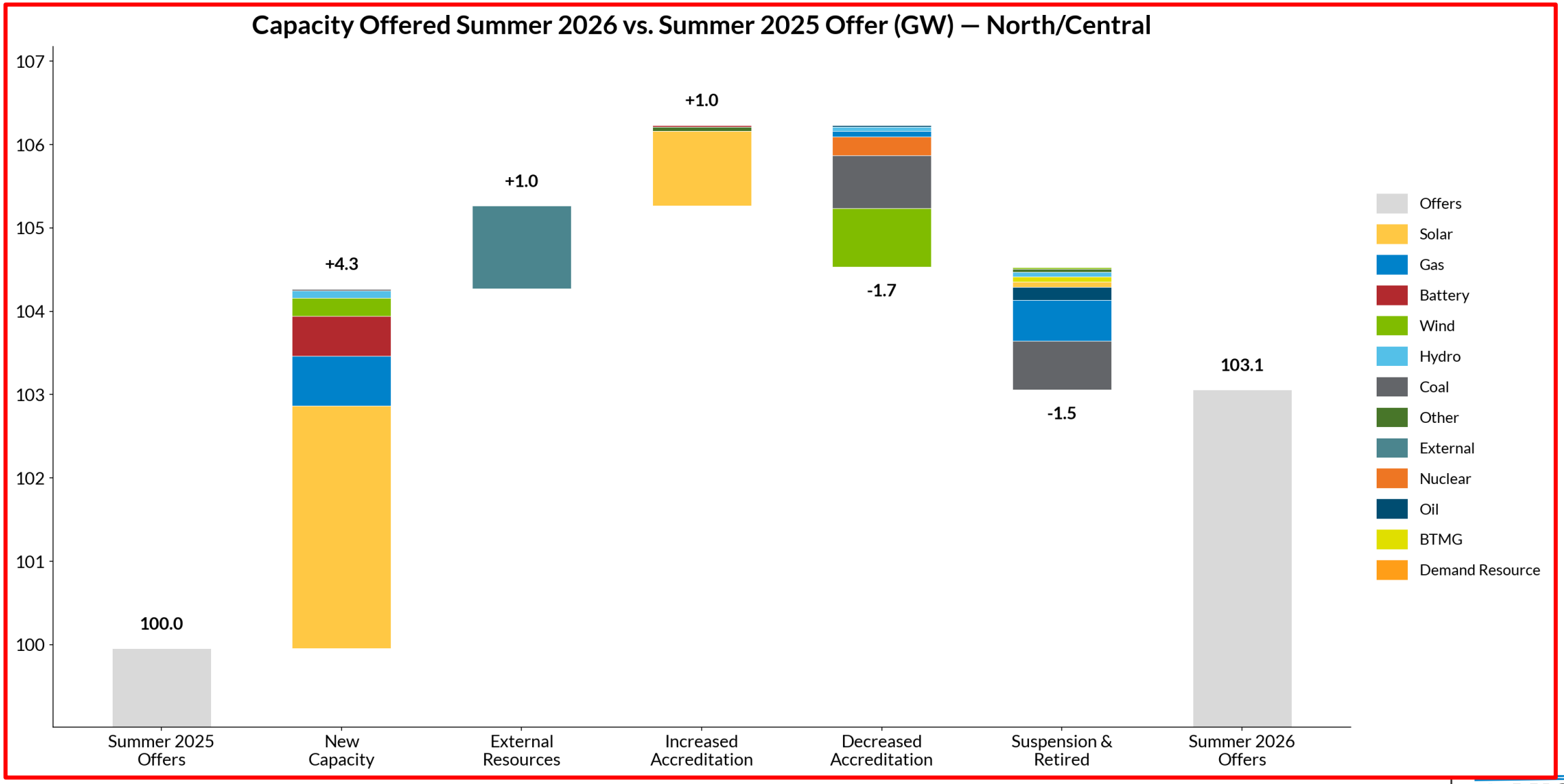
Annualized

$126.19 (N/C)
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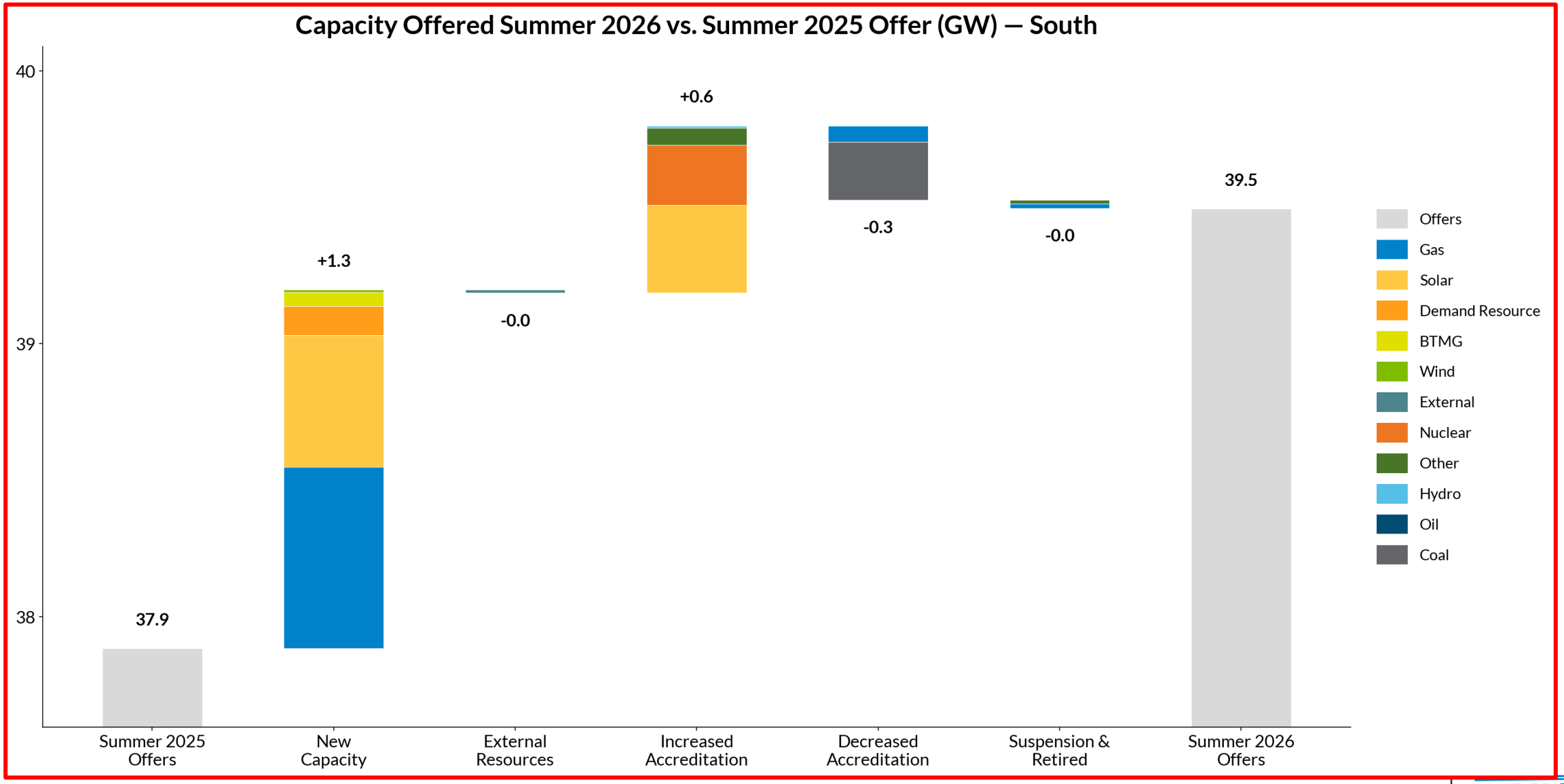
Year-over-year change in capacity offers: Summer - System



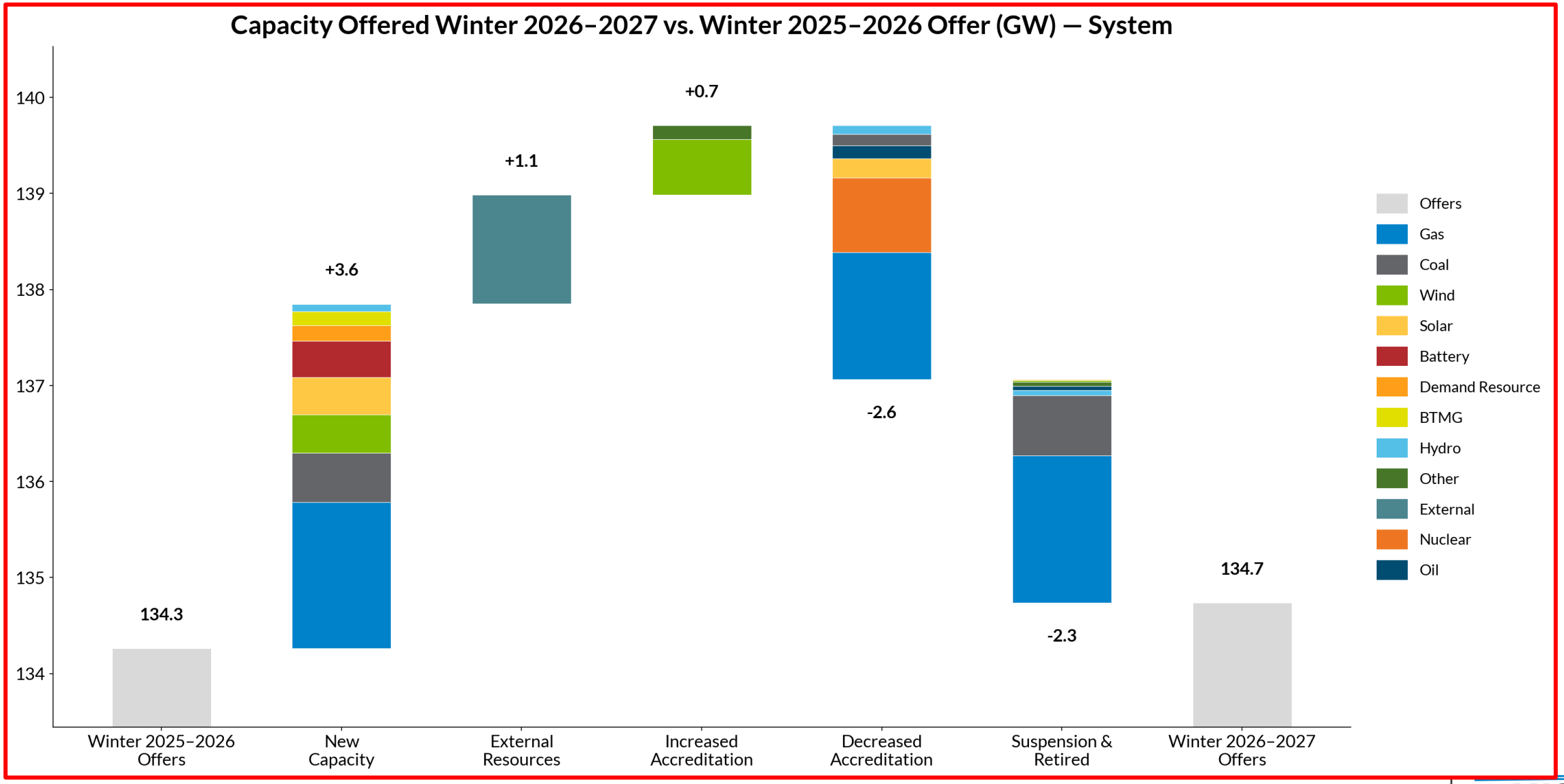
Year-over-year change in capacity offers: Summer – North/Central Subregion



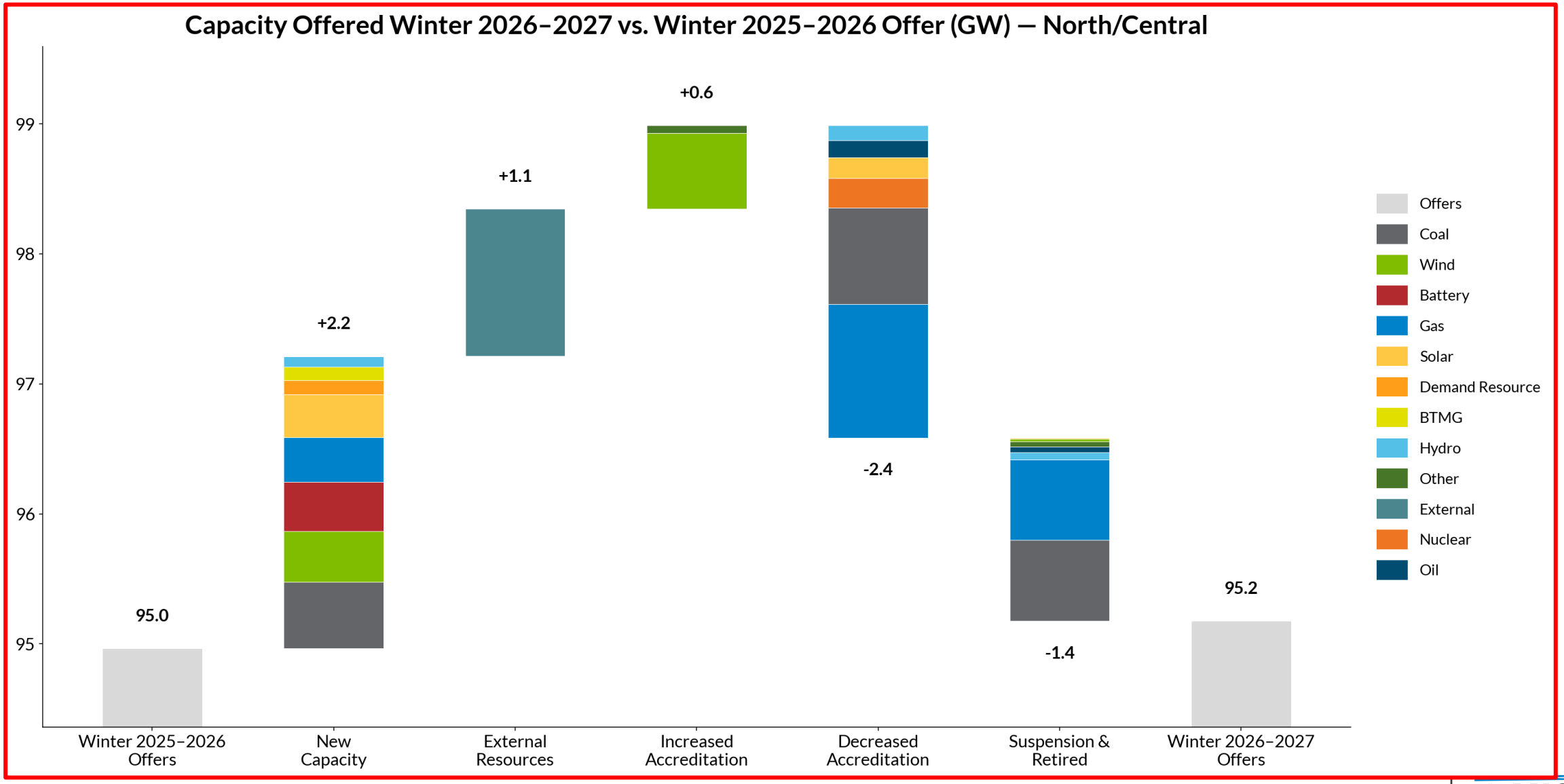
Year-over-year change in capacity offers: Summer – South Subregion



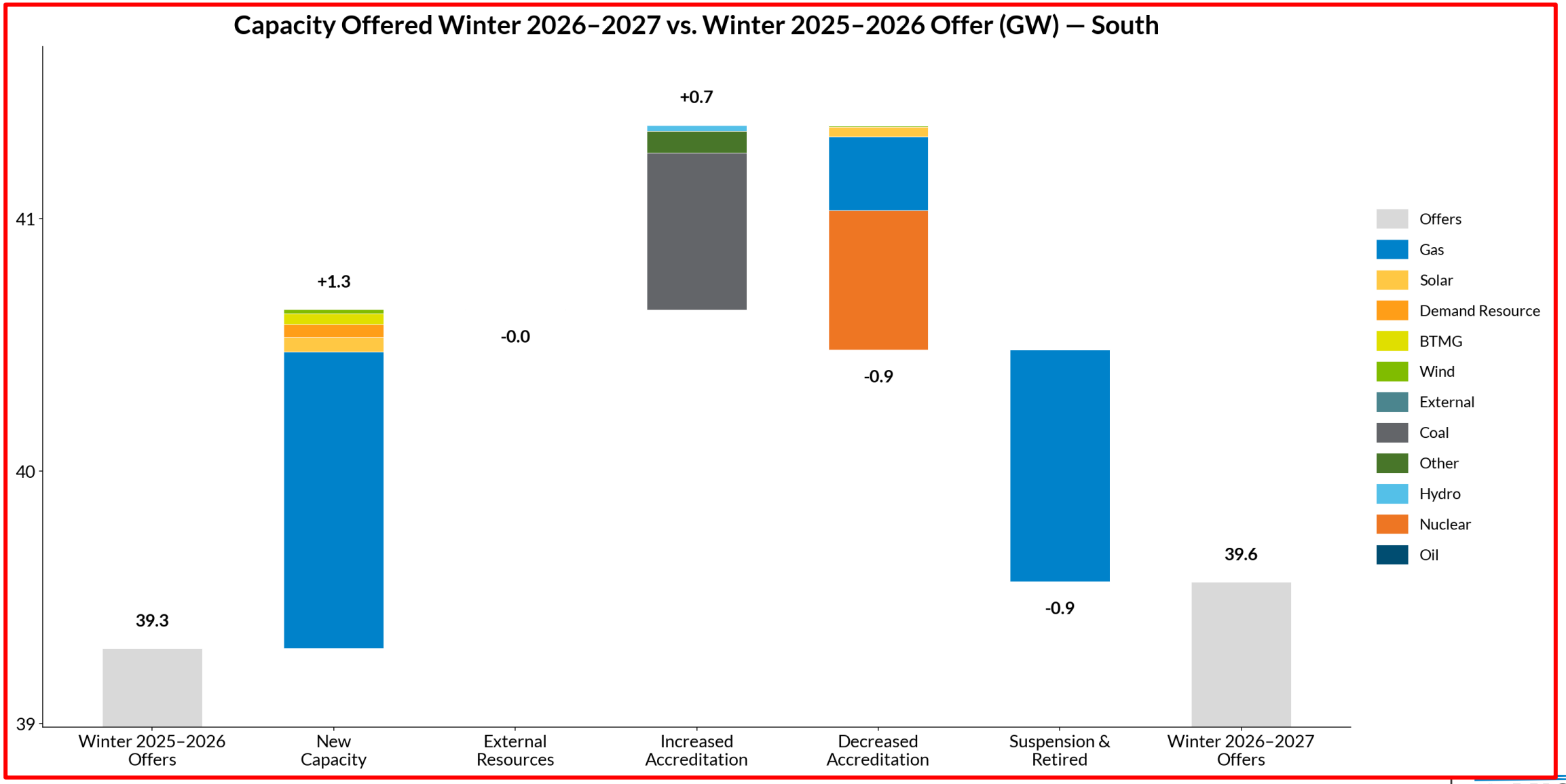
Year-over-year change in capacity offers: Winter – System



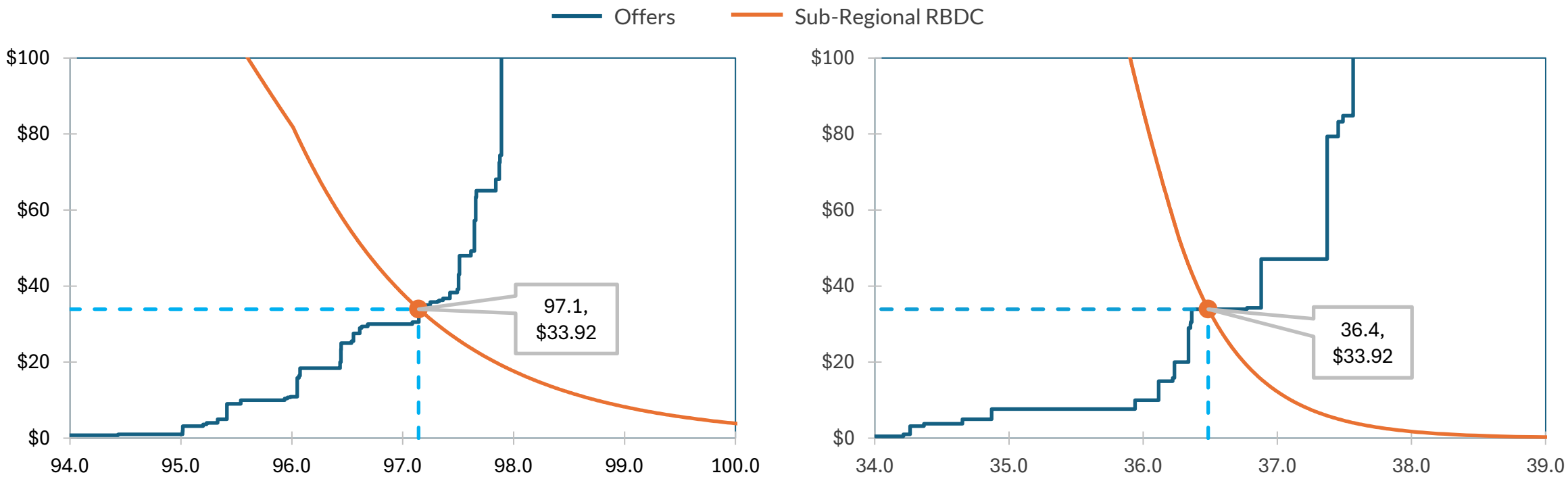
Year-over-year change in capacity offers: Winter – North/Central Subregion



Year-over-year change in capacity offers: Winter – South Subregion

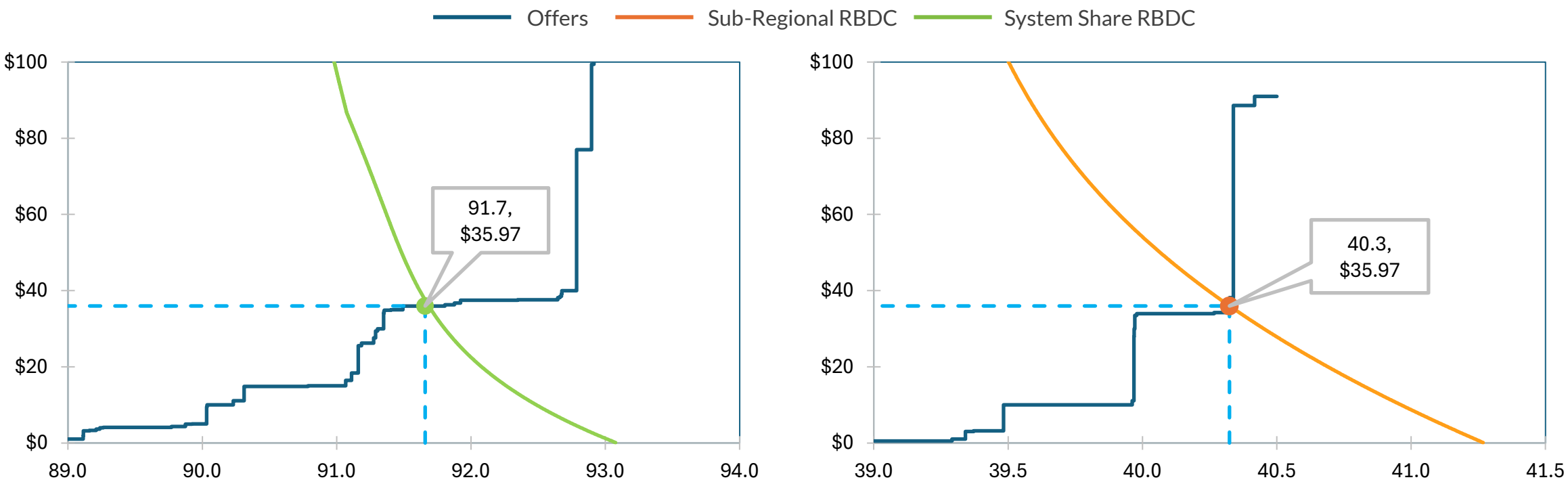


Fall 2026 Reliability-Based Demand Curve, Offer Curves and Auction Clearing Prices



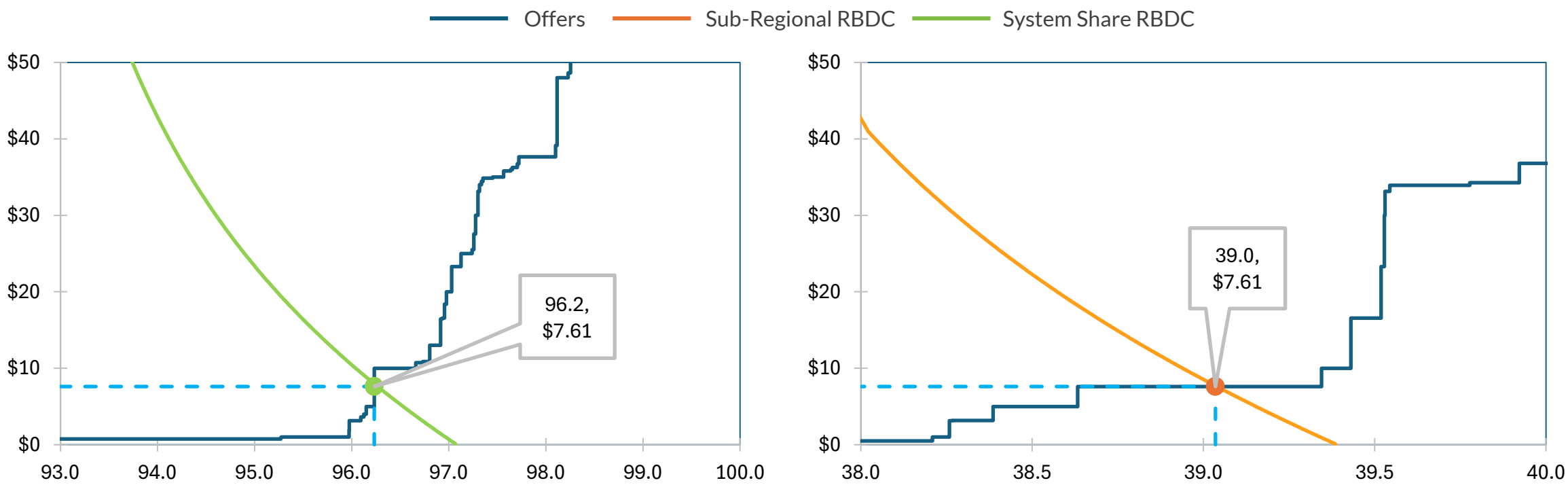
- Subregional RBDCs are determining clearing for both subregions
- No price separation between North/Central and South subregions in fall
  - ACP for both subregions is $33.92
  - Single marginal resource in South sets the price
- In fall season, "effective" margin for North/Central subregion is at **16.7% and 18.9%** for South subregion vs. target of 11.6%

Winter 2026/27 Reliability-Based Demand Curve, Offer Curves and Auction Clearing Prices



- Share of System RBDC determined clearing in the North/Central subregion
- Subregional RBDC determines clearing in the South subregion
- No price separation between North/Central and South subregions in winter
  - ACP for both subregions is $35.97; Multiple marginal resources in North/Central set the price
- In winter, "effective" margin for North/Central subregion is at **20.0% and 30.7**% for South subregion vs. target of 18.9%

Spring 2027 Reliability-Based Demand Curve, Offer Curves and Auction Clearing



- Share of System RBDC determined clearing in the North/Central subregion
- Subregional RBDC determines clearing in the South subregion
- No price separation between North/Central and South subregions in spring
  - ACP for both subregions is $7.61; Multiple marginal resources in South set the price
- In spring, "effective" margin for North/Central subregion is at **26.1% and 33.2%** for South subregion vs. target of 23.4%

Summer 2026 PRA Results by Zone

	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	Z9	Z10	ERZ[1]	North	South	System
Initial PRMR	18,968.1	13,425.3	11,290.0	9,194.7	8,455.7	18,778.8	21,004.1	8,691.4	22,548.5	5,566.2	N/A	101,116.7	36,806.1	137,922.8
Final PRMR	19,688.5	13,935.4	11,719.1	9,543.7	8,777.4	19,492.0	21,802.2	8,835.6	22,921.9	5,658.5	N/A	104,958.3	37,416.0	142,374.3
Offer Submitted (Including FRAP)	19,568.4	15,061.4	11,298.8	10,634.6	7,119.2	16,753.8	21,403.4	11,998.8	21,368.7	5,816.8	1,529.2	103,058.3	39,494.8	142,553.1
FRAP	4,609.7	8,203.5	341.2	463.6	0.0	1,245.0	1,291.8	434.5	0.0	1,562.5	36.3	16,188.4	1,999.7	18,188.1
RBDC Opt-Out	-	-	-	-	-	-	-	-	-	-		0.0	0.0	0.0
Self Scheduled (SS)	14,641.3	6,682.7	10,725.5	8,435.5	6,934.9	10,365.0	19,814.5	11,031.1	19,109.6	3,999.3	1,141.4	78,542.5	34,338.3	112,880.8
Non-SS Offer Cleared	317.4	175.2	232.1	1,735.5	184.3	5,143.8	297.1	533.2	2,080.3	255.0	351.5	8,327.4	2,978.0	11,305.4
Committed (Offer Cleared + FRAP)	19,568.4	15,061.4	11,298.8	10,634.6	7,119.2	16,753.8	21,403.4	11,998.8	21,189.9	5,816.8	1,529.2	103,058.3	39,316.0	142,374.3
LCR	13,280.5	8,795.4	8,145.5	2,554.5	6,062.8	15,243.5	17,396.8	7,226.4	21,189.9	1,860.9	-	N/A	N/A	N/A
CIL	7,044.0	5,072.0	5,489.0	8,708.0	4,417.0	6,731.0	4,628.0	4,187.0	4,309.0	5,322.0	-	N/A	N/A	N/A
ZIA	7,042.0	5,072.0	5,400.0	8,517.0	4,417.0	6,440.0	4,628.0	3,981.0	4,309.0	5,322.0	-	N/A	N/A	N/A
Import	120.1	0.0	420.3	0.0	1,658.2	2,738.2	398.8	0.0	1,732.0	0.0	-	1,900.0	0.0	1,529.2
CEL	3,718.0	3,088.0	5,044.0	8,034.0	5,255.0	7,453.0	5,745.0	5,197.0	3,361.0	2,132.0	-	N/A	N/A	N/A
Export	0.0	1,126.0	0.0	1,090.9	0.0	0.0	0.0	3,163.2	0.0	158.3	1,529.2	0.0	1,900.0	-
ACP ($/MW-Day)	$424.30	$424.30	$424.30	$424.30	$424.30	$424.30	$424.30	$384.10	$412.10	$384.10	$405.31-$424.30	N/A	N/A	N/A

Values displayed in MW SAC; ERZ: External Resource Zones. Final PRMR values provided at Zonal level given lack of RBDC Opt-Out.

[1]Total ZRCs from External Resources that are not Border External Resources (BER) or Coordinating Owner Resources (COR).

Fall 2026 PRA Results by Zone

	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	Z9	Z10	ERZ[1]	North	South	System
Initial PRMR	17,218.8	11,870.4	10,449.6	8,822.8	7,691.2	17,520.0	19,286.6	7,880.1	21,174.7	5,200.8	N/A	92,859.4	34,255.6	127,115.0
Final PRMR	18,012.8	12,418.2	10,931.4	9,230.0	8,046.1	18,328.3	20,177.0	8,393.1	22,552.9	5,539.0	N/A	97,143.8	36,485.0	133,628.8
Offer Submitted (Including FRAP)	19,290.8	14,299.1	12,531.4	9,984.5	7,153.6	15,241.1	20,491.1	11,634.5	21,268.3	5,528.8	1,527.1	100,225.7	38,724.6	138,950.3
FRAP	4,201.3	7,027.2	343.6	445.7	0.0	1,095.3	1,246.9	403.2	0.0	1,367.1	34.1	14,392.5	1,771.9	16,164.4
RBDC Opt-Out	-	-	-	-	-	-	-	-	-	-		0.0	0.0	0.0
Self Scheduled (SS)	13,841.9	6,748.2	11,775.2	7,843.7	6,937.7	9,526.1	18,027.5	9,845.0	16,494.1	3,833.8	1,084.4	75,599.5	30,358.1	105,957.6
Non-SS Offer Cleared	700.5	426.7	314.3	1,621.7	179.5	3,810.7	241.1	493.7	3,195.2	180.8	342.6	7,530.9	3,975.9	11,506.8
Committed (Offer Cleared + FRAP)	18,743.7	14,202.1	12,433.1	9,911.1	7,117.2	14,432.1	19,515.5	10,741.9	19,689.3	5,381.7	1,461.1	97,522.9	36,105.9	133,628.8
LCR	12,057.3	6,520.8	4,424.1	3,397.9	5,160.5	13,479.1	16,133.1	5,090.4	19,222.5	2,018.4	-	N/A	N/A	N/A
CIL	7,297.0	6,050.0	9,283.0	6,673.0	4,762.0	7,301.0	5,193.0	6,336.0	4,761.0	4,379.0	-	N/A	N/A	N/A
ZIA	7,245.0	6,050.0	9,191.0	6,491.0	4,762.0	7,012.0	5,193.0	6,170.0	4,761.0	4,379.0	-	N/A	N/A	N/A
Import	0.0	0.0	0.0	0.0	928.9	3,896.2	661.5	0.0	2,863.6	157.3	-	0.0	379.1	1,461.1
CEL	4,147.0	5,034.0	5,652.0	6,429.0	3,701.0	5,172.0	5,305.0	3,781.0	3,970.0	2,459.0	-	N/A	N/A	N/A
Export	730.9	1,783.9	1,501.7	681.1	0.0	0.0	0.0	2,348.8	0.0	0.0	1,461.1	379.1	0.0	-
ACP ($/MW-Day)	$33.92	$33.92	$33.92	$33.92	$33.92	$33.92	$33.92	$33.92	$33.92	$33.92	$33.92	N/A	N/A	N/A

Values displayed in MW SAC; ERZ: External Resource Zones. Final PRMR values provided at Zonal level given lack of RBDC Opt-Out.
[1]Total ZRCs from External Resources that are not Border External Resources (BER) or Coordinating Owner Resources (COR).

Winter 2026/27 PRA Results by Zone

	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	Z9	Z10	ERZ[1]	North	South	System
Initial PRMR	18,112.7	11,417.0	10,727.8	8,550.7	8,155.2	18,198.5	15,627.5	8,783.0	22,413.9	5,489.4	N/A	90,789.4	36,686.3	127,475.7
Final PRMR	18,285.9	11,526.7	10,831.0	8,632.3	8,233.4	18,372.6	15,776.8	9,653.8	24,636.2	6,033.8	N/A	91,658.7	40,323.8	131,982.5
Offer Submitted (Including FRAP)	18,976.4	13,305.7	12,736.1	8,210.2	6,246.9	14,617.0	19,647.2	10,982.4	22,518.4	5,730.2	1,766.8	95,177.6	39,559.7	134,737.3
FRAP	4,741.7	6,654.8	334.9	424.6	0.0	1,126.1	1,168.6	458.8	0.0	1,681.4	35.9	14,484.7	2,142.1	16,626.8
RBDC Opt-Out	-	-	-	-	-	-	-	-	-	-		0.0	0.0	0.0
Self Scheduled (SS)	13,674.5	6,243.9	12,146.0	6,735.5	6,153.3	7,898.8	16,240.9	10,326.7	20,995.4	3,998.1	1,360.4	70,239.9	35,533.6	105,773.5
Non-SS Offer Cleared	515.2	259.5	255.2	979.5	90.2	5,119.3	414.7	196.9	1,360.8	50.7	340.0	7,874.3	1,707.7	9,582.0
Committed (Offer Cleared + FRAP)	18,931.4	13,158.2	12,736.1	8,139.6	6,243.5	14,144.2	17,824.2	10,982.4	22,356.2	5,730.2	1,736.3	92,598.9	39,383.4	131,982.3
LCR	13,639.8	7,123.9	5,013.8	3,090.6	1,890.3	11,080.7	14,688.8	8,021.3	21,311.9	3,756.4	-	N/A	N/A	N/A
CIL	5,135.0	5,379.0	9,724.0	5,682.0	6,379.0	8,499.0	4,123.0	3,544.0	3,690.0	3,154.0	-	N/A	N/A	N/A
ZIA	4,533.0	5,294.0	9,620.0	5,493.0	6,379.0	8,208.0	4,123.0	3,366.0	3,690.0	3,154.0	-	N/A	N/A	N/A
Import	0.0	0.0	0.0	492.7	1,989.9	4,228.4	0.0	0.0	2,280.0	303.6	-	0.0	940.4	1,736.3
CEL	2,385.0	3,860.0	9,181.0	4,535.0	6,786.0	3,087.0	5,546.0	4,431.0	2,096.0	1,602.0	-	N/A	N/A	N/A
Export	645.5	1,631.5	1,905.1	0.0	0.0	0.0	2,047.4	1,328.6	0.0	0.0	1,736.3	940.2	0.0	-
ACP ($/MW-Day)	$35.97	$35.97	$35.97	$35.97	$35.97	$35.97	$35.97	$35.97	$35.97	$35.97	$35.97	N/A	N/A	N/A

Values displayed in MW SAC; ERZ: External Resource Zones. Final PRMR values provided at Zonal level given lack of RBDC Opt-Out.
[1]Total ZRCs from External Resources that are not Border External Resources (BER) or Coordinating Owner Resources (COR).

Spring 2027 PRA Results by Zone

	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	Z9	Z10	ERZ[1]	North	South	System
Initial PRMR	17,840.4	12,483.5	10,640.6	7,773.7	7,828.4	17,981.9	19,625.5	8,074.8	22,644.1	5,431.1	N/A	94,174.0	36,150.0	130,324.0
Final PRMR	18,230.6	12,756.1	10,873.3	7,943.3	7,999.5	18,375.1	20,054.3	8,719.1	24,451.4	5,864.4	N/A	96,232.2	39,034.9	135,267.1
Offer Submitted (Including FRAP)	18,619.7	15,445.5	11,520.6	10,895.8	7,288.4	16,078.3	20,721.0	12,186.6	21,295.8	6,216.2	1,420.9	101,683.7	40,005.1	141,688.8
FRAP	4,416.3	7,372.7	336.0	454.4	0.0	1,125.1	1,309.9	298.6	0.0	1,471.5	34.9	15,047.7	1,771.7	16,819.4
RBDC Opt-Out	-	-	-	-	-	-	-	-	-	-		0.0	0.0	0.0
Self Scheduled (SS)	13,460.0	7,952.9	10,781.3	8,595.3	6,995.9	9,691.5	18,445.6	9,727.2	18,812.3	4,333.1	945.7	76,680.8	33,060.0	109,740.8
Non-SS Offer Cleared	321.7	50.0	260.4	1,293.9	164.0	4,090.8	444.0	811.1	1,055.0	126.5	89.5	6,714.3	1,992.6	8,706.9
Committed (Offer Cleared + FRAP)	18,198.0	15,375.6	11,377.7	10,343.6	7,159.9	14,907.4	20,199.5	10,836.9	19,867.3	5,931.1	1,070.1	98,442.9	36,824.2	135,267.1
LCR	10,315.9	6,052.3	3,341.2	2,117.6	4,087.4	10,895.5	15,143.0	5,946.1	19,442.6	2,929.7	-	N/A	N/A	N/A
CIL	6,892.0	6,133.0	9,420.0	6,732.0	4,733.0	8,324.0	5,338.0	5,566.0	4,657.0	4,187.0	-	N/A	N/A	N/A
ZIA	6,690.0	6,133.0	9,311.0	6,533.0	4,733.0	7,999.0	5,338.0	5,374.0	4,657.0	4,187.0	-	N/A	N/A	N/A
Import	32.6	0.0	0.0	0.0	839.6	3,467.7	0.0	0.0	4,584.1	0.0	-	0.0	2,210.7	1,070.1
CEL	3,513.0	4,608.0	6,282.0	6,248.0	5,811.0	4,140.0	5,497.0	3,952.0	4,633.0	2,725.0	-	N/A	N/A	N/A
Export	0.0	2,619.5	504.4	2,400.3	0.0	0.0	145.2	2,117.8	0.0	66.7	1,070.1	2,210.7	0.0	-
ACP ($/MW-Day)	$7.61	$7.61	$7.61	$7.61	$7.61	$7.61	$7.61	$7.61	$7.61	$7.61	$7.61	N/A	N/A	N/A

Values displayed in MW SAC; ERZ: External Resource Zones. Final PRMR values provided at Zonal level given lack of RBDC Opt-Out.
[1]Total ZRCs from External Resources that are not Border External Resources (BER) or Coordinating Owner Resources (COR).

Summer Supply Offered and Cleared Comparison Trend

Planning Resource	Offered (ZRC)				Cleared (ZRC)			
	Summer 2023	Summer 2024	Summer 2025	Summer 2026	Summer 2023	Summer 2024	Summer 2025	Summer 2026
Generation	122,375.6	123,277.8	121,015.6	124,690.1	116,989.7	119,361.4	120,738.6	124,511.3
External Resources[1]	4,514.6	4,430.4	3,505.9	4,490.6	4,072.5	4,309.8	3,505.9	4,490.6
Behind the Meter Generation	4,175.2	4,180.2	4,282.8	4,272.9	4,129.4	4,143.5	4,282.8	4,272.9
Demand Resources	8,303.5	8,618.3	9,004.4	9,099.5	7,694.6	8,067.5	9,004.4	9,099.5
Energy Efficiency	5.0	22.5	27.6	0.0	5.0	22.5	27.6	0.0
Total	**139,373.9**	**140,529.2**	**137,836.3**	**142,553.1**	**132,891.2**	**135,904.7**	**137,559.3**	**142,374.3**

ZRC: Zonal Resource Credit

[1]Total ZRC/SAC for all External Resources (including BER and COR)

Fall Supply Offered and Cleared Comparison Trend

	Offered (ZRC)				Cleared (ZRC)			
Planning Resource	Fall 2023	Fall 2024	Fall 2025	Fall 2026	Fall 2023	Fall 2024	Fall 2025	Fall 2026
Generation	121,403.5	119,627.5	122,283.4	123,289.3	111,713.8	111,673.7	118,309.5	118,561.2
External Resources[1]	4,095.4	4,366.8	2,833.5	3,846.2	3,979.6	3,990.2	2,763.6	3,780.2
Behind the Meter Generation	3,874.2	3,877.9	3,646.8	3,925.0	3,842.8	3,789.7	3,646.8	3,923.0
Demand Resources	7,004.2	6,824.2	7,983.7	7,889.8	6,254.4	5,915.6	7,767.8	7,364.4
Energy Efficiency	4.9	22.5	28.1	0.0	4.8	22.5	28.1	0.0
Total	**136,382.2**	**134,718.9**	**136,775.5**	**138,950.3**	**125,795.4**	**125,391.7**	**132,515.8**	**133,628.8**

ZRC: Zonal Resource Credit
[1]Total ZRC/SAC for all External Resources (including BER and COR)

Winter Supply Offered and Cleared Comparison Trend

Planning Resource	Offered (ZRC)				Cleared (ZRC)			
	Winter 2023-2024	Winter 2024-2025	Winter 2025-2026	Winter 2027-2026	Winter 2023-2024	Winter 2024-2025	Winter 2025-2026	Winter 2026-2027
Generation	124,632.7	132,844.3	120,225.1	119,295.9	114,886.6	117,640.7	117,392.0	117,053.4
External Resources[1]	3,937.1	3,973.0	2,808.7	3,941.5	3,334.6	3,313.3	2,793.7	3,911.0
Behind the Meter Generation	3,257.8	3,111.5	3,082.9	3,228.3	3,173.9	2,957.3	3,082.6	3,228.3
Demand Resources	7,648.2	7,818.6	8,112.3	8,271.6	6,702.4	6,774.9	7,698.3	7,789.6
Energy Efficiency	6.7	29.7	32.9	0.0	6.7	29.7	32.9	0.0
Total	**139,482.5**	**147,777.1**	**134,261.9**	**134,737.3**	**128,104.2**	**130,715.9**	**130,999.5**	**131,982.3**

ZRC: Zonal Resource Credit
[1]Total ZRC/SAC for all External Resources (including BER and COR)

Spring Supply Offered and Cleared Comparison Trend

	Offered (ZRC)				Cleared (ZRC) [1]			
Planning Resource	Spring 2024	Spring 2025	Spring 2026	Spring 2027	Spring 2024	Spring 2025	Spring 2026	Spring 2027
Generation	119,254.7	121,303.8	120,780.6	125,637.7	110,195.8	113,091.4	115,724.7	120,373.9
External Resources[1]	3,794.1	3,481.8	2,640.1	3,527.3	3,409.1	3,406.5	2,570.3	3,076.5
Behind the Meter Generation	4,096.4	4,201.6	4,133.5	4,263.8	4,058.9	4,180.5	4,133.5	4,240.2
Demand Resources	7,287.7	7,602.9	8,475.9	8,260.0	6,720.0	7,087.2	8,240.5	7,576.5
Energy Efficiency	5.3	25.0	30.5	0.0	5.3	25.0	30.5	0.0
Total	**134,438.2**	**136,615.1**	**136,060.6**	**141,688.8**	**124,389.1**	**127,790.6**	**130,699.5**	**135,267.1**

ZRC: Zonal Resource Credit
[1]Total ZRC/SAC for all External Resources (including BER and COR)

2026 PRA pricing compared with Independent Market Monitor (IMM) Conduct Threshold and Cost of New Entry (CONE)

PY	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9	Zone 10	ERZs	System CONE (Seasonal)	North/Central CONE (Seasonal)	South CONE (Seasonal)
Summer 2026	$424.30							$384.10	$412.10	$384.10	$405.31-$424.30	$1,422.37	$1,453.99	$1,348.59
Fall 2026	$33.92											$1,422.37	$1,453.99	$1,348.59
Winter 2026-27	$35.97											$1,422.37	$1,453.99	$1,348.59
Spring 2027	$7.61											$1,422.37	$1,453.99	$1,348.59
Cost of New Entry (Annual)	$134,160	$131,310	$127,330	$132,380	$142,970	$130,710	$137,510	$125,070	$123,890	$123,250	$142,970			
IMM Conduct Threshold*	$36.76	$35.98	$34.88	$36.27	$39.17	$35.81	$37.67	$34.27	$33.94	$33.77	-			

- Zonal Resource Credit (ZRC) offers that impact pricing should generally stay below the IMM Conduct Threshold and applies to all seasons.

Zonal Auction Clearing Prices (ACP) shown in $/MW-day. ERZ: External Resource Zones.

Historical Summer Auction Clearing Price Comparison ($/MW-Day)

PY	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9	Zone 10	ERZs
2015-2016		$3.48		$150.00		$3.48		$3.29		N/A	N/A
2016-2017	$19.72			$72.00				$2.99			N/A
2017-2018					$1.50						N/A
2018-2019	$1.00				$10.00						N/A
2019-2020				$2.99			$24.30	$2.99			
2020-2021				$5.00			$257.53	$4.75	$6.88	$4.75	$4.89-$5.00
2021-2022				$5.00				$0.01			$2.78-$5.00
2022-2023				$236.66				$2.88			$2.88-236.66
Summer 2023					$10.00						
Summer 2024					$30.00						
Summer 2025					$666.50						
Summer 2026				$424.30				$384.10	$412.10	$384.10	$405.31-$424.30

ERZ: External Resource Zones.

Fall Auction Clearing Price Comparison ($/MW-Day)

PY	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9	Zone 10	ERZs
Fall 2023	$15.00								$59.21	$15.00	
Fall 2024	$15.00				$719.81	$15.00					
Fall 2025	$91.60							$74.09			$83.24-$91.60
Fall 2026	$33.92										

ERZ: External Resource Zones.

Winter Auction Clearing Price Comparison ($/MW-Day)

PY	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9	Zone 10	ERZs
Winter 2023-24	$2.00								$18.88	$2.00	
Winter 2024-25	$0.75										
Winter 2025-26	$33.20										
Winter 2026-27	$35.97										

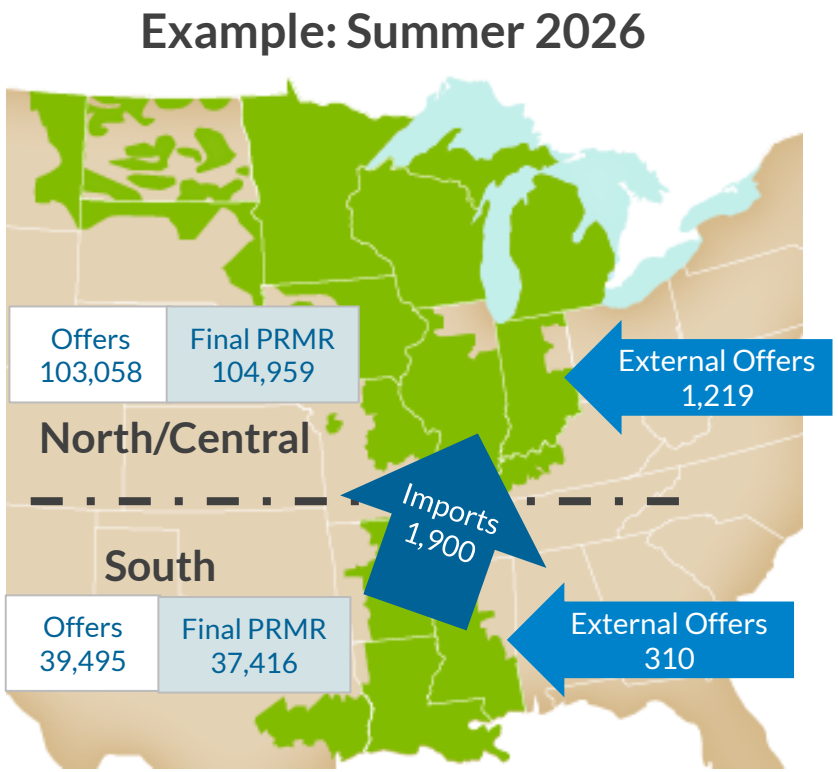
ERZ: External Resource Zones.

Spring Auction Clearing Price Comparison ($/MW-Day)

PY	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9	Zone 10	ERZs
Spring 2024	$10.00										
Spring 2025	$34.10				$719.81	$34.10					
Spring 2026	$69.88										
Spring 2027	$7.61										

ERZ: External Resource Zones.

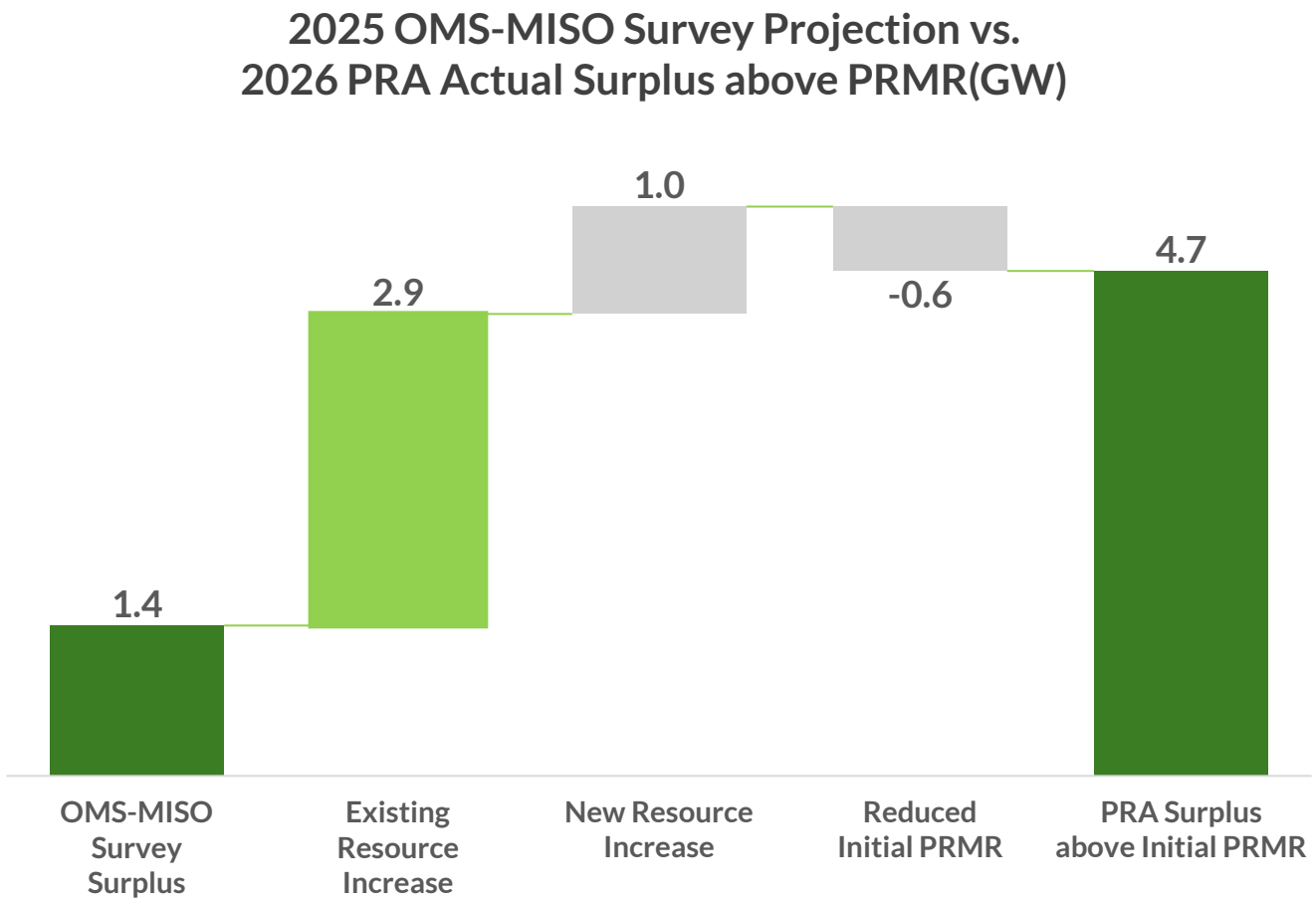
Offered Capacity, Final PRMR, Imports & Exports (MW)



	Subregion	External Offers	Total Offers	Final PRMR	Imports	Exports
Summer	North/Central	1,219	103,058	104,959	1,900	-
	South	310	39,495	37,416	-	1,900
Fall	North/Central	1,234	100,226	97,144	-	379
	South	293	38,725	36,485	379	-
Winter	North/Central	1,422	95,178	91,659	-	940
	South	315	39,560	40,234	940	-
Spring	North/Central	881	101,684	96,233	-	2,211
	South	189	40,005	39,035	2,211	-

PRMR: Planning Reserve Margin Requirement. Offers includes Fixed Resource Adequacy Plan (FRAP), Self-scheduled and price sensitive offers.

The surplus capacity, with reference to PRMR target, offered into the 2026 auction was within the projections range included in the 2025 OMS-MISO Survey



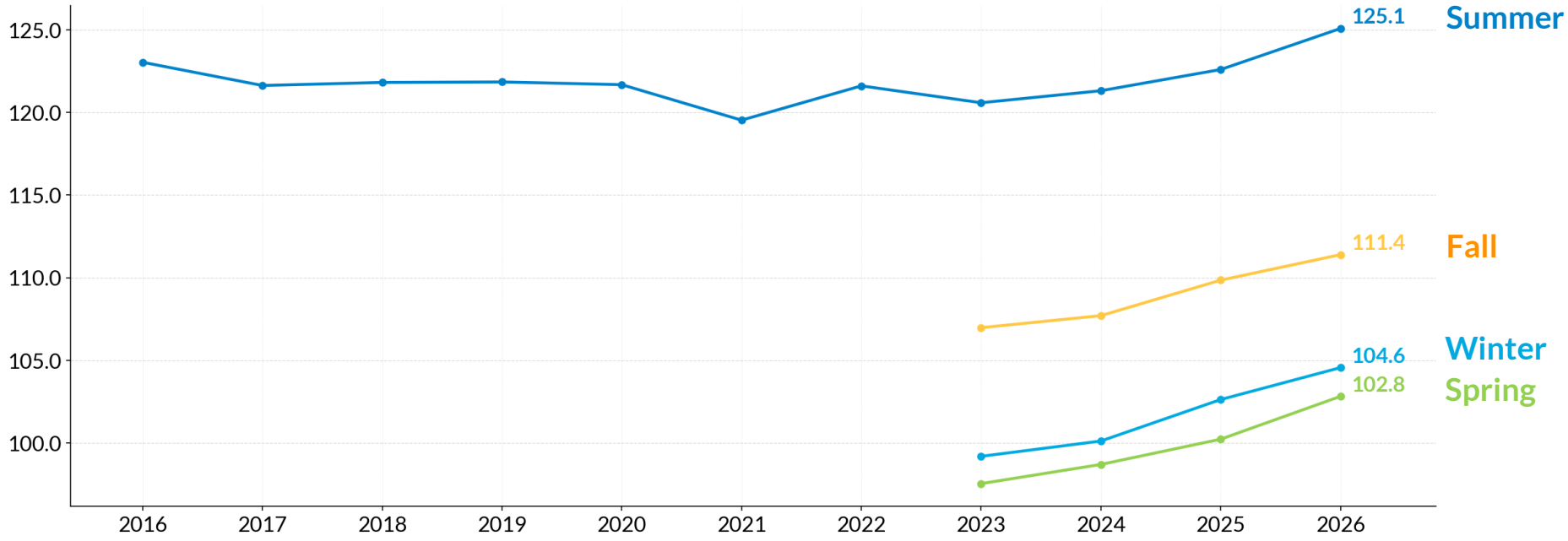
Summer 2026 auction outcomes vs. 2025 OMS-MISO Survey projection for 2026

- Surplus capacity above PRMR target offered into the 2026 PRA for Summer 2026 was ~4.6GW which is within the range of 1.4 GW – 6.1 GW projections in the 2025 OMS-MISO Survey
- Incremental accreditation reductions in the auction were offset by incremental increases in new resource additions
- Notably, initial PRMR was lower (0.6 GW) than projected in the OMS-MISO Survey

PRA Shortfall/Surplus relative to Initial PRMR | PRMR: Planning Reserve Margin Requirement

Coincident Peak Forecast History

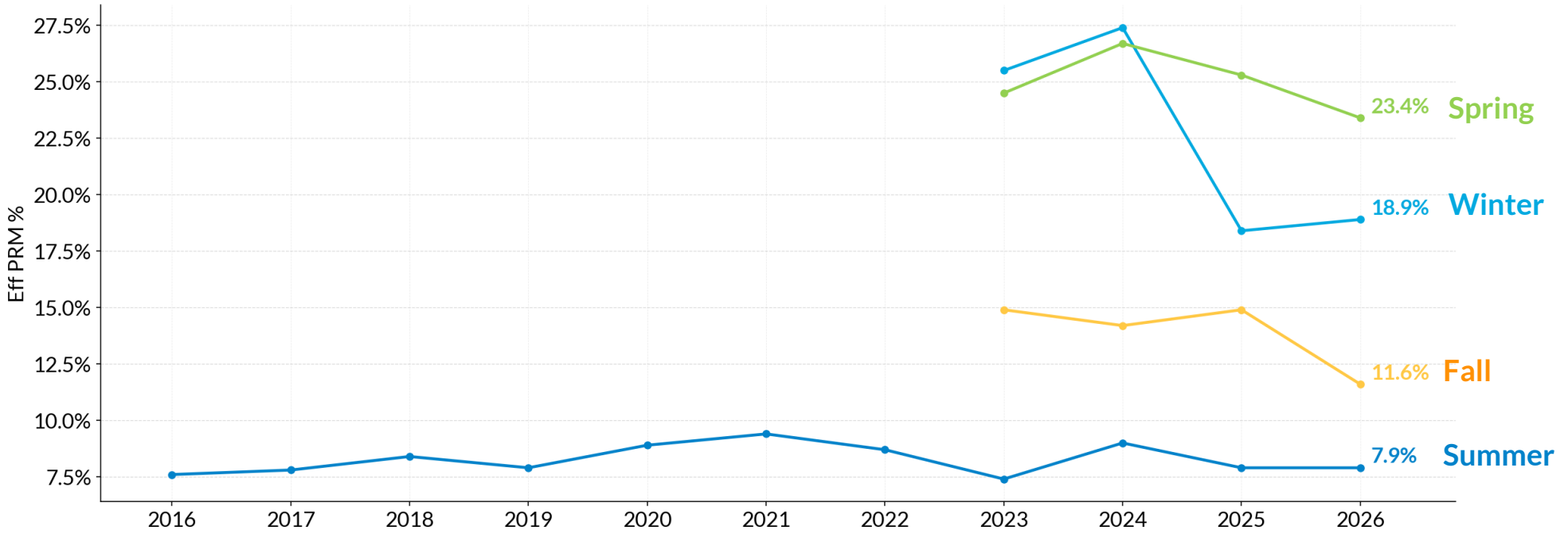
Year-over-year:
- Summer CPF (+2.5 GW)
- PRM (+/-0.0%)
- Final PRMR (+4.8 GW)



	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Summer CPF	123,035.8	121,631.2	121,815.6	121,845.4	121,679.8	119,532.0	121,608.5	120,586.8	121,314.1	122,596.6	125,080.2
Fall CPF								106,973.8	107,701.4	109,850.0	111,392.9
Winter CPF								99,188.0	100,114.6	102,624.0	104,556.9
Spring CPF								97,537.6	98,697.8	100,225.2	102,818.0

CPF: Coincident Peak Forecast

Planning Reserve Margin History

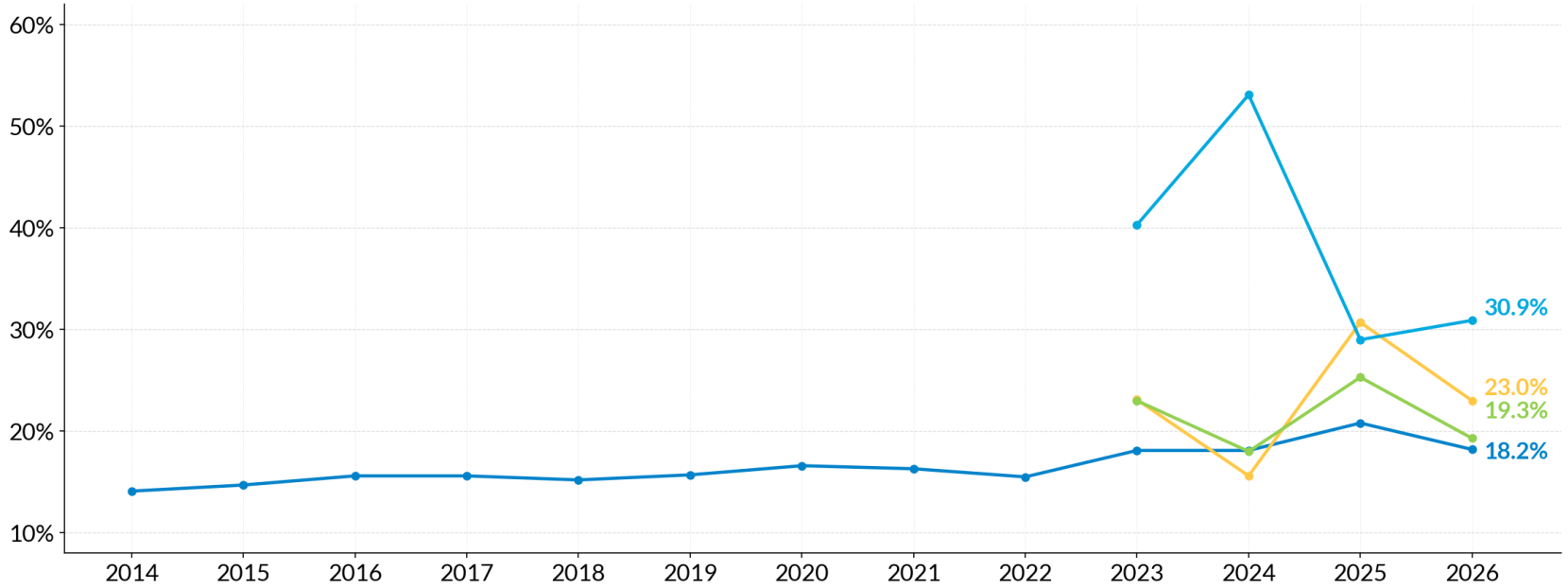


	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Summer PRM	7.6%	7.8%	8.4%	7.9%	8.9%	9.4%	8.7%	7.4%	9.0%	7.9%	7.9%
Fall PRM								14.9%	14.2%	14.9%	11.6%
Winter PRM								25.5%	27.4%	18.4%	18.9%
Spring PRM								24.5%	26.7%	25.3%	23.4%

PRM: Planning Reserve Margin

Wind Effective Load Carrying Capacity (%)

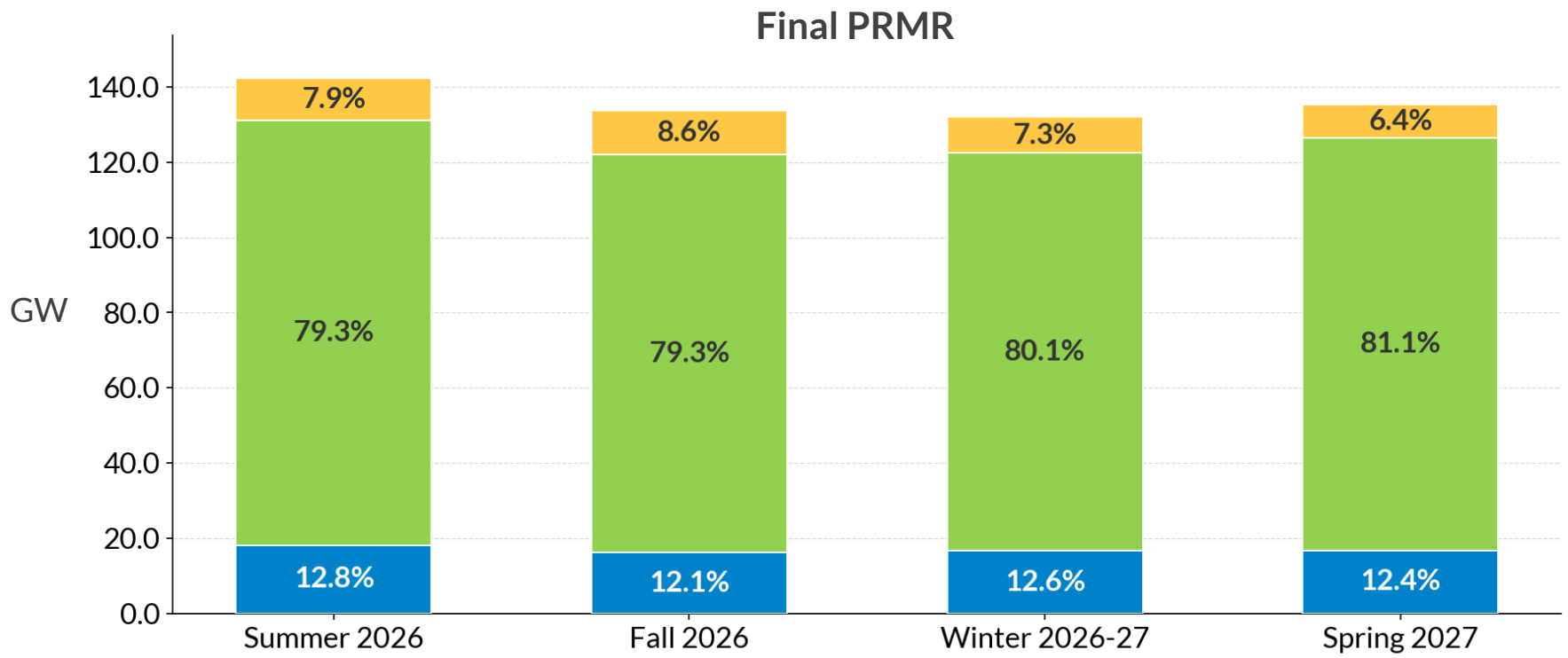
- No change to wind or solar accreditation methodology from previous years
- Methodology applied on a seasonal basis
- Wind ELCC and new solar capacity is established in the LOLE Study
- New solar class average
  - Summer, Fall, Spring: 50%; Winter: 5%



	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Summer ELCC	14.1%	14.7%	15.6%	15.6%	15.2%	15.7%	16.6%	16.3%	15.5%	18.1%	18.1%	20.8%	18.2%
Fall ELCC										23.1%	15.6%	30.7%	23.0%
Winter ELCC										40.3%	53.1%	29.0%	30.9%
Spring ELCC										23.0%	18.0%	25.3%	19.3%

ELCC: Effective Load Carrying Capability LOLE: Loss of Load Expectation

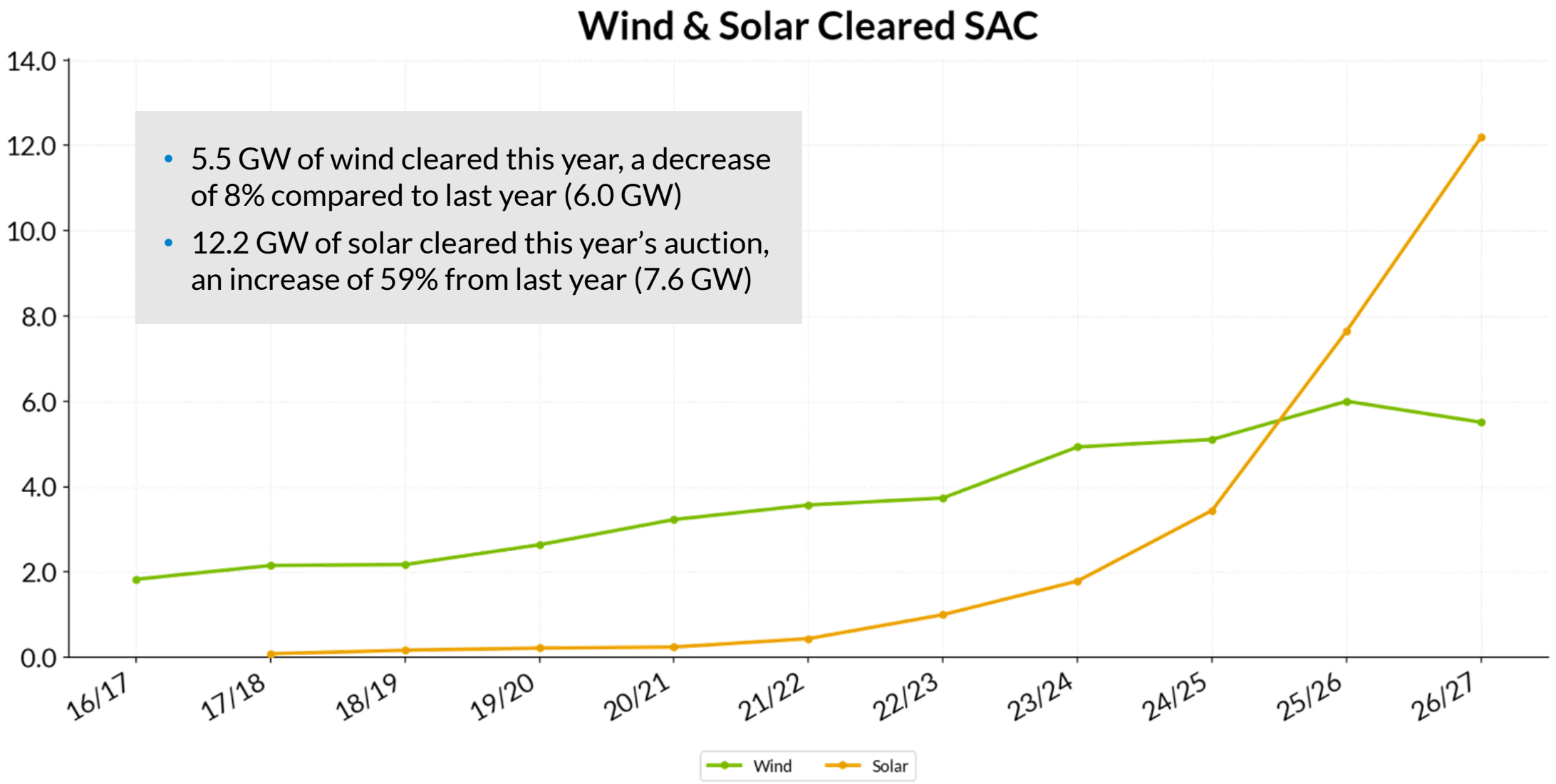
2026/27 Seasonal Resource Adequacy Requirements are fulfilled similarly across all four seasons



	Summer 2026	Fall 2026	Winter 2026-27	Spring 2027
Cleared Non-Self Scheduled	11,305.4	11,506.8	9,582.2	8,706.9
Self Scheduled	112,880.8	105,957.6	105,773.5	109,740.8
FRAP	18,188.1	16,164.4	16,626.8	16,819.4

PRMR: Planning Reserve Margin Requirement FRAP: Fixed Resource Adequacy Plan

Although conventional generation still comprises most of the capacity, wind and solar continue to grow

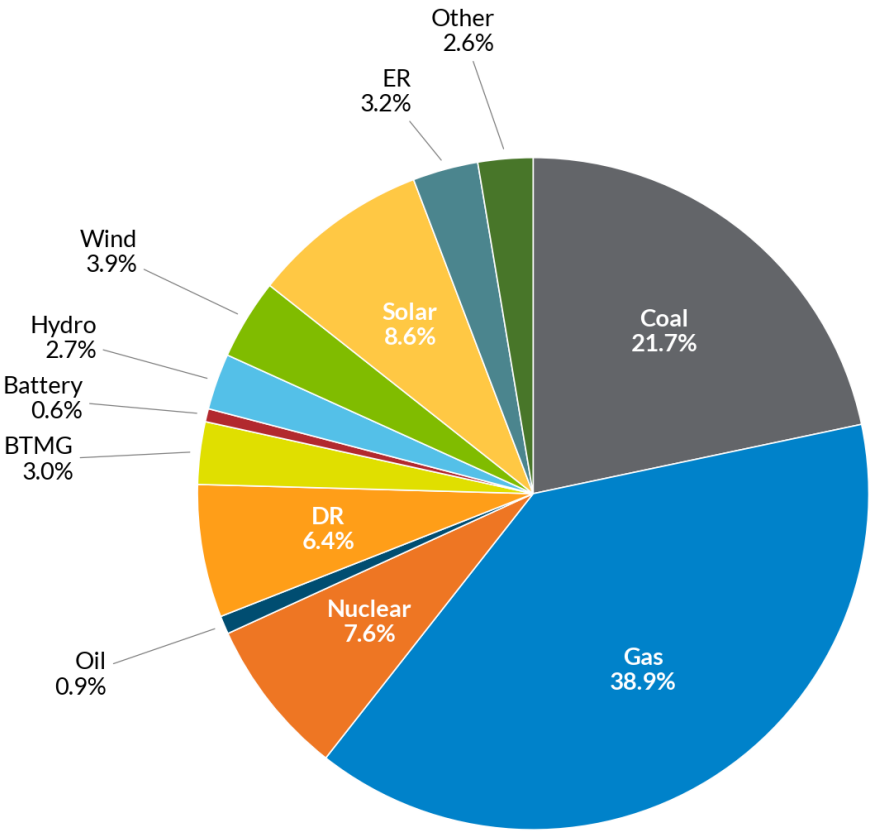


- 5.5 GW of wind cleared this year, a decrease of 8% compared to last year (6.0 GW)
- 12.2 GW of solar cleared this year's auction, an increase of 59% from last year (7.6 GW)

SAC: Seasonal Accredited Capacity

Winter Final PRMR is 6.6 GW (4.8%) lower than the summer with fewer solar resources to meet Final PRMR in the winter versus the summer

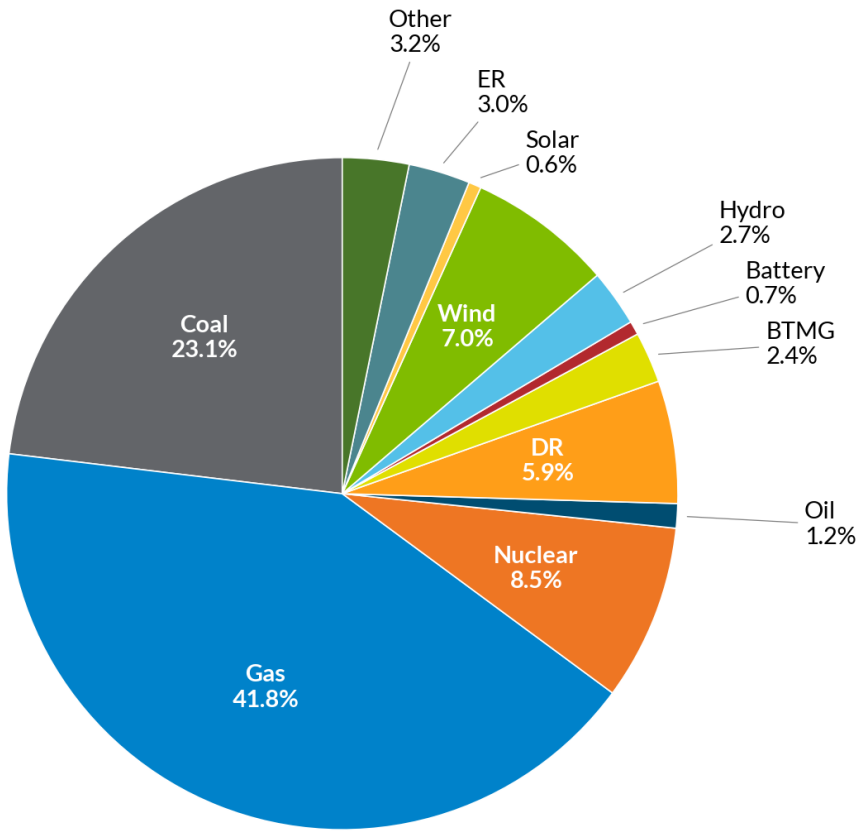
Summer 2026



MISO-Wide

Cleared ZRC	Summer 2026	Winter 2026/27	Difference
Coal	30,884.7	30,492.7	392.0
Gas	55,391.4	55,158.7	232.7
Nuclear	10,782.8	11,167.2	-384.4
Oil	1,246.5	1,548.8	-302.3
DR	9,099.5	7,789.6	1,309.9
BTMG	4,272.9	3,228.3	1,044.6
Battery	893.8	870.4	23.4
Hydro	3,843.1	3,595.9	247.2
Wind	5,509.1	9,196.2	-3,687.1
Solar	12,198.3	801.9	11,396.4
ER	4,490.6	3,911.0	579.6
Other	3,761.6	4,221.8	-460.2
PRMR	**142,374.3**	**131,982.5**	**10,391.8**

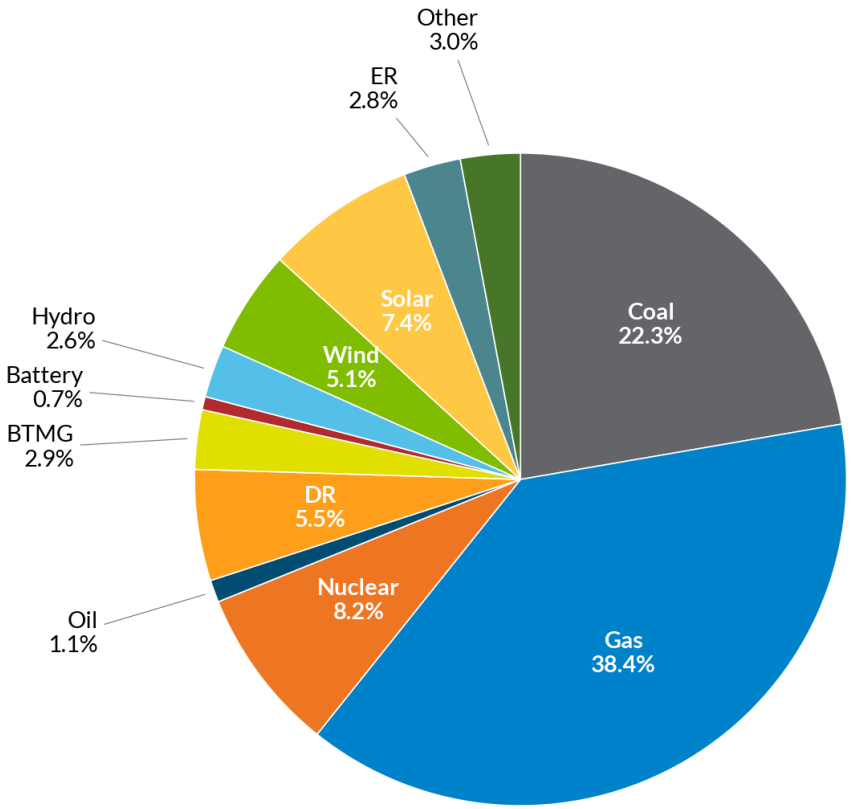
Winter 2026/27



PRMR: Planning Reserve Margin Requirement

Fall 2026 and Spring 2027 - Cleared ZRCs and Final PRMR

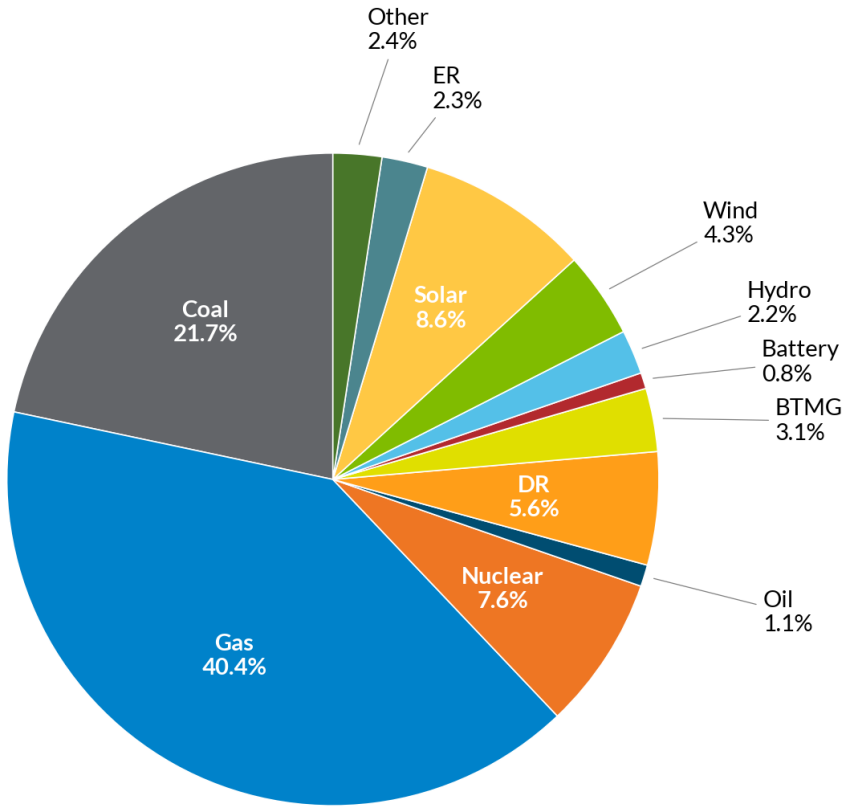
Fall 2026



MISO-Wide

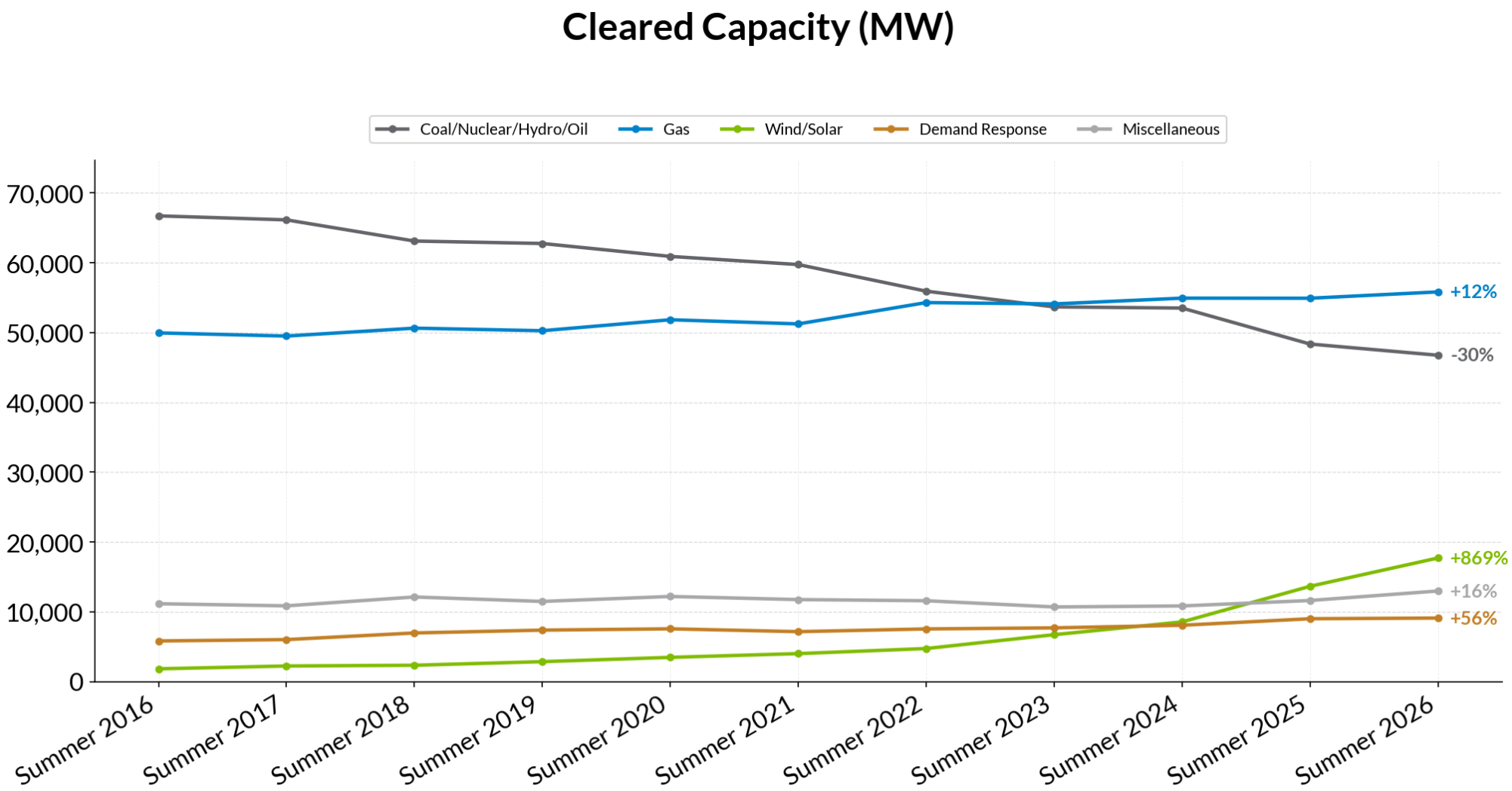
Cleared ZRC	Fall 2026	Spring 2027	Difference
Coal	29,777.7	29,324.7	453.0
Gas	51,370.6	54,663.4	-3,292.8
Nuclear	10,900.3	10,286.7	613.6
Oil	1,471.9	1,448.6	23.3
DR	7,364.4	7,576.5	-212.1
BTMG	3,923.0	4,240.2	-317.2
Battery	873.3	1,070.8	-197.5
Hydro	3,475.3	2,964.0	511.3
Wind	6,797.3	5,757.1	1,040.2
Solar	9,932.9	11,595.0	-1,662.1
ER	3,780.2	3,076.5	703.7
Other	3,961.9	3,263.6	698.3
PRMR	**133,628.8**	**135,267.1**	**-1,638.3**

Spring 2027

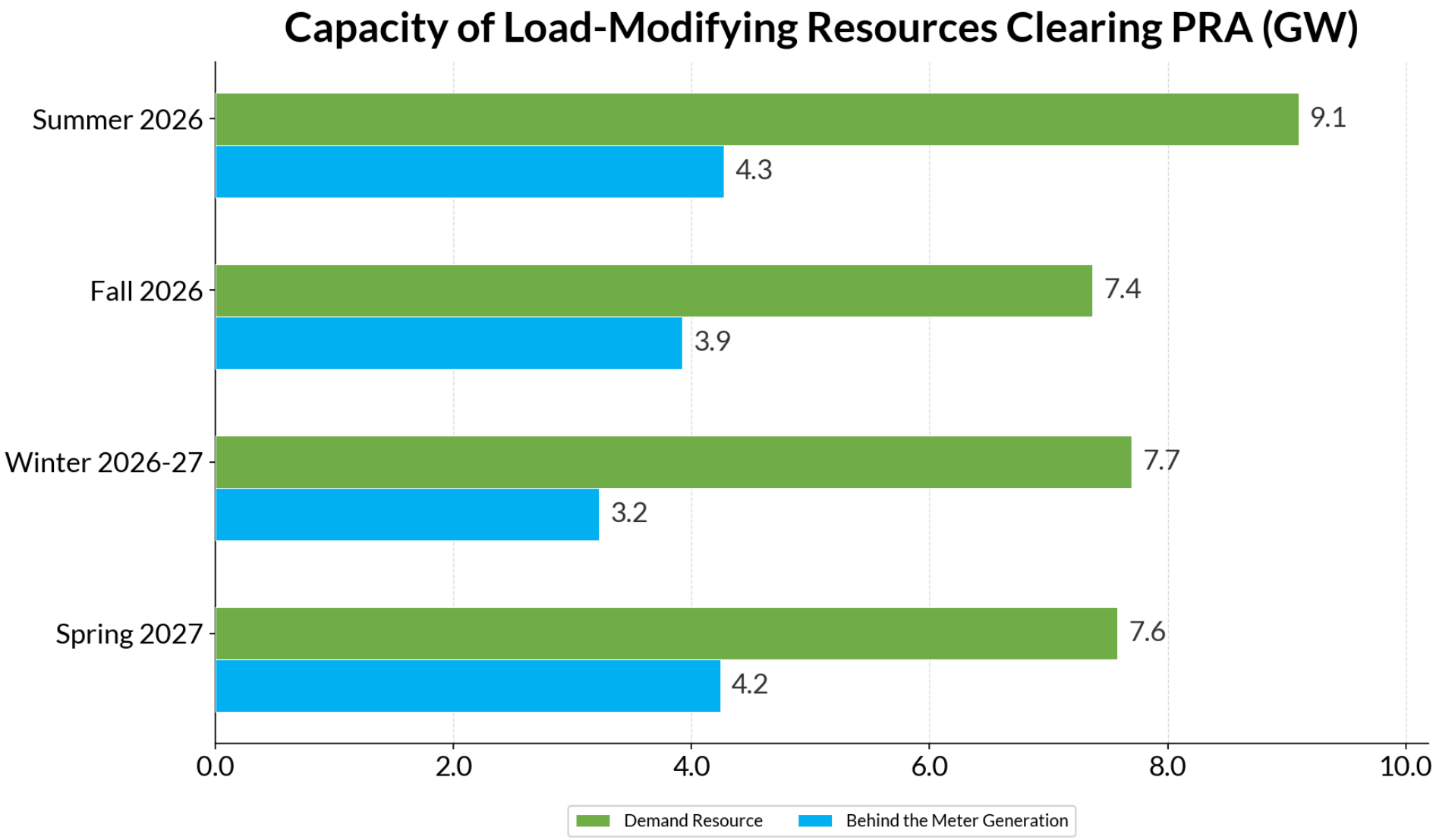


PRMR: Planning Reserve Margin Requirement ZRC: Zonal Resource Credit

The planning resource mix shows the continuation of a multi-year trend towards less coal/nuclear/hydro/oil and increased gas and non-conventional resources



2026/27 Seasonally Cleared Load Modifying Resources Comparison



PRA: Planning Resource Auction

Visit MISO's Help Center for more information
https://help.misoenergy.org/

NERC

2026 State of Reliability

Technical Assessment of 2025 Bulk Power System Performance

June 24, 2026

2026 SOR Snapshot

2026 SOR Overview

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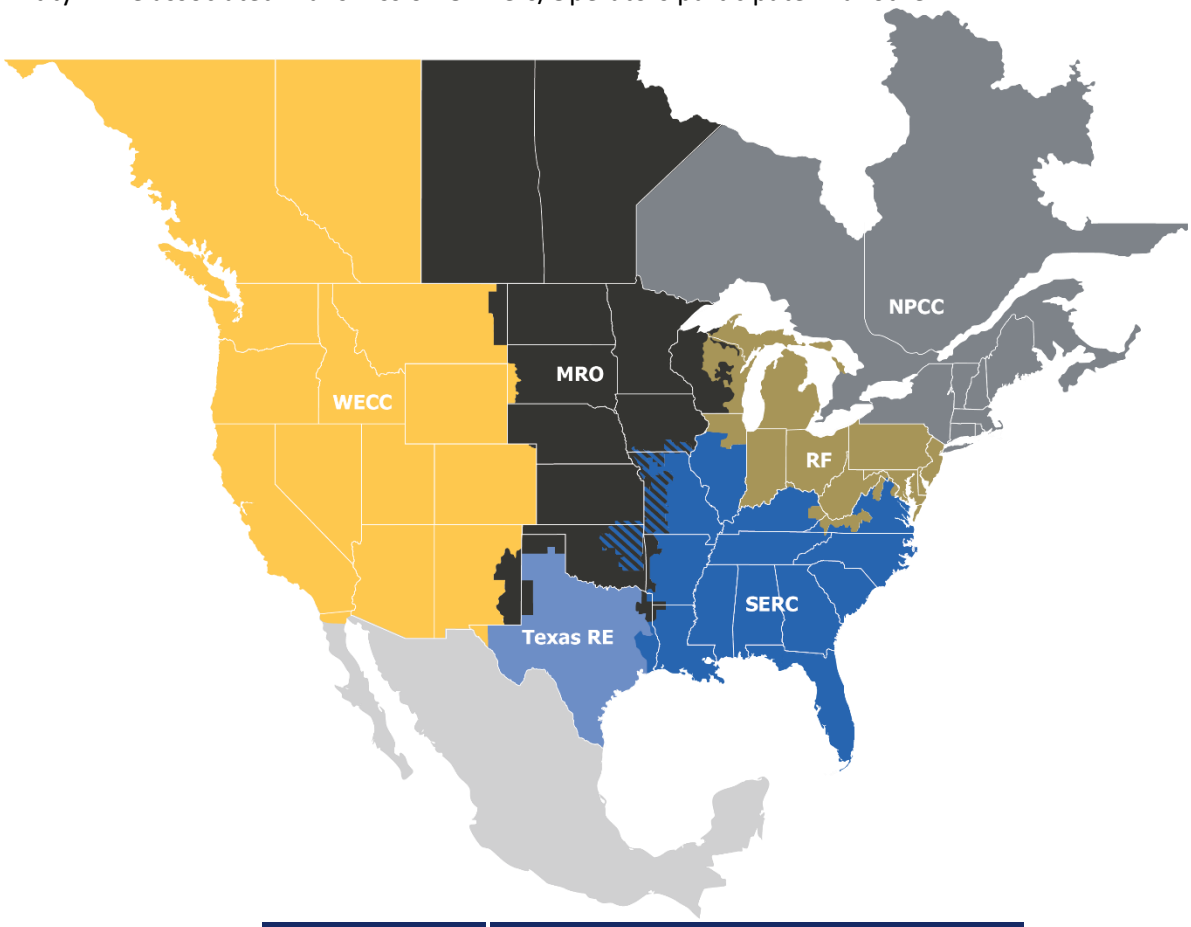
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Preface

Electricity powers our modern life and is the bedrock of our economic wellbeing. The Electric Reliability Organization (ERO) Enterprise—comprised of NERC and the six Regional Entities—is firmly committed to assuring a highly reliable, resilient, and secure bulk power system (BPS) in North America. The ERO Enterprise enables collaborative engagement with industry, regulators, and stakeholders, embracing innovation and supporting the needs of nearly 400 million people.

RELIABILITY | RESILIENCE | SECURITY
POWERING TODAY. PROTECTING TOMORROW.

The North American BPS is made up of six Regional Entities as shown on the map and in the corresponding table below. The multicolored area denotes overlap as some load-serving entities participate in one Regional Entity while associated Transmission Owners/Operators participate in another.



MRO	Midwest Reliability Organization
NPCC	Northeast Power Coordinating Council
RF	ReliabilityFirst
SERC	SERC Reliability Corporation
Texas RE	Texas Reliability Entity
WECC	WECC

About This Technical Assessment

Introduction

The *State of Reliability* (SOR) report seeks to inform regulators, policymakers, and industry leaders on the most significant reliability risks facing the BPS and describe the actions that the ERO Enterprise has taken and will take to address them. This year's SOR report is comprised of two publications: this *2026 SOR Technical Assessment*, which provides NERC's comprehensive annual technical review of BPS reliability for the 2025 operating (calendar) year, and the *2026 SOR Overview*, which is a high-level summary of the Technical Assessment with the following details:

- The *2026 SOR Overview* replaces the key findings previously found in the Technical Assessment.
- This *2026 SOR Technical Assessment* details major occurrences and provides in-depth analysis of risks and resilience, grid transformation and performance, and related performance metrics.

Purpose of the SOR

Both the Overview and the Technical Assessment provide objective and concise information for policymakers, industry leaders, and regulators on issues that affect the reliability and resilience of the North American BPS. Specifically, the SOR report does the following:

- Analyzes performance trends and emerging reliability risks
- Reports on the relative health of the interconnected system
- Measures the success of mitigation activities

NERC, as the ERO, works to assure the effective and efficient reduction of reliability and security risks to the North American BPS. Annual and seasonal risk assessments look to the future, and special reports on emergent risks serve to identify and mitigate potential risks. This assessment identifies performance trends and provides strong technical support for those interested in the detailed analytics.

NERC defines the reliability[1] of the interconnected BPS in terms of two basic and functional aspects: adequacy and operating reliability.

The *2026 SOR* report focuses on BPS[2] performance during the prior calendar year as measured by an established set of performance metrics, other reliability indicators, and more detailed analysis performed by ERO staff and technical committee participants. Data used in the analysis comes from the Transmission Availability Data System (TADS), the Generating Availability Data System (GADS), the Misoperation Information Data Analysis System (MIDAS), voluntary reporting into the Event Analysis Management System (TEAMS), Bulk Power System Awareness monitoring and processes, and the Institute of Electrical and Electronics Engineers (IEEE) Distribution Reliability Working Group. ERO staff developed this independent assessment with support from the Performance Analysis Subcommittee (PAS).

[1] **Learn About NERC** provides background information about NERC, the definition of reliability, and the electric grid.

[2] The term BPS is defined in Section 215 of the Federal Power Act as facilities and control systems necessary for operating an interconnected electric energy transmission network (or any portion thereof); and electric energy from generating facilities needed to maintain transmission system reliability. The term does not include facilities used in the local distribution of electric energy. 16 U.S.C. § 824o(a)(1). Bulk Electric System (BES) is a subset of the BPS and is a defined term under the NERC Glossary as approved by the Federal Energy Regulatory Commission (FERC). As the Electric Reliability Organization, NERC is responsible for developing and enforcing Reliability Standards to ensure an adequate level of reliability of the BPS and assessing reliability of the BPS. NERC's regulatory model is designed to ensure that entities capable of affecting the reliability of the BPS are registered and subject to Reliability Standards. North Am. Elec. Reliability Corp., 187 FERC ¶ 61,196, P 53 (2024).

NERC also produces the following regular assessments to evaluate BPS security as well as present and future BPS reliability:

- *Long-Term Reliability Assessment* (LTRA)
- Summer and Winter Assessments
- Electricity Information Sharing and Analysis Center (E-ISAC) *End-of-Year Report*

Considerations

- Data in the SOR report represents the performance for the January–December 2025 operating year unless otherwise noted.
- Unless specified otherwise, analysis in this report is based on data from 2021–2025 that was available in Spring 2026, and it provides a basis to evaluate 2025 performance relative to performance over the last five years. All dates and times shown are in Coordinated Universal Time (UTC).
- The SOR report is a review of industry-wide trends and not the performance of individual entities.
- When analysis is presented by Interconnection, the Québec Interconnection (QI) is combined with the Eastern Interconnection (EI) unless specific analysis for the QI is shown.

Chapter 1: Major Occurrences for 2025

Overall, the BPS was reliable[3] throughout 2025. This chapter highlights major occurrences and reports that were issued in 2025. These occurrences and reports did not constitute a key finding but had a notable impact on the BPS.

Figure 1.1 highlights important numbers and facts about the North American BPS. **Table 1.1** shows the five-year trend of these numbers.

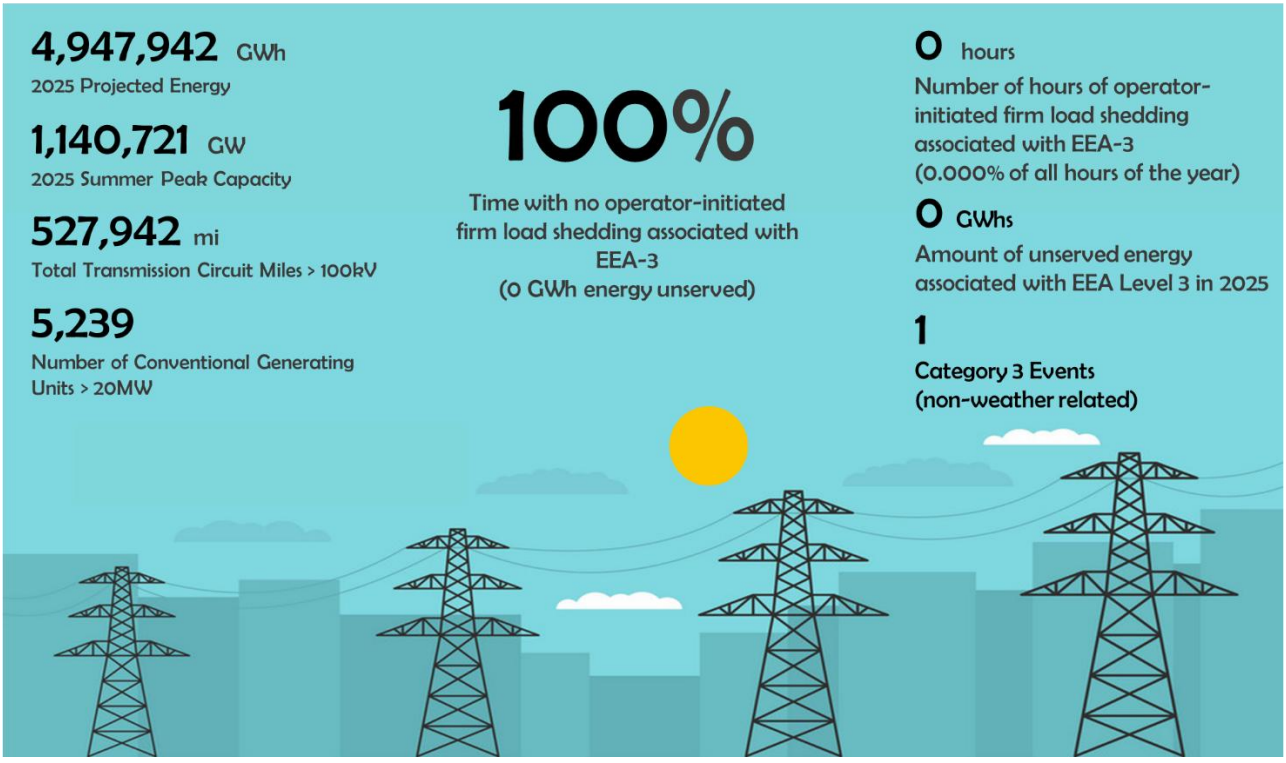


Figure 1.1: 2025 BPS Inventory and Performance Statistics

Table 1.1: Five-Year BPS Inventory and Performance Statistics

Rank	2021	2022	2023	2024	2025
Projected Energy (GWh)	4,585,939	4,674,290	4,687,894	4,856,251	4,947,942
Actual Energy (GWh)	4,626,790	4,695,921	4,663,574	4,787,277	N/A
Summer Peak Capacity (MW)	1,056,980	1,057,455	1,071,370	1,087,354	1,140,721
Total Transmission Circuit Miles >100 kV miles	508,766	522,433	529,344	526,853	527,942
Count of Transmission Circuits >100 kV	28,411	29,165	29,932	30,014	30,666
Count of Transformers with a Low-Side Voltage >100 kV	5,715	5,773	5,805	5,832	5,866
Number of Conventional Generating Units >20 MW[4]	5,375	5,453	5,290	5,243	5,239

[3] Learn About NERC provides background information about NERC, the definition of reliability, and understanding the grid.
[4] 2025 methodology was updated to only include mandatorily reported units that submitted at least one performance record.

Table 1.1: Five-Year BPS Inventory and Performance Statistics					
Rank	2021	2022	2023	2024	2025
Reported MW of Installed Conventional Generation[5]	913,103	926,302	902,018	896,430	876,982
Reported MW of Installed Wind Generation[6]	112,811	124,039	129,963	135,866	138,190
Reported MW of Installed Solar Generation[7]	N/A	N/A	N/A	N/A	N/A
Portion of Hours in the Year with No Operator-Initiated Firm Load Shedding Associated with Energy Emergency Alert Level 3 (EEA 3)	99.2%	99.4%	100%	>99.9%	100%
Category 3 Events (Non-Weather Related)	0	1	0	1	1
Amount of Unserved Energy Associated with EEA 3 (GWh)	1,015.5	96.2	0	0.1	0
Number of Hours with Operator-Initiated Load Shed	71	56.5	0	0.4	0

Major Weather Events

Although 2025 was generally temperate, major weather events continue to be considered the greatest risk to reliability due to the increase in frequency, footprint, and duration; NERC's *ERO Reliability Risk Priorities Report*[8] identified resilience to extreme events, including extreme natural weather events, as one of the five risk groupings that represent evolving risks to reliability. Major weather events in 2025, including severe winter storms, thunderstorms, and tornadoes, were analyzed and collectively found to have had less of an impact on the BPS than in previous years. Of the 23 billion-dollar events highlighted in **Figure**,[9] only three appeared in the **Severity Risk Index** and six in the **Analysis of Transmission System Resilience** section. Although numerous economically impactful events also occurred in Canada in 2025 (**Figure**), none were considered to have had a major impact on the BPS based on data used in the severity risk index (SRI) and transmission system resilience analysis.

[5] MW of installed conventional generation is calculated based on highest net dependable capacity reported in GADS performance for the given year. Only units >20 MW are required to report for GADS. Units that did not complete performance reporting are excluded from this total.

[6] Includes plants with a total installed capacity >75 MW.

[7] During this year's data analysis, NERC identified significant GADS solar data reporting errors and numerous missing plants compared to EIA 860 data. NERC will be coordinating with Regional Entity staff to perform industry outreach and resolve these errors in 2026.

[8] NERC's ERO Reliability Risk Priorities Report

[9] In alignment with evolving priorities, NOAA's National Centers for Environmental Information (NCEI) will no longer be updating the Billion Dollar Weather and Climate Disasters product. Climate Central, a policy-neutral 501(c)(3) nonprofit now generates a similar product.

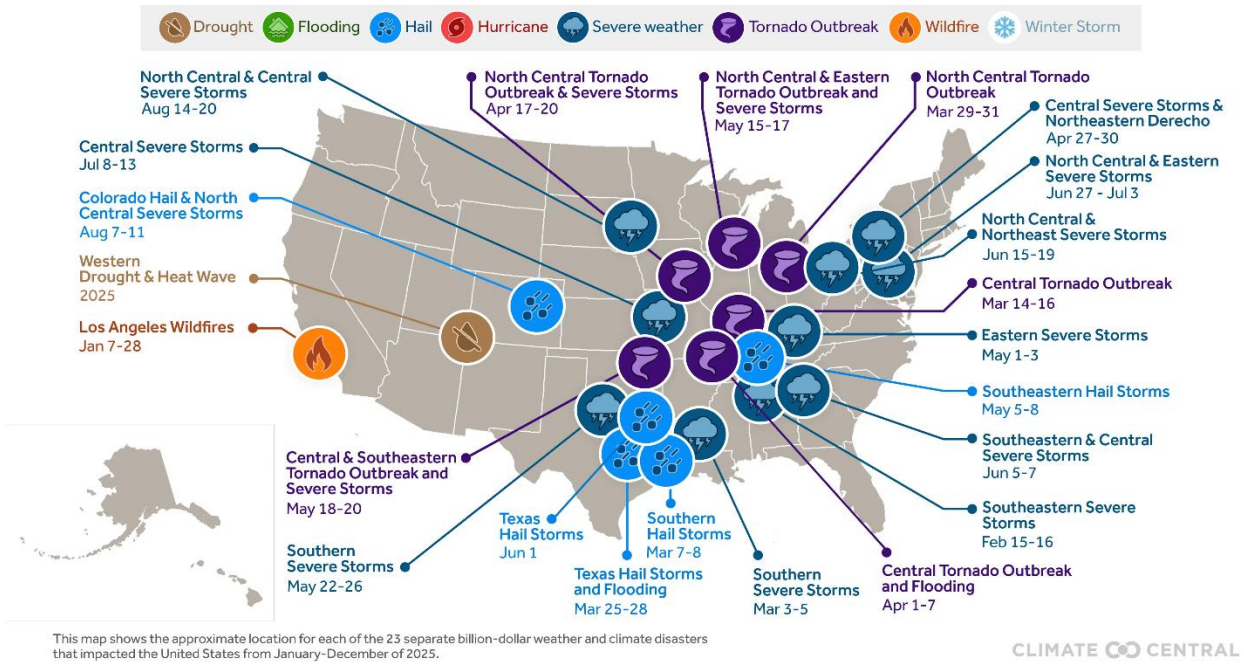


Figure 1.2: 2025 U.S. Billion-Dollar Weather and Climate Disasters[10]



Figure 1.3: 2025 Canadian Insured Catastrophic Losses[11]

[10] The peer-reviewed methodologies behind this dataset remain unchanged at Climate Central, where the project will continue to be led by Adam Smith, who served as the lead scientist for the project at NOAA from 2010 to 2025. U.S. Billion-Dollar Weather and Climate Disasters | Climate Central

[11] Severe weather-related insured losses in Canada exceed $2.4 billion in 2025

Major System Events and Observations

The following sections highlight major system events and observations that occurred last year. While these events were notable and may have impacted many customers, NERC has determined that they do not belong in the SOR Overview as no industry-wide or policy action is being proposed.

Wyoming System Event

As further detailed in the WECC and NERC joint disturbance report,[12] in the early afternoon of November 13, 2025, the northeast portion of the Western Interconnection (WI) experienced a system disturbance that triggered cascading outages affecting about 250,000 customers for up to nine hours. The event impacted parts of several states, including Montana, South Dakota, Wyoming, and Nebraska, with one Transmission Operator (TOP) experiencing a complete blackout across facilities located on the seam between two Reliability Coordinators (RC). This is a low-load, generation-rich portion of the Interconnection.

The disturbance began with a planned outage of a 500 kV transmission line, part of a critical path necessary to deliver wind and thermal generation to distant load centers in the WI. The outage was scheduled for 8:00 a.m. Mountain but postponed until 12:00 p.m. Mountain due to delays in field personnel availability at remote stations. During this delay, wind generation increased more than 50% above the day-ahead operational planning analysis (OPA) studied flows.

A remedial action scheme (RAS) is in place to automatically trip wind generation for unplanned outages to ensure system balance. Prior to switching, the TOP raised the RAS arming setpoint, effectively disabling its tripping function. Operators relied on real-time contingency analysis (RTCA) tools but were unaware of disabled alarms in their RTCA contingency modeling and the inaccurate megavolt-ampere reactive (Mvar) generation parameters that masked the issues that would occur for opening the 500 kV line.

With real-time tools showing no issues, the TOP removed the line from service. Power shifted to an adjacent 500 kV line, causing a rapid voltage collapse to approximately .30 per unit. Protective relays correctly tripped the line within 0.4 seconds, and, with the RAS disabled, there was no action to reduce wind generation.

Most of the western grid remained intact as power flows shifted across the area; however, the system experienced a rapid loss of more than 4,800 MW of coal, natural gas, solar photovoltaic (PV), and wind generation within six seconds. The sudden imbalance caused frequency to dip to 59.758 Hz, after which it gradually recovered and stabilized over the next six minutes. Underfrequency load shedding mechanisms were appropriately triggered in the region before the blackout occurred. Total load loss was just over 1,100 MW.

Coordinated restoration was delayed due to limited RC visibility and competing mitigation priorities. High voltages and seam coordination challenges slowed progress, including instances where equipment was energized across TOP boundaries without prior notification. Most load was restored within nine hours. The entity performing the initial line switching returned most of its generation within eight hours, but one thermal plant required more than four days, and one thermal unit experienced catastrophic damage.

Opportunities for Improvement

Personnel

- Communications during system events should be clear and concise and ensure that mutual understanding has been achieved prior to actions being taken.

[12] WECC and NERC Joint Wyoming Disturbance Report

- System restoration training should be re-evaluated for effectiveness with respect to the RCs and TOPs to improve the effectiveness of restoration, focusing on their system status by thorough assessments, and communication and coordination among the entities.

Processes

- RCs should verify how far to model across seams to provide overlapping visibility of potential contingencies and operating limits.
- Entities should use conservative decision making in verifying any discrepancies between RTCA results.
- RCs/TOPs should evaluate the variability of the generation resources in their OPA and set appropriate max/min parameters within system operating limits (SOL) to prompt additional operator actions.

Tools

- Entities should investigate the use of additional offline tools to confirm/evaluate online tool results.
- To ensure mutual understanding, RCs and TOPs should clearly define the information needed and the means of communication to be used.
- Entities should ensure consistent modeling of system parameters such as RAS status.

Load-Pocket Shoulder Season Challenges

In recent years, shoulder seasons have become increasingly challenging for BPS operators to manage, resulting in several recent instances of pre-contingent load shedding.[13] In all these cases, RTCA indicated that significant issues, such as cascading outages or widespread voltage instability, would likely occur following the next loss of a transmission element.

Shoulder seasons are the spring and fall periods between summer and winter peak load periods and have historically been used for planned maintenance. Because of this common industry practice, fewer generators and transmission lines are available for operators to utilize during these periods, which has historically been offset by the lower peak loads. Spring in particular also coincides with more frequent thunderstorms. In recent years, tightening reserve margins and an increasing baseline load have compounded with a rapid increase in variable energy resources (VER), which present an inherent level of uncertainty, to significantly increase operating challenges during these periods.

Instances where these challenges align in specific small areas within a Balancing Authority's (BA) footprint that have limited transmission lines connecting them to the remainder of the system, also known as load pockets, have been the catalyst of several recent instances of pre-contingent load shedding.[14]

Opportunities for Improvement

As the Interconnections are changing in both resource mix and load characteristics coupled with weather variability during shoulder seasons, a different approach may be needed when coordinating facility outages. Entities should consider the following:

- Planning a higher level of operating margin and committing additional generation in load pockets to account for larger real-time variabilities in generation, load, and weather
- Including demand-side management in the mitigation plans for insufficient capacity in load pockets

[13] *Incident Review: Load-Pocket Shoulder Season Challenges*

- Considering more extreme scenarios when determining which outage requests to approve
- Considering PRC-023 loadability requirements when determining contingent overload thresholds that trigger cascading analysis
- Periodically revisiting planned outages and considering updated and expected system conditions to determine whether such outages should be postponed
- In market areas, reviewing processes to ensure that reliability studies (OPA) are using accurate generation dispatch and availability as determined from the latest day-ahead market analysis (coordinating processes that eliminate discrepancies between the day-ahead market unit commitment plan and the OPA studies)

Chapter 2: Severity Risks, Impact, and Resilience

This chapter identifies and examines the highest-stress days on the BPS in 2025 using established measures.

Severity Risk Index (SRI)

The SRI provides a quantitative measure of the relative severity of the combined impact of load, generation, and transmission loss on the BPS daily and offers a comprehensive picture of the performance of the BPS, allowing NERC to assess year-on-year reliability trends. For 2025, load-loss data voluntarily reported to the IEEE Distribution Reliability Working Group was used to estimate the daily load-loss component; generation and transmission components are calculated from data collected by NERC.

By comparing the daily SRI scores in descending order for each of the past five years, the overall performance of the BPS can be evaluated (**Figure 2.1**). The inset chart in the upper right of **Figure 2.1.** provides a detailed comparison of the top 10 SRI days for each year. The annual cumulative SRI shown in **Table 2.1** sums each day's SRI for the year by component.

The cumulative performance of the BPS is calculated by summing each day's SRI for the year. **Table 2.1** shows the annual cumulative SRI for the five-year period of 2021–2025.

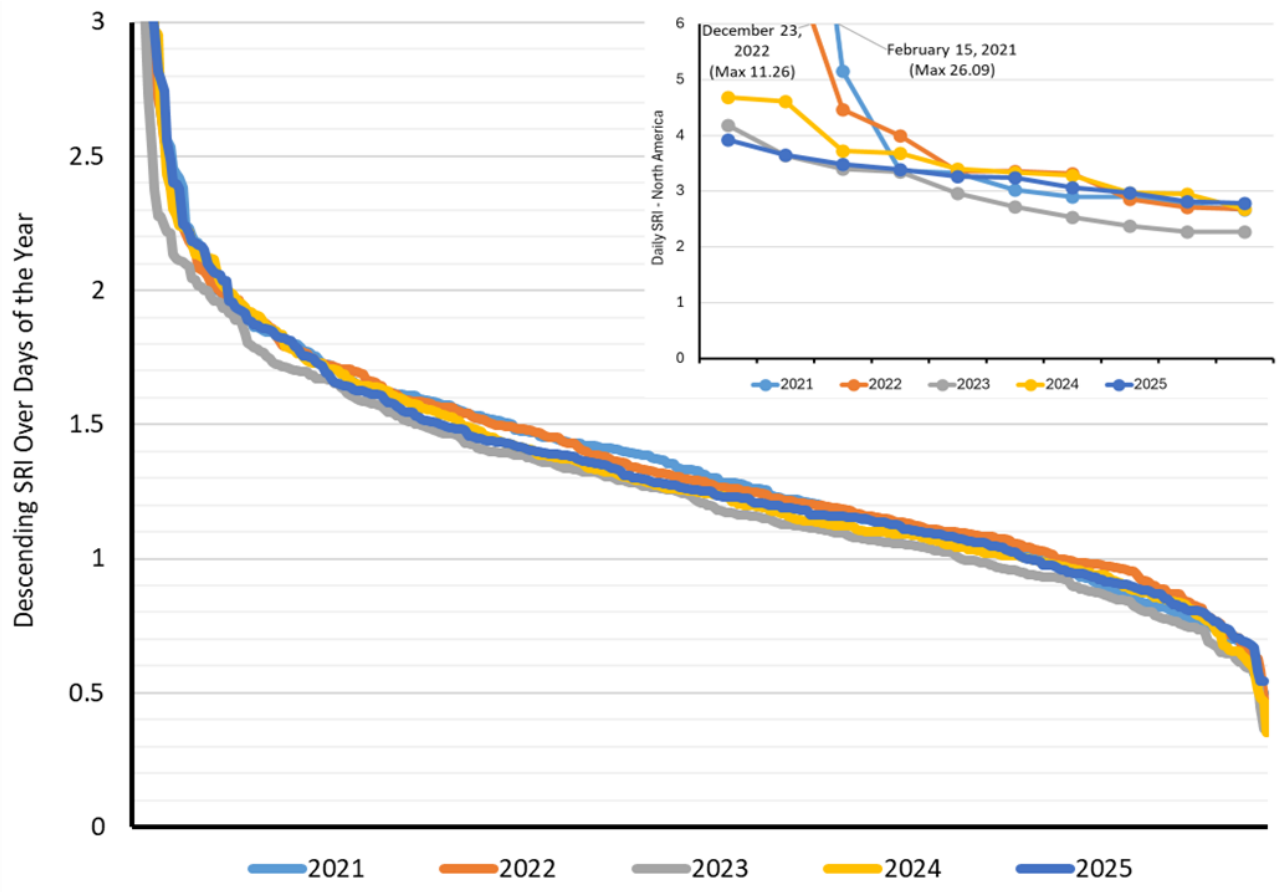


Figure 2.1: NERC Descending SRI by Day of the Year

Table 2.1: Annual Cumulative SRI					
Year	Cumulative Weighted Generation	Cumulative Weighted Transmission	Cumulative Weighted Load Loss	Annual Cumulative SRI	Average Daily SRI
2021	375.9	63.9	96.6	536.4	1.47
2022	404.1	59.7	55.2	518.9	1.42
2023	356.9	64.1	50.5	471.5	1.29
2024	383.7	60.6	51.8	496.1	1.36
2025	395.0	55.7	45.3	496.0	1.36

Figure 2.2 plots the 10 highest SRI days daily and the SRI scores for 2025 against control limits that were calculated by using the seasonal daily performance of the prior four years. A general normal range of performance is represented by the gray-colored band, showing the daily seasonal 90% control limits.[14] Days that extend above the seasonal control limit indicate irregularities for the season but may not have a high enough SRI to rank in the top 10.

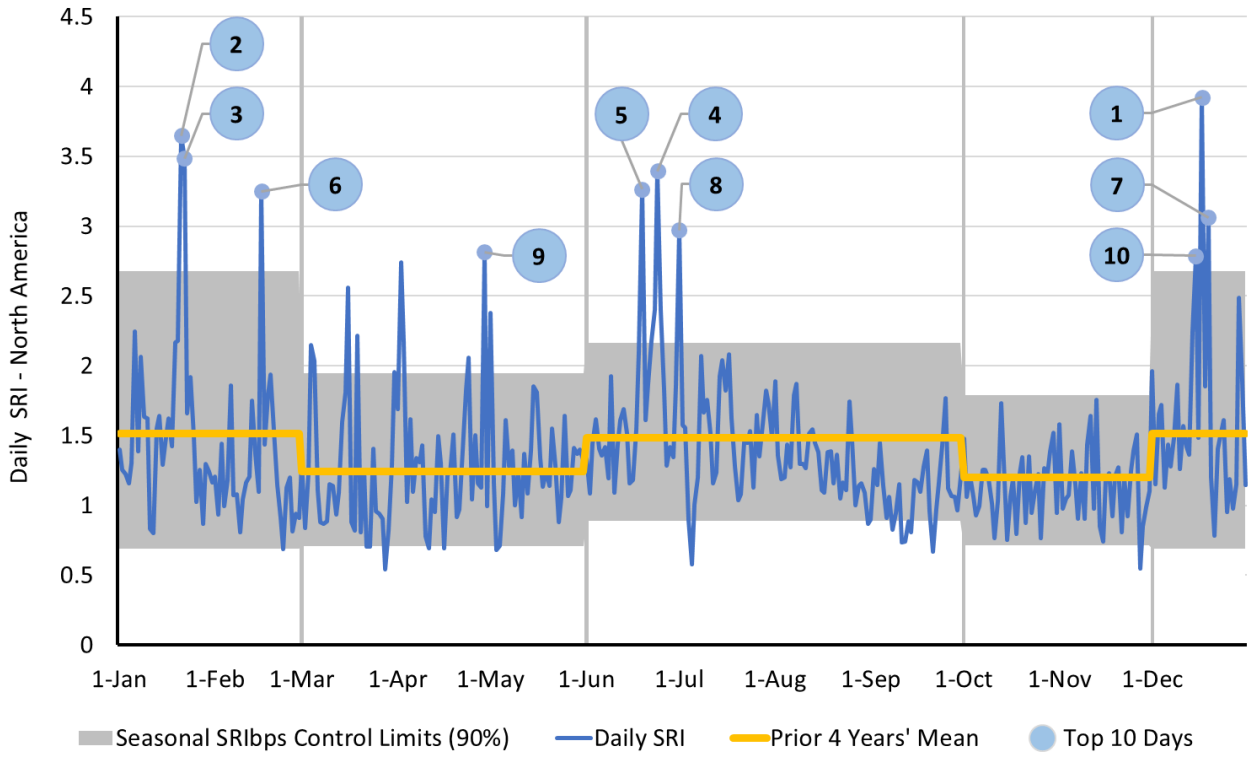


Figure 2.2: 2025 Daily SRI with Top 10 Days Labeled, 90% Confidence Interval

Table 2.2 details the scores for the top 10 SRI days during 2025. The table identifies where atypical weather conditions were ongoing during the day and the general location by Regional Entity. Weather conditions in 2025 were fairly temperate with no hurricanes making landfall and only a few large, major winter storms and thunderstorms. The most impacted day was the result of an atmospheric river, a phenomenon that resulted in high winds and heavy rainfall in the Northwestern United States.

[14] The shaded area reflects the 90% confidence interval (CI) of the historic values between the 5th and 95th percentiles.

Table 2.2: 2025 Top 10 SRI Days							
Rank	Date	SRI and Weighted Components 2025				Atypical Weather Conditions	Regional Entities
		SRI	Weighted Generation	Weighted Transmission	Weighted Load Loss		
1	17-Dec	3.92	2.34	0.95	0.64	Northwestern Atmospheric River	WECC
2	21-Jan	3.65	3.24	0.32	0.09	Winter Storm Enzo	RF, SERC
3	22-Jan	3.49	3.27	0.14	0.07	Winter Storm Enzo	RF, SERC
4	24-Jun	3.39	2.75	0.24	0.40	Thunderstorms	NPCC, RF, SERC
5	19-Jun	3.27	1.35	0.26	1.65	Thunderstorms, Tornadoes	MRO, RF, SERC
6	16-Feb	3.25	1.91	0.21	1.13	Severe Storm in Southeast	SERC
7	19-Dec	3.06	1.56	0.31	1.19	Northwestern Atmospheric River	WECC
8	1-Jul	2.97	2.75	0.16	0.06	Coincidental Generator Outages	All Regions
9	29-Apr	2.81	1.03	0.28	1.51	Thunderstorms	MRO, NPCC, RF
10	15-Dec	2.79	2.47	0.10	0.22	Winter Storm	RF, SERC, Texas RE

SRI Performance Trends

To put the severity of days in 2025 into context with historic BPS performance, the top 10 days over the five-year period are updated annually. Historically, the PAS has identified days with an SRI below 5 to generally be low impact to the BPS. **Table 2.3** identifies the top 10 SRI days occurring for 2021–2025 with the contribution of the generation, transmission, and load-loss components to the SRI for each day; contributing event information; and the Regional Entities impacted by the event. For 2025, there were no days severe enough to be added to the top 10 SRI days of the past five years, with all days having an SRI under 4, which has historically been considered a very good year.

Table 2.3: 2021–2025 Top 10 SRI Days							
Rank	Date	SRI and Weighted Components				Atypical Weather Conditions	Regional Entities
		SRI	Weighted Generation	Weighted Transmission	Weighted Load Loss		
1	February 15, 2021	61.35[15]	5.54	0.78	55.02[16]	Winter Storm Uri	MRO, RF, SERC, Texas RE, WECC
2	February 16, 2021	18.31[17]	5.01	0.53	12.78[18]	Winter Storm Uri	MRO, RF, SERC, Texas RE, WECC

[15] IEEE DRWG data supplemented with Eagle-I information.
[16] Ibid.
[17] Ibid.
[18] Ibid.

Table 2.3: 2021–2025 Top 10 SRI Days							
Rank	Date	SRI and Weighted Components				Atypical Weather Conditions	Regional Entities
		SRI	Weighted Generation	Weighted Transmission	Weighted Load Loss		
3	December 23, 2022	11.25	8.16	0.84	2.26	Winter Storm Elliott	All
4	December 24, 2022	7.44	6.43	0.95	0.05	Winter Storm Elliott	All
5	December 11, 2021	5.16	1.01	0.70	3.45	Severe Storms	MRO, NPCC, RF, SERC, WECC
6	September 27, 2024	4.69	1.44	2.40	0.85	Hurricane Helene	SERC
7	January 9, 2024	4.61	1.59	0.68	2.35	Northwestern Winter Storm, Eastern Tornadoes and Severe Storms	RF, SERC, Texas RE, WECC
8	June 14, 2022	4.46	1.52	0.38	2.57	High Temperatures and Derecho	MRO, NPCC, RF, SERC, Texas RE
9	April 1, 2023	4.19	1.10	0.44	2.65	Hurricane Florence	MRO, NPCC, RF, SERC
10	June 15, 2022	3.99	1.59	0.19	2.21	High Temperatures and Derecho	MRO, NPCC, RF, SERC, Texas RE

Impact of Extreme Event Days

Extreme Event Days

Extreme event days are identified as event days above the 95th percentile upper bound relative to the past four years' severity measures for any season within North America or a specified Interconnection. This analysis expands on the transmission and generation components that contribute to the SRI reported in the previous **SRI Performance Trends** section to explore the causes of the extreme days.

The impacts of extreme days on BPS resources are characterized by the amount of transmission or generation reporting immediate forced outages or derates starting on a given day. By analyzing the impact and causes of extreme event days, it is possible to identify which conditions pose the highest risk to the BPS. While this analysis does not address every potential scenario, learning from performance during extreme events helps provide insight into how the system may respond to a range of conditions and events.

- Extreme-day outages for transmission and generation by Interconnection are presented in **0**. The analysis provided in the following subsections is reported separately for transmission and generation. The total estimated megavolt-amperes (MVA) transfer capacity[19] reported in TADS or

[19] Severity Risk Index

net maximum capacity reported to GADS for all Regional Entities or by Interconnection is shown at the top of each figure in this chapter.

Transmission Impacted

In 2025, 12 days met the criteria of extreme transmission days for the BPS as compared to 19 in 2024. The most extreme transmission-impacting day was December 17, primarily due to a combination of storms throughout the Northwestern United States as part of an atmospheric river phenomenon, affecting a total of 16 states (**Figure 2.3**), where the MVA capacity impacted due to automatic transmission outages was 5.8 times as high as the associated season's average. Other extreme days include March 14–15 due to a widespread winter storm, March 9 due to a series of severe thunderstorms, and the November 13 **Wyoming System Event**.

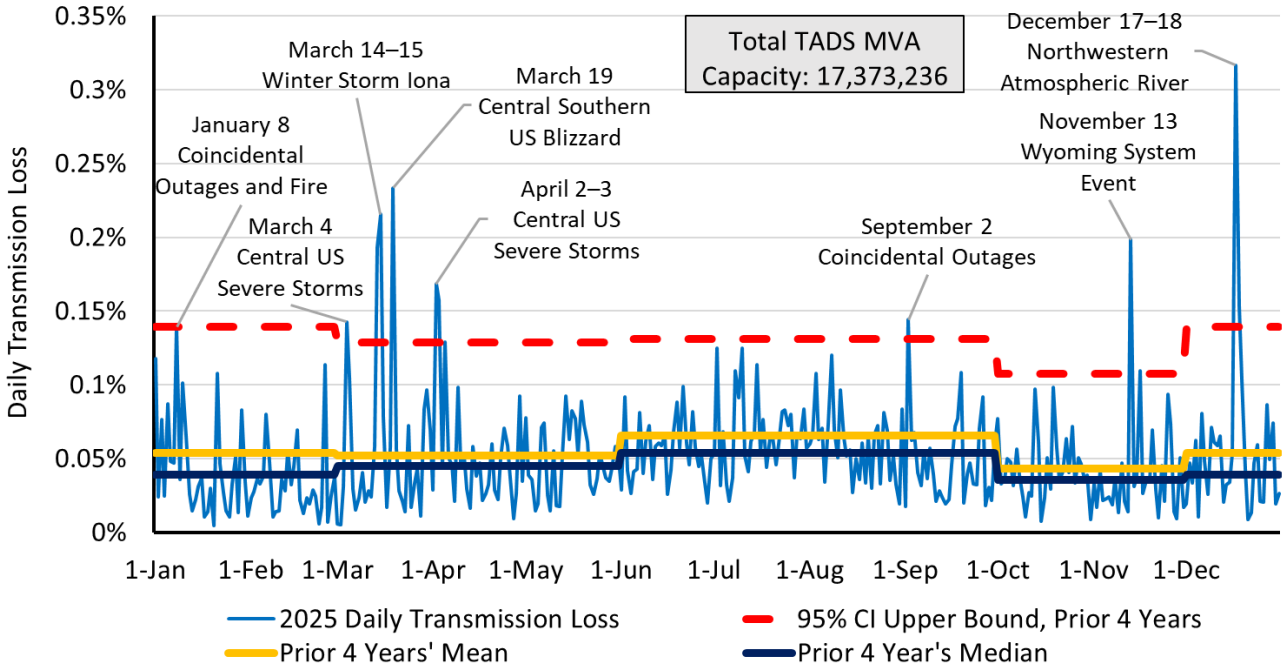


Figure 2.3: 2025 Sustained Transmission Outages During Extreme Days

The top causes reported for outages that occurred on extreme days are shown in rank order of MVA loss for North America and each Interconnection (**Table 2.4**). Causes for outages are based on those Interconnections' extreme days, shown in **Appendix A**. The number one outage cause for 2025 was Weather (Excluding Lightning), which affected almost five times more MVA capacity than any of the other top causes for the year across the Bulk Electric System (BES) and within each Interconnection.

Table 2.4: Top Transmission Initiating Outage Causes on Extreme Days Ranked by MVA Capacity					
Area	**Cause #1**	**Cause #2**	**Cause #3**	**Cause #4**	**Cause #5**
All NERC Regional Entities	Weather (Excluding Lightning) 156,789	Failed AC Substation Equipment 31,586	Unknown 31,515	Power System Condition 28,585	Contamination 23,963
Eastern–Québec Interconnections	Weather (Excluding Lightning) 142,446	Failed AC Substation Equipment 35,696	Lightning 24,057	Human Error 19,268	Failed AC Circuit Equipment 15,094
Texas Interconnection	Weather (Excluding Lightning) 18,052	Failed AC Substation Equipment 10,536	Lightning 6,993	Power System Condition 4,911	Unknown 4,315
Western Interconnection	Weather (Excluding Lightning) 49,701	Unknown 39,187	Fire 37,074	Power System Condition 30,008	Other 20,165

Conventional Generation Impacted

Based on analysis of GADS data, a total of 20 days in 2025 qualified as extreme for North America's BPS (**Figure 2.4**) compared to 26 in 2024. The four highest-impact days for generation loss were the January 19–22 winter storms. On these days, conventional generating units experienced outages that were 1.8–2.9 times as severe as the associated season's average. One of the extreme generation loss days coincided with extreme days identified for transmission (December 17 Atmospheric River Event). The days on which generation outages were slightly above the seasonal bounds that do not have a specific cause listed have been investigated and were either found to coincide with severe thunderstorms or high temperatures or saw many coincidental outages that were not a result of adverse weather conditions.

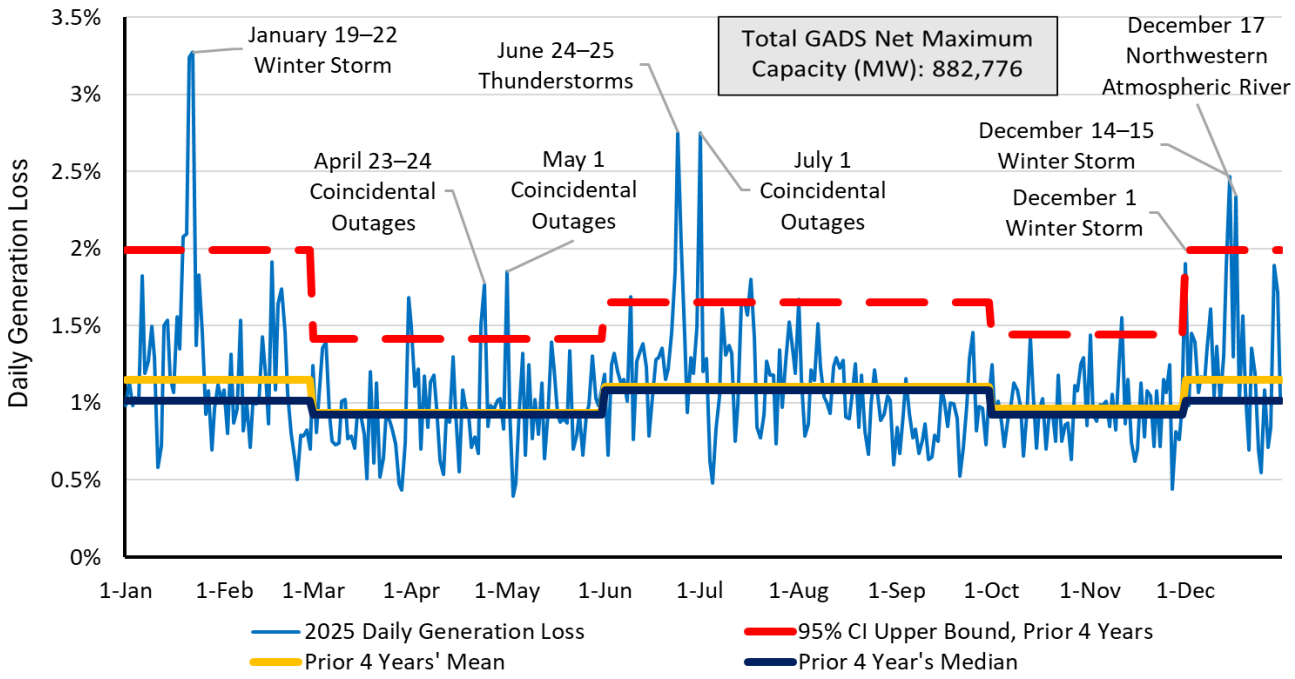


Figure 2.4: 2025 Generation Impacted During Extreme Days

The top causes reported for outages that occurred on extreme days are shown in ranked order by Interconnection (**Table 2.5**). Causes for Interconnections are based on those Interconnections' extreme days, shown in **Appendix A.**

Table 2.5: Top Generation Outage Causes on Extreme Days Ranked by Unavailable Net Maximum Capacity

Area	Cause #1	Cause #2	Cause #3	Cause #4	Cause #5
All NERC Regional Entities	Fuel, Ignition, and Combustion Systems (32,263)	Electrical (25,877)	Boiler Tube Leaks (21,524)	Controls (20,850)	Auxiliary Systems (20,596)
Eastern–Québec Interconnections	Fuel, Ignition, and Combustion Systems (29,278)	Electrical (22,638)	Boiler Tube Leaks (19,109)	Auxiliary Systems (17,338)	Miscellaneous (Gas Turbine) (14,908)
Texas Interconnection	Electrical (11,433)	Controls (9,391)	Boiler Control System (9,094)	Boiler Tube Leaks (7,432)	Feedwater System (5,504)
Western Interconnection	Controls (6,951)	Electrical (6,565)	Auxiliary Systems (5,941)	Turbine (5,740)	Miscellaneous (External) (5,529)

Analysis of Transmission System Resilience

The analysis of large transmission events evaluates transmission outages related to severe weather events that involve 20 or more automatic outages. Outage and restoration processes for transmission elements are analyzed, not the disruption and restoration of distribution customer load. Restoration of the transmission system to serve customer load is always the priority.

The analysis of the 2025 transmission outages identified 13 large transmission events, 12 of which were caused by weather and one non-weather event (**Wyoming System Event**) and quantified the resilience and restoration statistics for them. The resilience statistics enable the measurement and tracking of some abilities of the transmission system to withstand, adapt, protect against, and recover during and after major weather events.[20]

This section provides a detailed description of the December 17 Atmospheric River Event as the largest outage event on the transmission system in 2025. Multiyear statistics by associated weather type and changes in the severity and duration of these events as measured by the number of transmission outages reported for each cause are compared for two five-year periods: 2020–2024 and 2021–2025.

TADS Outage Grouping and 2025 Large Weather Events

The outage grouping algorithm[21] considers automatic outages reported in TADS based on Interconnection and associated start and end times. The resulting transmission outage events are determined to be weather-related if at least one outage in the event is initiated or sustained by one of the following TADS cause codes: Weather (Excluding Lighting), Lightning, Fire, or Environmental. The procedure produces groupings of outages that are further reviewed and compared with the weather information from external sources to confirm or refine the events. The TADS data was supplemented by Velocity Suite as a source to identify utility company footprints, and weather sources like the National Oceanic and Atmospheric Administration (NOAA) and Ventusky were used to visualize the weather events. Matching the data from these sources provides a much clearer picture of outages within the event. This combination of automatic and manual procedures results in a set of transmission events that can cross boundaries of different utilities and Regional Entities to capture significant events caused by major weather occurrences, such as hurricanes and severe winter storms.

In 2025, the grouping algorithm identified 13 large events; 12 of the 13 were weather-related events, in addition to the **Wyoming System Event** that started on November 13. **Table 2.6** lists these events in chronological order and shows the severe weather/event type for each event with statistics that quantify the impact of the event on the transmission system.

In 2025, the largest event was the December 17 Atmospheric River in the WI with 137 outages, affecting 5,343 miles and 48,418 MVA of capacity, making it the highest-impact storm of the year on the transmission system (shown in **blue** in **Table 2.6)**.

The second largest event, as identified by the grouping algorithm, was the March 14 severe storm event, which saw everything from blizzards in the north to tornadoes in the south (with 124 transmission outages reported) and occurred in the EI (shown in **red** in **Table 2.6**). Though it was the second largest event in terms of the number of outages, it had the largest amount of transmission capacity affected (MVA) and the highest number of element-days lost of any event in 2025 with 52,678 MVA affected and 359 element-days lost.

[20] *Resilience Framework, Methods, and Metrics for the Electricity Sector* | IEEE Power & Energy Society Resource Center (ieee-pes.org)

[21] *Impact of Extreme Weather on North American Transmission System Outages* | IEEE Conference Publication | IEEE Xplore

It is also worth noting that the **Wyoming System Event**, though not weather-related, had enough outages to be considered a large transmission event. This event (shown in **purple** in **Table 2.6**) had the quickest recovery of all large transmission events in 2025, with a time to 95% element restoration of just 0.1 days and a final restoration duration of 1 day.

Table 2.6: 2025 Large Transmission Outage Events

Event Start	Event Outage Count			Interconnection	Extreme/Severe Weather Event	Transmission Capacity Affected (MVA)	Miles Affected	Final Restoration Duration (Days)	Time to 95% Restoration, Elements (Days)	Element-Days[22] Lost	Most Simultaneous Unavailable Capacity (MVA)
	All Automatic	Sustained Automatic	Momentary Auto.								
21-Jan	22	19	3	ERCOT	Blizzard	11,714	581	.8	.6	5	5,899
16-Feb	31	23	8	Eastern	Thunderstorms	13,391	1,023	2.9	1.8	13	5,855
25-Feb	29	24	5	Western	Winter Storm	13,931	940	6.1	6.	30	5,541
4-Mar	31	23	8	Eastern	Blizzard	8,745	867	3.3	2.9	18	4,934
14-Mar	**124**	**104**	**20**	**Eastern**	**Tornadoes, Blizzard**	**52,678**	**4,510**	**54.2**	**12.3**	**359**	**27,011**
19-Mar	79	70	9	Eastern	Tornadoes, Blizzard	30,617	1,899	13.5	7.5	92	18,915
24-Mar	28	15	13	Eastern	Blizzard	9,487	507	44.5	3.7	52	4,741
2-Apr	39	29	10	Eastern	Thunderstorms Tornadoes	15,361	1,550	58.1	9.2	96	7,424
5-Apr	35	32	3	Eastern	Thunderstorms	11,545	1,332	6.5	4.9	37	5,835
29-Apr	51	47	4	Eastern	Thunderstorms	16,352	1,056	5.5	4.4	53	8,567
21-Jun	22	17	5	Eastern	Derecho	7,948	2,098	68.7	17.7	118	6,429
13-Nov	**46**	**46**	**0**	**Western**	**Wyoming System Event**	**25,357**	**1,924**	**1.0**	**0.1**	**2**	**12,320**
17-Dec	**137**	**129**	**8**	**Western**	**Northwestern Atmospheric River**	**48,418**	**5,343**	**36.7**	**6.1**	**235**	**27,190**

[22]The definition for element-days is provided in Appendix B of the NERC *2022 SOR*.

Outage, Restore, and Performance Curves

Table 2.6 illustrates the variability in event sizes and duration. However, these statistics do not completely explain what happened during the events; the outage, restore, and performance curves of the events provide more details on how the events unfolded.[23] **Figure 2.5** serves as an example to describe transmission outages during an event. These curves track the number of elements out or the MVA transmission capacity impact on the vertical axis versus time on the horizontal axis.

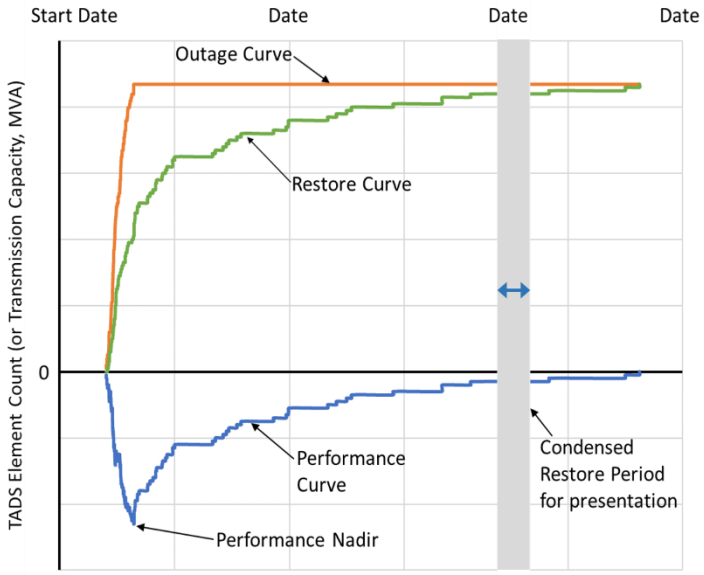


Figure 2.5: Example of Outage, Restore, and Performance Curves for a Large Transmission Outage Event

The outage curve is the cumulative number of elements or cumulative equivalent MVA capacity impact at the time shown on the horizontal axis.

The restore curve is the cumulative number of elements restored or cumulative equivalent MVA restored at the time shown on the horizontal axis.

The performance curve is the number of elements or equivalent MVA capacity impact out simultaneously at the time shown on the horizontal axis. The value is equal to elements or MVA capacity restored minus the elements or MVA capacity (i.e., the performance curve is the restore curve minus the outage curve). The performance curve combines information on degradation and recovery during the event.

The curves enable the calculation of several resilience metrics.[24] These metrics help quantify the abilities of a resilient power system to effectively absorb, withstand, adapt, protect against major weather events (event size, outage process duration and outage rate, time to first restore, the most degraded state in the event, the total element-days and MVA capacity days lost), and recover from and reduce the durations and impacts of major weather events (i.e., event duration, time to first restore, time to substantial restoration, instantaneous restore rate).

[23] S. Ekisheva, I. Dobson, R. Rieder, and J. Norris, "Assessing transmission resilience during extreme weather with outage and restore processes," 2022 17th International Conference on Probabilistic Methods Applied to Power Systems

[24] Resilience statistics are defined in Appendix B in the *2022 SOR*.

Resilience Curves and Statistics for the WI Atmospheric River, the Largest Transmission Outage Event in 2025

The atmospheric river that made landfall along the U.S. Pacific Northwest coastline on December 17, 2025, brought heavy snow and rain as well as high winds in the area before moving into British Columbia and the northern Midwestern United States. At the storm's peak, there were about 950,000 customer outages across British Columbia, Washington, Oregon, Colorado, and Montana.[25]

The atmospheric river also caused a large transmission outage event in the WI that impacted 18 Transmission Owners. With 137 automatic outages, this event was the largest transmission event in 2025 but less impactful than top historic hurricane events, such as the 2024 Hurricane Helene (431 outages) and the 2017 Hurricane Irma (352 outages).

Out of the 137 automatic outages caused by extreme weather, 133 were ac circuit outages (8 momentary and 125 sustained), two were transformer outages (both sustained), and two were ac/dc back-to-back converter outages (both sustained). The total affected mileage was 5,343 ac circuit-miles, and the total transmission capacity affected was 48,418 MVA. The reported event duration was 36.7 days, with a single 230 kV ac circuit outage continuing until January 22, 2026. The element- and MVA-based curves for the atmospheric river event are shown in **Figure 2.6** and **Figure 2.7**, respectively. The curves are truncated at 01/01/2026 0:00 UTC with one ac circuit outage still unrestored.

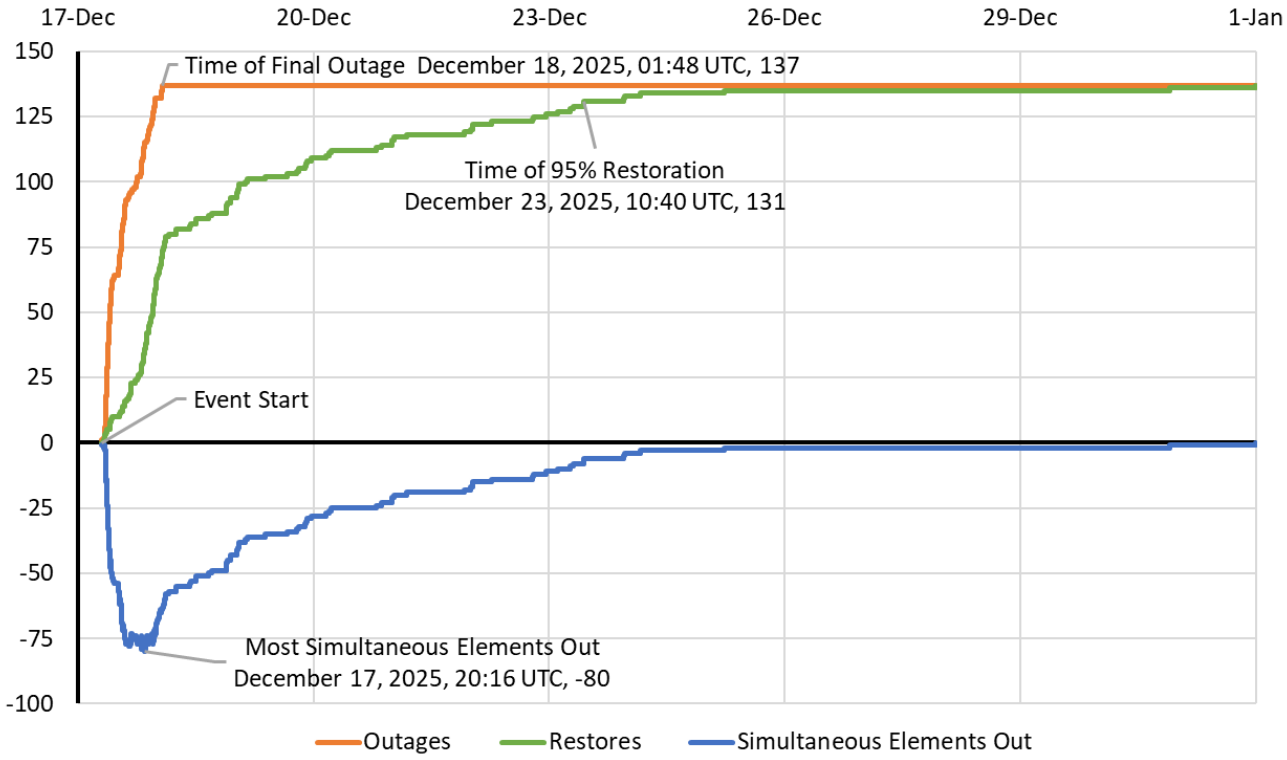


Figure 2.6: Transmission Element Outage, Restore, and Performance Curves for Atmospheric River Event in the Western Interconnection, December 17, 2025–January 22, 2026

[25] Customer outage data sourced from Eagle-I.

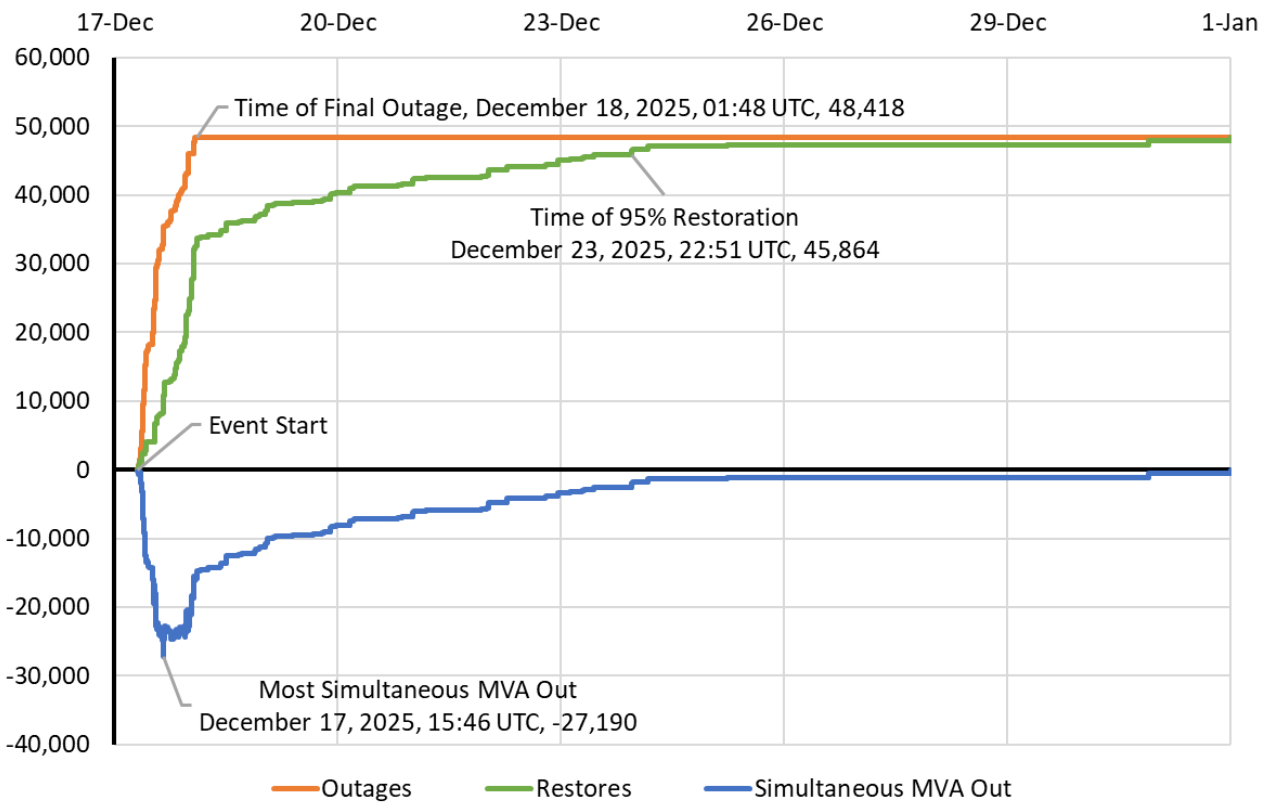


Figure 2.7: Transmission Capacity (MVA-Based) Outage, Restore, and Performance Curves for Atmospheric River Event in the Western Interconnection, December 17, 2025–January 22, 2026

The outage process shown in **Figure 2.6** and **Figure 2.7** by **orange** curves started as a cluster of quickly accumulating outages and continued for 18 hours with an average outage rate of 7.4 outages per hour (2,631 MVA per hour). Due to multiple outages of the same ac circuit, a total of 137 outages occurred on 123 distinct ac circuits.

The restoration process shown in **Figure 2.6** and **Figure 2.7** by **green** curves started with a momentary restoration 28 minutes after the first outage began, with the first sustained outage restoration 50 minutes after the event started. As is typical for large events, the restoration process progressed rapidly;[26] however, restoration times slowed with a larger percentage of equipment still out than usual. By applying a fitted curve for the restore process[27] to **Figure 2.6** it can be estimated that the maximum instantaneous restore rate of 4.3 restores per hour was reached 4 hours and 16 minutes into the event. The restoration rate was 2.4 elements per hour at the time half of the outages were restored (about 19 hours into the event), and only 0.1 elements per hour at the 95% element restoration level. The maximum number of transmission elements simultaneously out was 80 and was observed twice: a momentary nadir occurred about 13 hours after the event started, followed by another 13 minutes later, which lasted 2 minutes. The maximum amount of transmission capacity simultaneously out (27,190 MVA), represented by the nadir of the MVA-based performance curve in **Figure 2.7**, was observed only once and more than 4 hours earlier than the element-based nadirs. It occurred when a 500 kV ac circuit went out and ended 4 minutes later, when a different 500 kV ac circuit was restored. When the 80 elements were out simultaneously for the element-based nadirs,

[26] S. Ekisheva, I. Dobson, R. Rieder, and J. Norris, "Assessing transmission resilience during extreme weather with outage and restore processes," 2022 17th International Conference on Probabilistic Methods Applied to Power Systems.
[27] S. Ekisheva, D. K. Pratt, M. Kachadurian, W. G. Martin, J. Norris, and I. Dobson, "Grid Restoration after Extreme Weather Events", 2023 IEEE PES Innovative Smart Grid Technologies Europe (ISGT) Conference.

the total value of transmission capacity unavailable was about 24,000 MVA—notably lower than the MVA out at the MVA-based nadir.

A substantial 95% restoration was reached after 147 hours (17% of the event duration). The substantial 95% restoration for transmission capacity (MVA) took longer, 159 hours or 18% of the event duration. The total loss for the event, calculated as the area between a **blue** performance curve and the time axis, was 235 element-days lost (**Figure 2.6**) and 77,097 MVA-days lost (**Figure 2.7**).

The longest outage was 36.6 days on a 230 kV ac circuit that sustained tower damage. A small number of disproportionately long outages is common in large transmission events. These very large outage durations are often caused by inaccessibility of a portion of the line, damaged structure or equipment or, in some cases, a utility postponing the restoration of a single remaining element because this element is considered not critical for reliability of the grid.[28]

Transmission System Resilience Statistics by Associated Weather Type: 2021–2025

Weather Types

The outage grouping procedure identified 59 large transmission events in the years 2021–2025, two of which were not weather-related (a 2023 contamination event and a 2025 frequency event).[29,30] The 57 large weather-related events were caused by the weather types listed in **Figure 2.8**. If several weather factors were observed together (e.g., hurricane, tornado, and wind), the dominant cause of transmission outages was determined to be the weather type. Multiple sources (i.e., NERC's daily BPS awareness reports, Velocity Suite, NOAA, Ventusky, public media reports) were used in conjunction with cause codes to determine if a weather event was associated with each large transmission event.

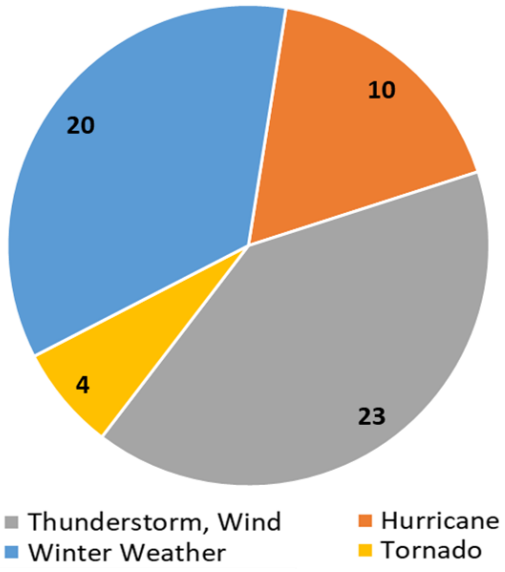


Figure 2.8: Weather Types of Large Transmission Events, 2021–2025

[28] S. Ekisheva, I. Dobson, R. Rieder, and J. Norris, "Assessing transmission resilience during extreme weather with outage and restore processes," 2022 17th International Conference on Probabilistic Methods Applied to Power Systems.
[29] A 2023 large event in SERC with 30 outages caused by Bird Contamination; the event duration was 2.5 days.
[30] A 2025 large event in WECC with 46 outages caused by Power System Condition; the event duration was a day.

Figure 2.9 shows selected resilience statistics for the 2021–2025 events by weather type. Hurricanes caused the largest transmission events, with the average one having 123 outages, while other groups had average outage counts that ranged from 43–64 outages. The maximum number of elements simultaneously out (the most degraded state in an event as indicated by the nadir of the performance curve) fell between 51–67% of the event size on average.

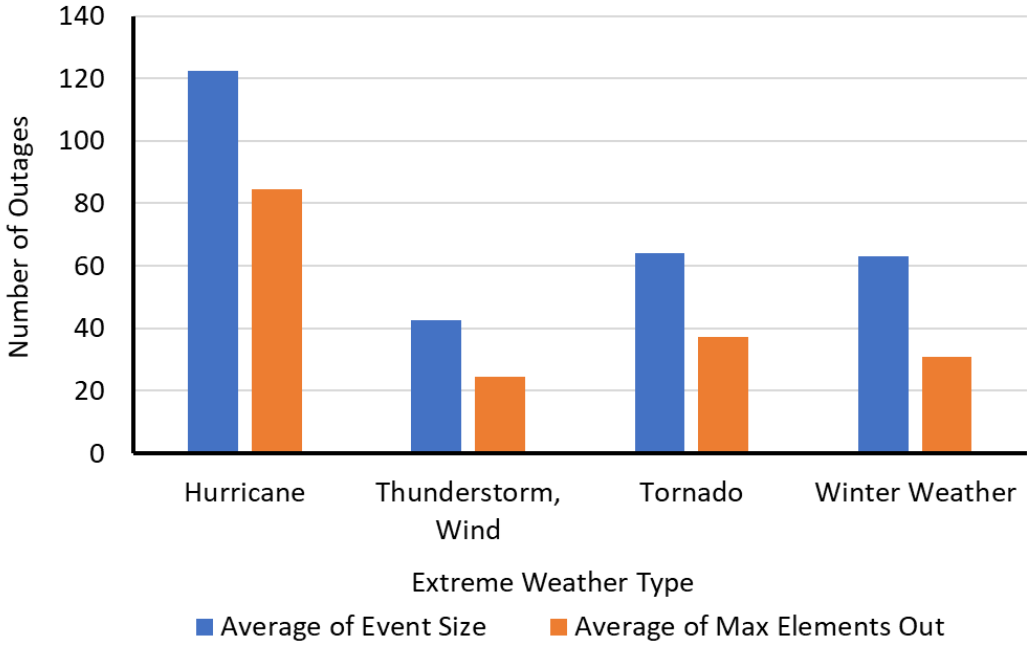


Figure 2.9: Resilience Statistics for 2021–2025 Large Weather-Related Events

Figure 2.10 compares the average event duration with the average substantial restoration duration (the time to restore 95% of outages and 95% of MVA capacity) and shows the time to first restore.

Hurricanes were the highest in average event duration, second for 95% outage restoration duration, and lowest for 95% MVA restoration duration. Tornadoes were the second highest in event duration with the highest average 95% restoration duration for both outages and MVA capacity. While some value can be extracted from evaluating the average event duration, the time to 95% restoration is typically more indicative of overall performance.[31]

[31] *How Long is a Resilience Event in a Transmission System?: Metrics and Models Driven by Utility Data* | IEEE Journals & Magazine | IEEE Xplore

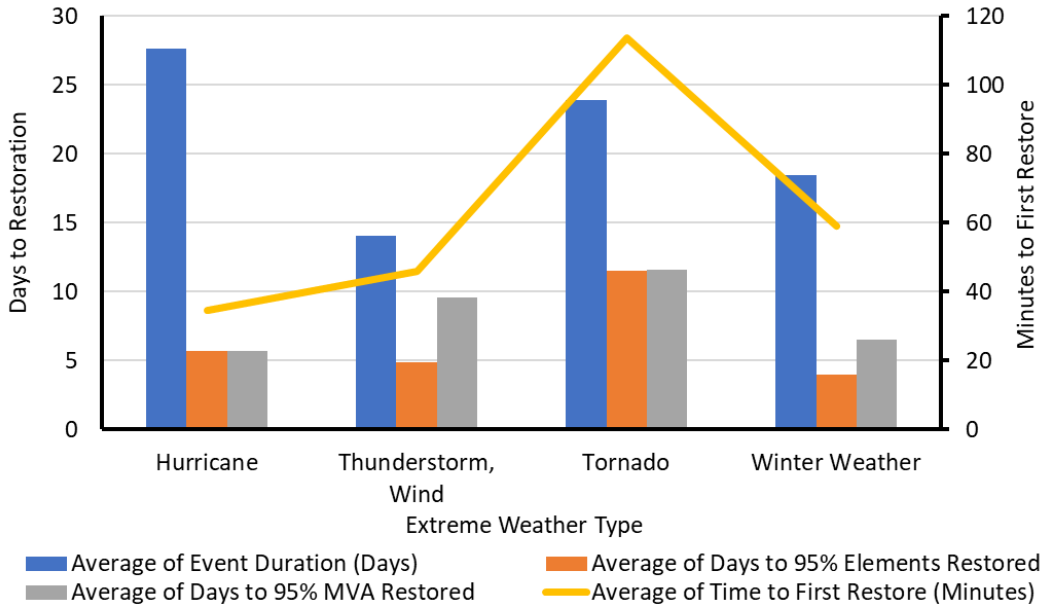


Figure 2.10: Average Event Duration vs. Average Sustained Restoration Duration

Changes in Resilience Statistics: 2021–2025 Events vs. 2020–2024 Events

To draw conclusions about improving, stable, or declining transmission resilience against weather, the analysis focuses on capturing changes in the several metrics that quantify resilience over years. The resilience statistics are calculated for large weather-related events for the years 2020–2024 and 2021–2025, and changes in the metrics by weather types were analyzed. The five-year period is selected due to the small annual number of events in some groups.

The bubble chart in **Figure 2.11** shows the groups of large weather-related transmission events by weather type; the five patterned bubbles correspond to the groups for combined 2020–2024 data, and the five solid-colored bubbles show the same groups for combined 2021–2025 data. The size of a bubble represents the average time (in days) to restore 95% of outages for the events in this group (displayed in the center of each bubble). The X-axis of a bubble shows the number of events, and the Y-axis shows the average event size. The bubble color indicates the average MVA-day loss for each group: Below 30,000 MVA-days is shown in **blue**, between 30,000 and 100,000 MVA-days is shown in **yellow**, and above 100,000 MVA-days is shown in **red**.

Change in size or position of a bubble for the same weather type in **Figure 2.11** indicates changes in the impact of that weather resulting from a combination of the weather frequency and severity and improved or declined resilience performance. There was a decrease in the number of events in all categories except for winter weather as reflected by the bubble position change along the X-axis in **Figure 2.11**.

Comparing 2020–2024 vs. 2021–2025, the number of Hurricane; Tornado; and Thunderstorm, Wind events decreased while Winter Weather increased. No weather type changed category for MVA-days lost as reflected by the color of the bubbles (shaded for previous range and solid for new). A comparison of the values for the average number of days to 95% element restoration between the year ranges indicates that the average increased by about one day. Tornado is an exception, which increased by 4.2 days because of some smaller tornadoes dropping out of the year range. Most categories had a similar average event size, except for Hurricanes. This decrease was because 2020, which is outside the most recent five-year window, had record-setting hurricanes and no hurricanes made landfall in 2025.

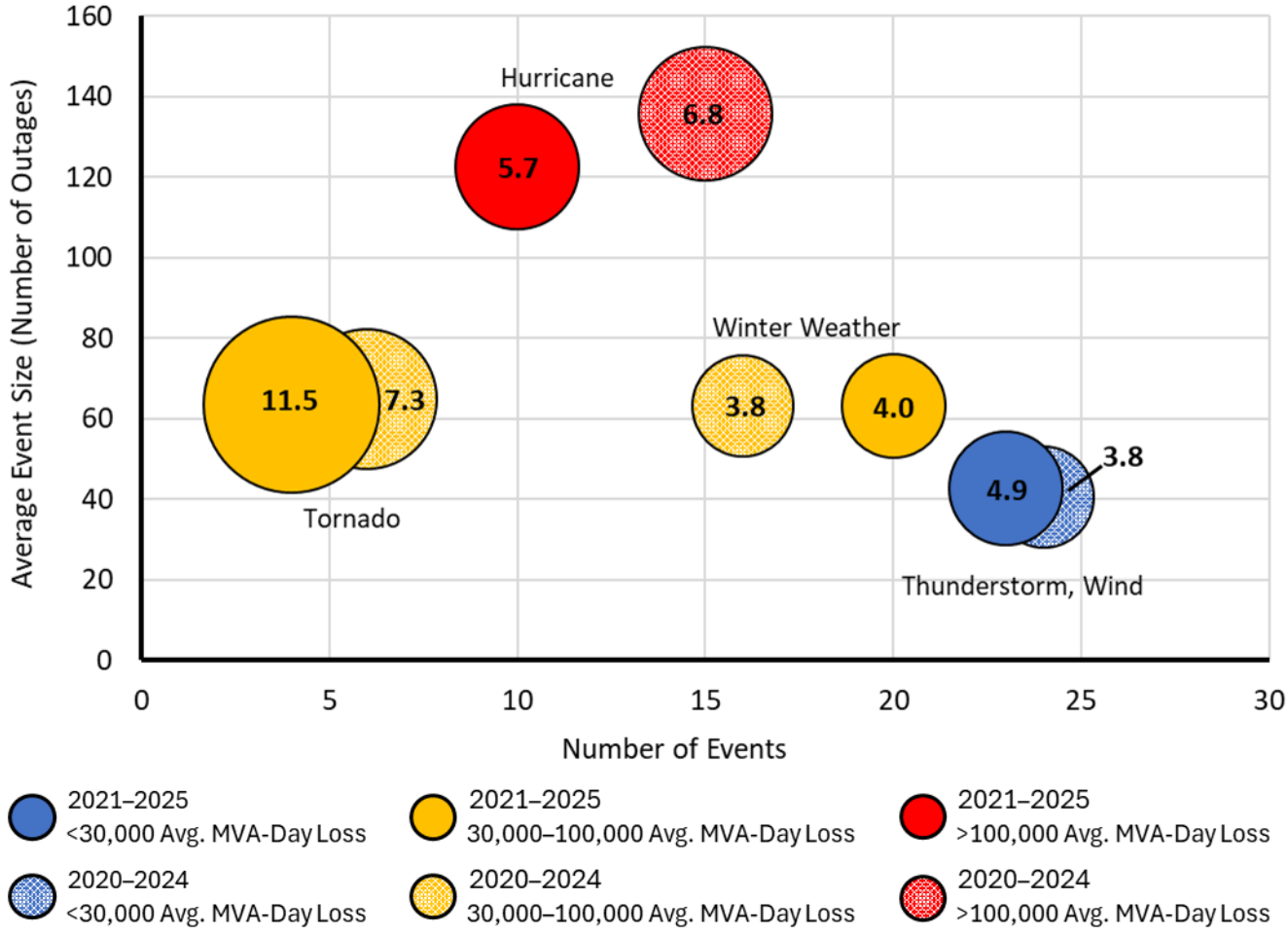


Figure 2.11: Statistics for Large Transmission Events by Weather Type for 2020–2024 vs. 2021–2025

Chapter 3: Grid Transformation

Resource Adequacy

Highlights

- In comparison to five years prior, 2025 saw tightening reserve margins across most notably Manitoba, New England and PJM with MISO, SaskPower and especially ERCOT seeing improvements in the level of anticipated reserve margins heading into last year's peak season.
- In 2025, anticipated resources exceeded Reference Margin Levels (RML) across all assessment areas.
- Improved performance of the thermal generation fleet and delivery of natural gas supplies to generators during arctic events of Winter 2024–2025 compared to prior extreme cold events.
- As of the 2025 LTRA, solar photovoltaic (PV) is no longer the sole, predominant generation type planned over the next 10 years as new battery resource projects have grown to match solar projections.

2025 Planning Reserve Margins

Planning Reserve Margins are a long-term resource adequacy indicator. Anticipated Reserve Margin (ARM) expresses the level of additional resource capacity that an area has above its peak summer (June–September) and winter (December–February) seasonal demand. It is calculated as the difference in anticipated resources and net internal demand divided by net internal demand and shown as a percentage. Each assessment area's ARM is compared against its RML—the threshold margin established by the state, provincial authority, Independent System Operator/Regional Transmission Organization (ISO/RTO), or other regulatory body to provide the level of resources needed to meet reliability criteria (e.g., maintain loss-of-load expectation below 1-day-in-10 years).

Figure 3.1 shows the ARM percent difference from the area-specific RML as calculated using data from the 2021 and 2025 seasonal assessments for each area's peak season. In 2025, all assessment areas except for NPCC-Maritimes had ARMs in excess of the area RML. Assessment areas with improved reserve margins relative to 2021 include MISO, SaskPower, New York, Québec, the eastern and southeastern SERC regions, British Columbia, and—most notably—ERCOT. A realignment of the WECC United States assessment areas in 2025 precludes comparison with 2021 values.[32]

The notable improvement in ERCOT is attributable to a 29% (7,010 MW) increase in solar capacity, continuing a trend of robust solar penetration, and a 94% (7,414 MW) increase in energy storage installed capacity. The large increase in available capacity reflects (1) new rules for managing state of charge (SoC), including a requirement to maintain a certain SoC to participate in ancillary services, (2) installation of systems with longer durations, and (3) improvements in battery operational practices.

The five-year comparisons also reveal tighter reserve margins across Manitoba, Ontario, SPP, Florida, and SERC-Central relative to 2021. In addition to having the most precipitous drops in reserve levels relative to 2021, NPCC-Maritimes, NPCC-New England, and PJM, where generator retirements and significant load growth continue to present challenges, also display discernible year-over-year trends of tightening reserve levels across the 2021–2025 period.

[32] 2025 Western Assessment, 2025–2026 Winter Reliability Assessment Western Overview

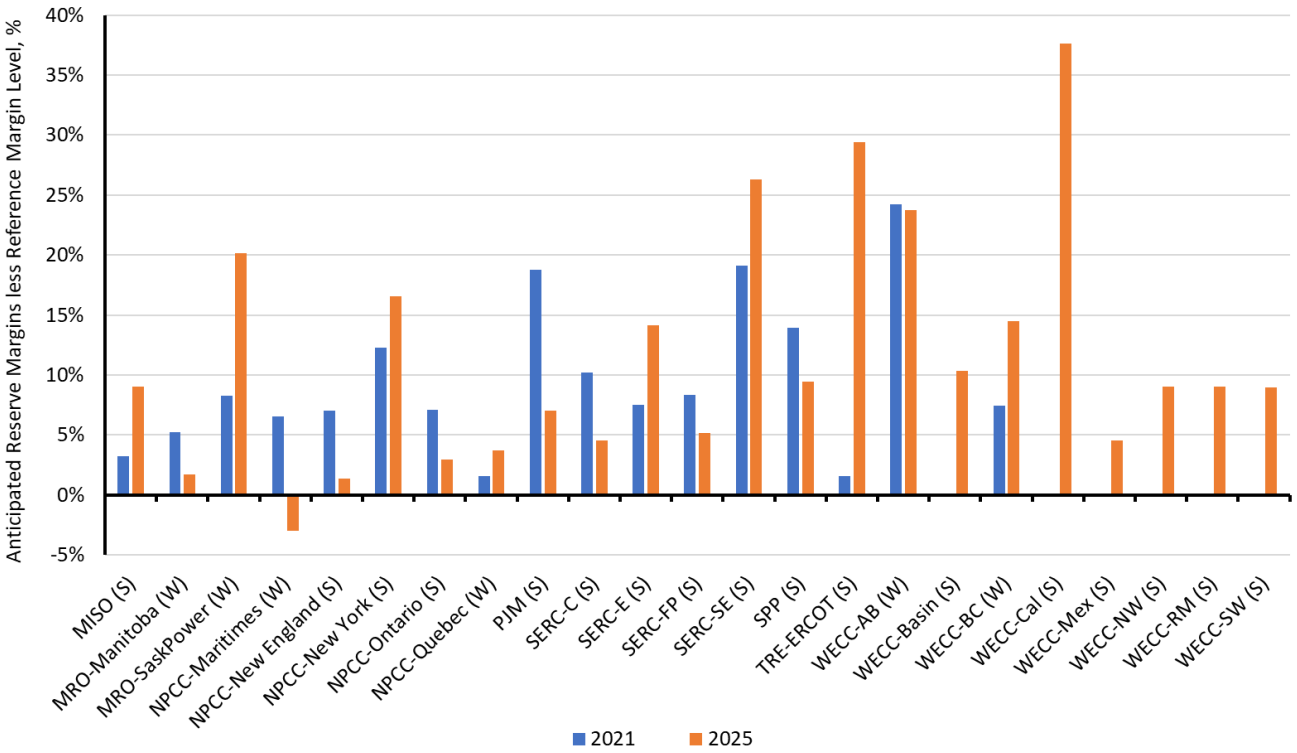


Figure 3.1: 2021 and 2025 Peak Season Planning Reserve Margins Less Reference Margin Levels[33]

Energy Emergency Alerts (EEA)[34]

The purpose of an EEA is to provide a real-time indication of potential and actual energy emergencies within an Interconnection. An EEA 3 is reported when firm load interruption is imminent or in progress. EEA trends may provide an indication of BPS capacity, energy, and transmission insufficiency.

Figure 3.2 shows that 10 EEA 3s were declared in 2025, a reduction of 11 EEA 3 declarations over 2024. None of the EEA 3 declarations in 2025 included load shed, versus 0.108 GWh of firm load shed in 2024.

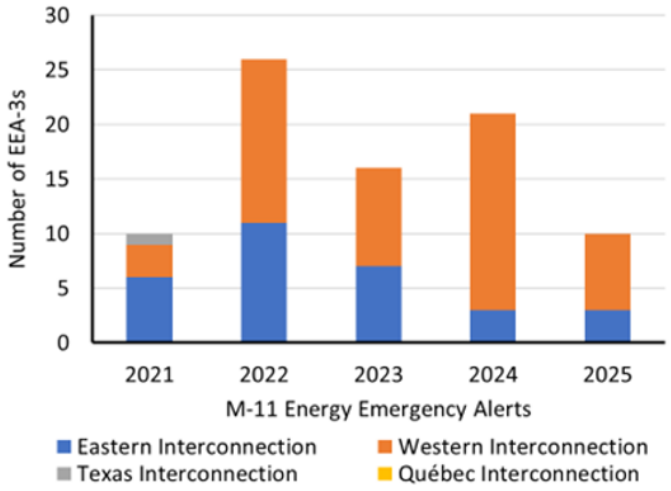


Figure 3.2: EEA 3 by Year and Interconnection

[33] M-1, Reserve Margin displayed as the difference between ARM and area's RML.
[34] M-11, Energy Emergency Alerts

All 10 of the EEA declarations in 2025 were associated with periods of reduced generation or import capability combined with heavy load days. Seven EEA 3s were associated with two non-U.S. entities, both of which have weak connections to their neighbors. Of these seven, six are associated with a balancing area that has processes requiring the declaration of an EEA 3 prior to requesting assistance from neighbors. **Table 3.1** shows the number of hours when operator-initiated firm load shed was deployed during each of the past five years.

Table 3.1: Hours with Operator-Initiated Firm Load Shed (Hours/Year)

Year	Event	Event Hours	Total Annual Hours
2021	Winter Storm Uri	70.5	70.5
2022	June Heatwave	21.0	56.5
	Winter Storm Elliot	35.5	
2023	N/A	0.0	0.0
2024	WI: Generator Trip, Subsequent Failure of Dispatched Units	0.43	0.43
2025	N/A	0.0	0.0

2025 Seasonal Energy and Capacity Risk Analysis

The ERO assesses the risk of electricity supply shortfall in seasonal reliability assessments by considering Planning Reserve Margins, seasonal risk scenarios, and probability-based risk assessments. The expected impact of generator outages and extreme operating conditions on electricity supply and demand are also considered in NERC's seasonal reliability assessments. NERC evaluates the availability of supplies to meet normal seasonal peak demand as well as higher demand that may occur only once per decade, referred to as an extreme or 90/10 demand scenario. In the case of Texas RE-ERCOT and WECC CA/MX in the summer, the highest risk hour period is analyzed. The highest risk hour typically occurs after the peak demand hour when the sun has set, and solar PV resources are not contributing. Increased demand, which can be caused by extreme temperatures, higher-than-anticipated generator forced outages, and derates, can create conditions that lead system operators to take emergency operating actions. The maps in **Figure 3.3** and **Figure 3.4** highlight the assessment areas that NERC identified ahead of the Winter 2024–2025[35] and Summer 2025[36] seasons as at risk for resource deficiencies.

[35] NERC 2024-2025 Winter Reliability Assessment
[36] NERC 2025 Summer Reliability Assessment

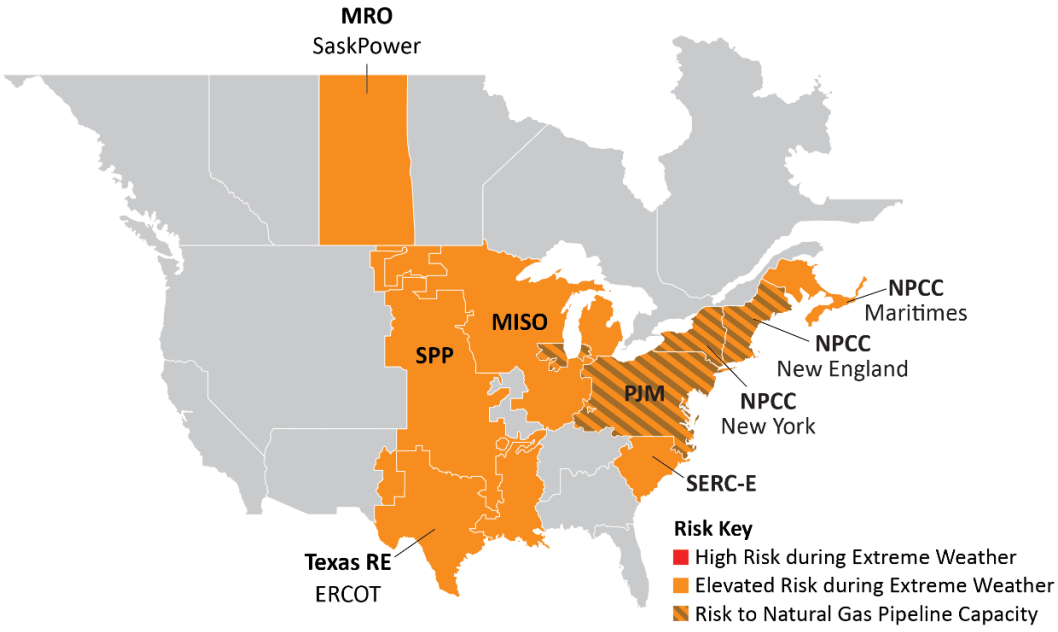


Figure 3.3: 2024–2025 Winter Reliability Assessment Risk Area Map

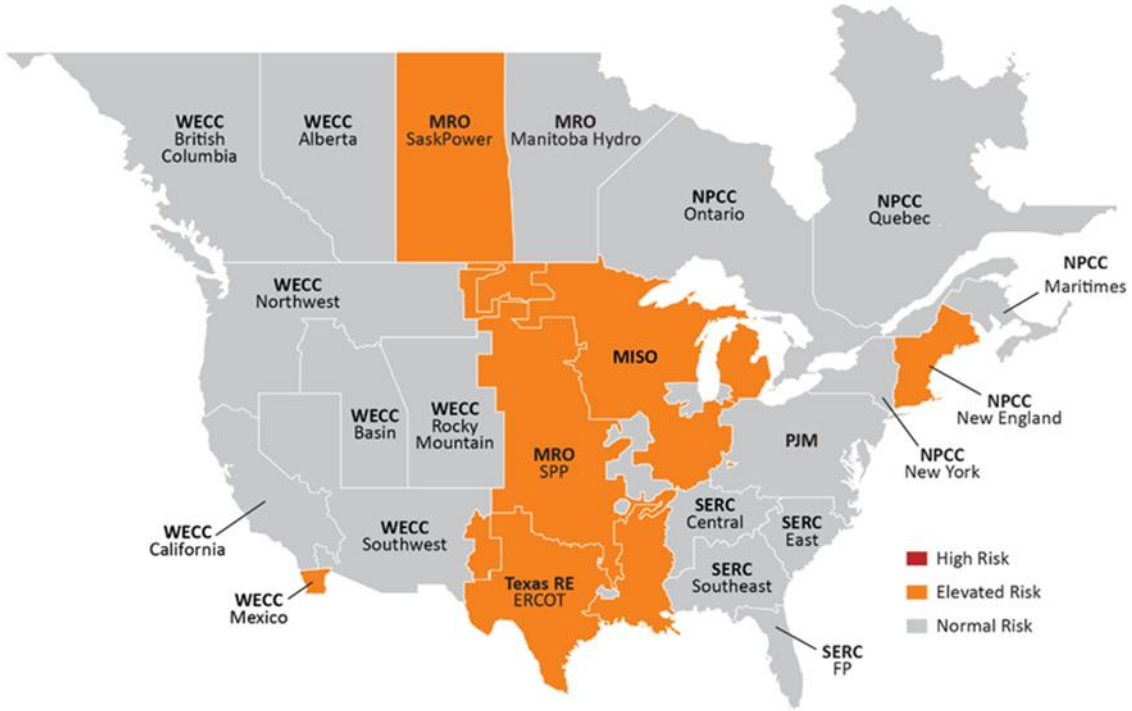


Figure 3.4: 2025 Summer Reliability Assessment Risk Area Map

Review of 2025 Capacity and Energy Performance

Periods of extreme temperatures in the summer and winter of 2025 challenged grid operators to maintain sufficient electricity supplies for demand in many parts of North America. Electricity demand is closely linked to temperature as electric load for space and equipment cooling varies with temperature. Seasonal weather extremes also affect electricity supply because generators of all types have weather-related limitations in some form. **Table 3.2** and **Table 3.3** provide demand and resource performance information for the peak demand hour of the summer and winter seasons in each assessment area. The tables include observed peak demand and resource output along with expected values from risk scenarios used in NERC's summer and

winter reliability assessments. Most assessment areas experienced peak demand that exceeded their normal 50/50 demand forecasts, and several areas exceeded their 90/10 (extreme) demand forecasts. As discussed below, winter arctic air events and summer heat domes contributed to generally high peak demand in North America.

Winter Operating Conditions

Meteorological winter (December 2024–February 2025) temperatures averaged 34.1 degrees Fahrenheit across the contiguous United States, 1.9 degrees above average, placing it in the warmest third of winters tracked by the National Oceanic and Atmospheric Administration. Total winter precipitation in the United States was nearly an inch below average, putting it in the driest third of recorded winters.[37] Canada experienced its fifth-warmest winter on record, with temperatures averaging 3.7 degrees Celsius above average.[38] Although the 2024–2025 Winter was warmer than average overall, a series of arctic events in January 2025 produced an extended deep freeze and harsh winter conditions over much of North America. As in past extreme winter storms, electricity demand surged while generator outages rose from freezing equipment and fuel supply issues. Nevertheless, during the January 2025 arctic events, operators did not require the use of manual load shedding and were able to maintain system balance using conservative operations, resource advisories, and other operational mitigations without resorting to EEA 3s.[39] A report of system performance prepared by the Federal Energy Regulatory Commission (FERC), NERC, and the NERC Regional Entities found that generators performed better during the January 2025 arctic events than in prior winter storms and attributed some improvements to additional generator commitments, improved preparedness, increased situational awareness, and the implementation of lessons learned from previous extreme cold weather events and prior report recommendations.[40] During the Winter 2024–2025 period, the highest amount of capacity in a forced outage state for all reasons occurred on January 20, 2025, with 68,519 MW across all regions. The natural gas system also performed better overall, delivering record levels of natural gas and experiencing only minor production declines and short-duration force majeure events.

A comparison of projected and actual Winter 2024–2025 peak/risk hour is provided in **Table 3.2**.

[37] Despite Arctic air outbreaks, U.S. had warm, dry winter on average | National Oceanic and Atmospheric Administration

[38] Climate Trends and Variations Bulletin – Winter 2024/2025 - Canada.ca

[39] See NERC's *2025–2026 Winter Reliability Assessment* for capacity and energy performance and operating narratives for each Interconnection (p. 51–52).

[40] *January 2025 Arctic Events | A System Performance Review by FERC, NERC, and its Regional Entities*, April 2025

Table 3.2: 2024–2025 Winter Demand and Generation Summary at Peak Demand

Assessment Area	2025 Values Winter Reliability Assessment Scenarios										
	Peak Demand			Generation[1] (MWh)	Transfers[1] (MW)	Wind Actual[1] (MWh)	Solar Actual[1] (MWh)	Forced Outages Summary[4] (MW)	Peak Demand[2] (MW)	Wind Expected[3] (MW)	Solar Expected[3] (MW)
	Date	Time	MW								
MISO	Jan. 21	18:00	108,888*	101,655	-977	18,468	0	17,010	96,134 100,395	16,761	519
MRO-Manitoba Hydro	Jan. 20	8:00	5,132	5,292	-277	142	N/A	146	4,814 5,060	52	0
MRO-SaskPower	Dec. 18	18:00	3,785	3,641	-231	664	0	0	3,802 3,897	368	3
MRO-SPP	Feb. 20	8:00	47,981	40,898	-1,424	4,886	255	9,272	45,926 47,054	4,783	36
NPCC-Maritimes	Jan. 22	7:00	5,810	4,266	-1,174	368	3	*	5,907 6,498	261	5
NPCC-New England	Jan. 21	18:00	19,607	17,686	-1,896	285	4	624	20,308 21,814	329	23
NPCC-New York	Jan. 22	19:00	23,521	18,932	-4,589	654	0	4,835	22,998 24,023	728	0
NPCC-Ontario	Jan. 22	18:00	21,940	24,250	2,990	3,693	0	*	20,951 22,179	1,914	0
NPCC-Québec	Jan. 22	8:00	37,178	39,514	-766	1,463	0	*	36,061 39,545	1,449	0
PJM	Jan. 22	9:00	144,420	152,142	7,731	3,704	3,076	8,663	130,712 144,939	3,620	1
SERC-C	Jan. 22	8:00	47,815	40,898	-6,921	563	214	1,538	41,397 47,062	176	455
SERC-E	Jan. 23	8:00	47,130	41,810	-5,323	0	145	1,830	44,023 47,662	0	2,526
SERC-FP	Jan. 25	8:00	43,974	41,702	-557	0	362	2,824	45,714 54,239	0	1,684
SERC-SE	Jan. 22	8:00	46,490	48,227	1,741	0	592	2,210	43,670 45,116	0	3,861
TRE-ERCOT	Feb. 20	8:00	80,560	79,960	-191	9,397	1,586	5,742	731,935 904,055	15,697	15
WECC-AB	Dec. 18	17:00	12,241	12,711	-470	3,175	4	*	12,280 12,635	1,867	0

Table 3.2: 2024–2025 Winter Demand and Generation Summary at Peak Demand

Assessment Area	2025 Values Winter Reliability Assessment Scenarios										
	Peak Demand			Generation[1] (MWh)	Transfers[1] (MW)	Wind Actual[1] (MWh)	Solar Actual[1] (MWh)	Forced Outages Summary[4] (MW)	Peak Demand[2] (MW)	Wind Expected[3] (MW)	Solar Expected[3] (MW)
	Date	Time	MW								
WECC-BC	Feb. 3	18:00	11,359	11,415	44	70	0	839	11,996 12,749	279	0
WECC-CA/MX	Dec. 12	15:00	35,555	31,925	-4,669	4,021	11,547	1,627	35,359 36,823	569	0
WECC-NW	Feb. 12	8:00	54,278	48,437	-920	2,607	1,494	3,281	58,001 62,230	7,876	2,198
WECC-SW	Feb. 13	16:00	22,969	25,087	2,117	2,741	1,599	1,496	16,177 17,777	1,065	182

Highlighting Notes:

Actual peak demand in the highlighted areas met or exceeded extreme scenario levels

Actual wind output in highlighted areas was significantly below seasonal forecast

Actual solar output in highlighted areas was significantly below seasonal forecast.

Actual forced outages above or below forecast by factor of two.

Table Notes:

1 Actual demand, wind, and solar values for the hour of peak demand in U.S. areas were obtained from EIA From 930 data. For areas in Canada, this data was provided to NERC by system operators and utilities.

2 See NERC 2024–2025 WRA demand scenarios for each assessment area. Values are the normal winter peak demand forecast and an extreme peak demand forecast that represents a 90/10, or once-per-decade, peak demand. Some areas use other basis for extreme peak demand.

3 Expected values of wind and solar resources from the 2024–2025 WRA for the projected peak hour; actual peak hour can impact solar contribution

4 Values from NERC GADS for the 2024–2025 winter hour of peak demand in each assessment area. Highlighted areas had actual forced outages that were more than twice the value for typical forced outage rates used in the 2024–2025 winter risk period scenarios in the 2024–2025 WRA.

5 Texas RE-ERCOT peak demand scenarios are obtained by adding expected demand response (5.4 GW for winter 2024-2025) to the demand

scenarios found on p. 29 of the 2024–2025 WRA.

*Canadian assessment areas report to GADS on a voluntary basis, which can contribute to the absence of some values in certain assessment areas.

Summer Operating Conditions

The summer of 2025 was the 12th-hottest on record for the contiguous United States[41] during the meteorological summer period (June–August) and the 11th-warmest summer in Canada.[42] Actual peak demand exceeded normal demand forecasts across most assessment areas and exceeded extreme demand projections from the *2025 SRA* in three assessment areas. A summer heat wave developed in early June for most of the eastern half of the continent, triggering system operators to issue resource advisories and other operating mitigations. The east experienced only brief periods of relief from high temperatures through the end of July. Twenty energy emergency alerts were declared during the June and July heat events, but operators were able to manage high loading without resorting to load shedding.[43]

Summer conditions were generally less severe in other parts of the North American BPS. Peak demand in the Western Interconnection was 168,206 MW, slightly below Summer 2024. Western Canada experienced a heat wave from late August and through early September, exacerbating the ongoing drought in western Canada and triggering some energy shortfall events that were managed without shedding load. Wildfire activity also increased due to heat and dry conditions. The western United States overall navigated last summer with the BPS experiencing relatively few emergency events. Demand in WECC U.S. assessment areas never reached or exceeded the projections for extreme demand from the *2025 SRA.* Texas experienced a relatively mild summer in 2025, yet, due to significant load growth, the Summer 2025 load levels were comparable to the far hotter 2023 summer load levels.[44]

A comparison of projected and actual Summer 2025 peak/risk hour is provided in **Table 3.3**.

Table 3.3: 2025 Summer Demand and Generation Summary at Peak Demand

Assessment Area	Actual Peak Demand[1]			SRA Peak Demand Scenarios[2] (GW)	Wind Actual[1] (MW)	Wind Expected[3] (MW)	Solar Actual[1] (MW)	Solar Expected[3] (MW)	Forced Outages Summary[4] (MW)
	Date	Time	GW						
MISO	Jul. 29	17:00	121.6	116.3 121.6	1,105	6,039	12,323	9,123	8,779
MRO-Manitoba Hydro	Aug. 29	17:00	3.5	3.4 3.6	0	48	0	0	252
MRO-SaskPower	Sep. 7	17:30	3.6	3.6 3.8	232	310	26	9	0
MRO-SPP	Jul. 29	16:00	54.5	54.8 57.5	8,130	5,556	810	492	4,370
NPCC-Maritimes	Aug. 11	17:00	3.6	3.3 3.5	151	314	69	0	33
NPCC-New England	Jun. 24	19:00	26.6	24.7 26.4	566	142	180	1,412	1,963
NPCC-New York	Jun. 24	19:00	32	30.0 31.7	1,256	446	164	243	1,372
NPCC-Ontario	Jun. 24	19:00	24.9	21.0 24.5	607	742	39	66	1,532
NPCC-Québec	Aug. 11	18:00	22.7	22.3 23.3	790	885	0	0	5,029
PJM	Jun. 23	18:00	160.7	146.2 158.7	4,515	1,855	7,730	6,244	15,945

[41] Assessing the U.S. Temperature and Precipitation Analysis in August 2025 | News | National Centers for Environmental Information (NCEI)

[42] Rapid Extreme Weather Attribution system: Top heat events of summer 2025 – ClimateData.ca

[43] See NERC Bulk Power Systems Awareness update to the Reliability and Security Technical Committee on September 10, 2025.

[44] See NERC's *2026 Summer Reliability Assessment* for capacity and energy performance and operating narratives for each Interconnection (p. 52–56).

Table 3.3: 2025 Summer Demand and Generation Summary at Peak Demand

Assessment Area	Actual Peak Demand[1]			SRA Peak Demand Scenarios[2] (GW)	Wind Actual[1] (MW)	Wind Expected[3] (MW)	Solar Actual[1] (MW)	Solar Expected[3] (MW)	Forced Outages Summary[4] (MW)
	Date	Time	GW						
SERC-C	Jul. 28	18:00	43.2	41.9 45.7	84	370	714	1,053	701
SERC-E	Jun. 24	17:00	44.8	42.5 45.7	0	0	3,200	5,022	2,407
SERC-FP	Jul, 28	17:00	54.6	49.8 50.8	0	0	8,035	5,749	1,599
SERC-SE	Jul. 28	16:00	46.4	45.7 55.9	0	0	3,366	7,728	1,380
TRE-ERCOT	Aug. 8	18:00	83.7	81.9 88.1	14,509	9,396	16,961	22,962	11,095
WECC-AB	Aug. 27	0:00 UTC	12.0	12.2 12.7	2,870	796	32	1,480	N/A
WECC-BC	Aug. 13	01:00 UTC	9.8	9.3 10.0	293	149	4.8	0	N/A
WECC-CA	Aug. 22	02:00 UTC	54	54.1 64.3	1,744	1,207	5,064	14,756	1,063
WECC-MX	Aug. 7	0:00 UTC	3.5	3.8 4.1	2.5	50	296	227	N/A
WECC-NW	Aug. 13	01:00 UTC	29.8	29.1 32.7	1,054	3,107	1,398	666	1,825
WECC-RM	Jul. 9	00:00 UTC	13.4	13.8 15.0	2,313	1,359	1,571	1,669	1,954
WECC-Basin	Jul. 9	01:00 UTC	13.8	13.6 15.0	931	911	2,660	2,231	0
WECC-SW	Aug. 8	01:00 UTC	36.9	35.1 39.0	1,230	1,091	4,472	4,293	2,323

Highlighting Notes

Actual peak demand in the highlighted areas met or exceeded extreme scenario levels.

Actual wind output in highlighted areas was significantly below seasonal forecast.

Actual solar output in highlighted areas was significantly below seasonal forecast.

Actual forced outages above or below forecast by factor of two.

Table Notes:

[1] Actual demand, wind, and solar values for the hour of peak demand in U.S. areas were obtained from the assessment areas.

[2] See NERC *2025 SRA* demand scenarios for each assessment area (pp. 14–33). Values represent the normal summer peak demand forecast and an extreme peak demand forecast that represents a 90/10, or once-per-decade, peak demand. Some areas use other basis for extreme peak demand.

[3] Expected values of wind and solar resources from the *2025 SRA* for the projected peak hour, actual peak hour can impact solar contribution[4] Values from NERC GADS for the 2025 summer hour of peak demand in each assessment area. Highlighted areas had actual forced outages that were more than twice the value for typical forced outage rates used in the 2024 summer risk period scenarios in the *2025 SRA*.

*Values include both maintenance and forced outages.

**Canadian assessment areas report to GADS on a voluntary basis, which can contribute to the absence of some values in certain assessment areas.

Changes in the Peak Resource Mix Over the Past 10 Years

The generation resource mix is changing as older nuclear and fossil-fired generators retire and natural-gas-fired generators and wind and solar PV resources are built (**Table 3.4**). Over the past 10 years, the BPS has reduced its on-peak[45] capacity of coal-fired generation by almost 118 GW and reduced its capacity of nuclear generation by 6.6 GW. During this time, the BPS added on-peak generation capacity: 57.6 GW of natural gas, 20.5 GW of wind, and 65 GW of solar PV.[46] **Table 3.4** shows the resource contribution to meeting the seasonal peaks for years 2015 and 2025. The lower solar contribution to meeting the Winter 2025 peak is offset by increased gas generation and lower peak demand.

Table 3.4: Generation Resource Capacity by Fuel Type

Generation Fuel Type	Summer				Winter			
	2015 On-Peak		2025 On-Peak		2015 On-Peak		2025 On-Peak	
	GW	Percent	GW	Percent	GW	Percent	GW	Percent
Coal	289.2	28.0%	172.1	15.8%	286.6	27.4%	172.7	16.2%
Natural Gas	418.1	40.5%	489.0	44.9%	437.2	41.8%	512.9	48.2%
Hydro	128.9	12.5%	135.3	12.4%	128.9	12.3%	137.9	13.0%
Nuclear	112.2	10.9%	105.4	9.7%	112.2	10.7%	107.1	10.1%
Oil	48.1	4.7%	28.2	2.6%	51.2	4.9%	30.2	2.8%
Wind	13.0	1.3%	37.4	3.4%	13.6	1.3%	44.0	4.1%
Solar PV	3.9	0.4%	77.8	7.1%	0.6	0.1%	13.5	1.3%
Other	19.8	1.9%	44.2	4.1%	16.8	1.6%	45.3	4.3%
Total:	**1,033.3**	**100.0%**	**1,089.4**	**100.0%**	**1,047.0**	**100.0%**	**1,063.7**	**100.0%**

The resource mix and the pace at which it is changing varies considerably across different parts of the North American BPS. **Figure 3.5** provides an Interconnection-level view of the generation resource mix since 2015.

[45] Individual assessment areas may peak in either the Winter or Summer season and thus on-peak in this context is the sum of the individual areas' non-coincident seasonal peak.

[46] Data obtained from NERC long-term reliability assessments

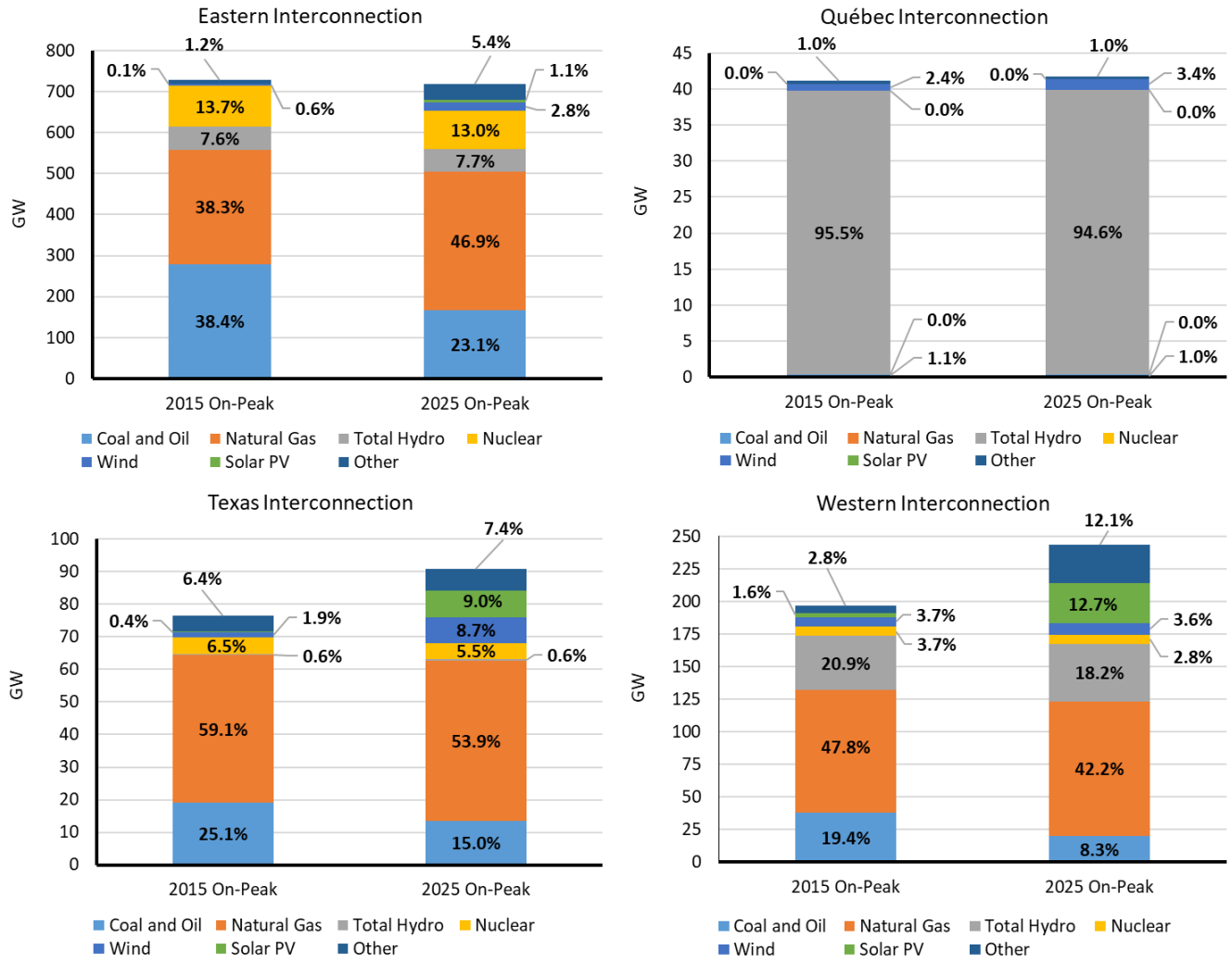


Figure 3.5: 2015 and 2025 Capacity Resource Mix by Interconnection

The growth of battery energy storage systems (BESS) arrived at an inflection point in 2025. **Figure 3.6** below shows the recent growth in both nameplate and on-peak capacity for battery storage across all Interconnections. NERC's LTRA reports on both the current generation resource mix and projections for the next 10 years for each of the 20 assessment areas within the four Interconnections that encompass the North American BPS. As the *2025 LTRA*[47] notes, the shift toward a more variable resource mix continues. One key insight from the *2025 LTRA* is that solar PV is no longer the sole, predominant generation type planned over the next 10 years. New battery resource projects have grown to match solar projections, and, together, solar and battery capacity additions represent two-thirds of the Tier 1 and Tier 2 resources over the 10-year LTRA study period.

[47] *Long-Term Reliability Assessment*, 2025

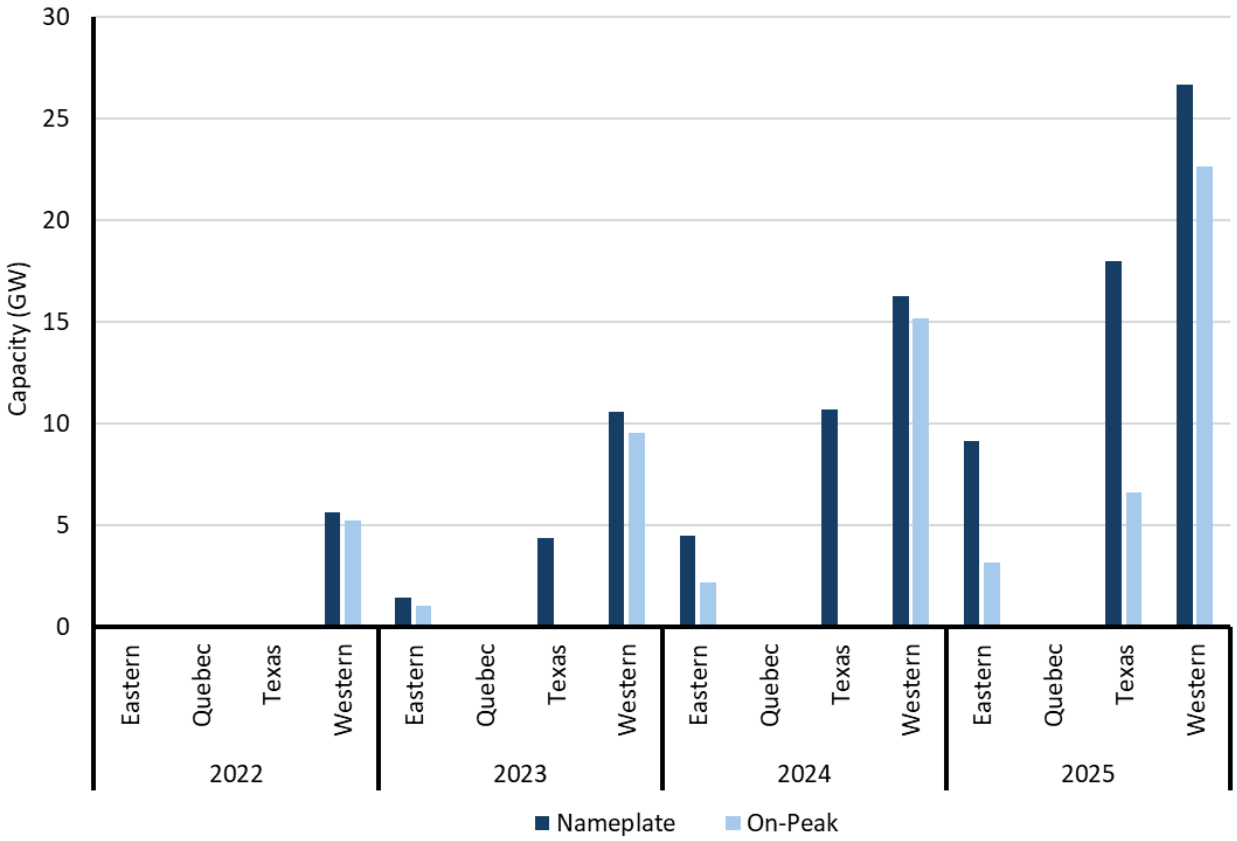
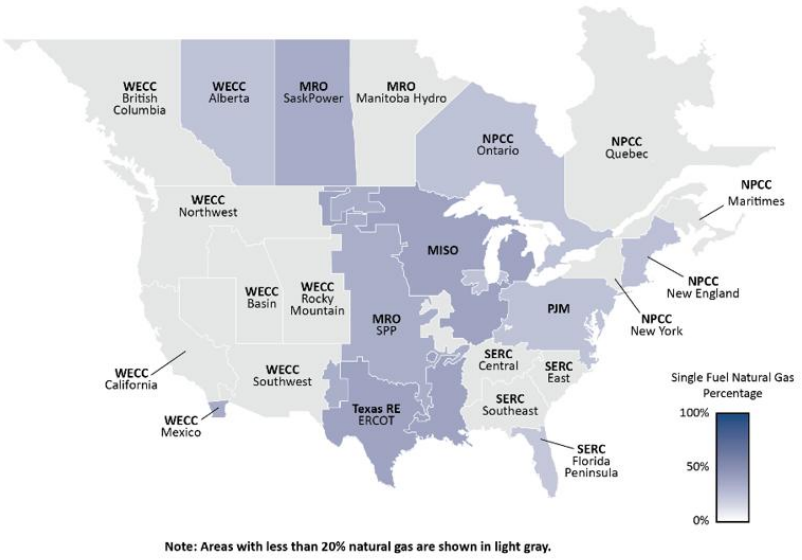


Figure 3.6: 2022–2025 Battery and Hybrid Capacity by Interconnection[48]

Critical Infrastructure Interdependencies

The natural gas and electric systems are constituent parts of an interconnected energy delivery system in North America. While natural-gas-fired generation is important in all seasons, it is especially vital to meet electricity demand in winter when solar and battery resources have less capability than in other seasons. Natural gas-fired generators can be exposed to risk of fuel supply curtailments in winter for a variety of reasons. One mitigation strategy used by generators in some areas is to have dual-fuel capability and maintain supplies of backup fuels. Single-fueled generators currently make up a large portion of the winter peak generating capacity in many parts of the BPS (**Figure 3.7**). These generators are at risk of outages or derates when fuel supplies are limited.

[48] Includes hybrid generation



Single-Fuel Natural-Gas-Fired Generation

	Winter Capacity (GW)	Contribution to Total Winter Resource Mix
MISO	63.9	38%
TRE-ERCOT	53.0	38%
WECC-MX	2.2	34%
MRO-SaskPower	2.5	34%
SPP	33.4	32%
NPCC-New England	12.1	24%
PJM	60.9	23%
WECC-AB	13.9	23%
NPCC-Ontario	8.0	23%
SERC-FP	45.6	21%
WECC-CA	35.9	18%
WECC-SW	21.5	17%
WECC-Basin	4.9	16%
WECC-RM	6.2	14%
SERC-C	17.0	13%
SERC-SE	21.5	13%
WECC-NW	8.7	12%
SERC-E	11.3	9%
NPCC-New York	5.0	8%
NPCC-Maritimes	0.5	7%
MRO-Manitoba	0.3	4%
WECC-BC	0.1	1%
NPCC-Quebec	0.0	0%

Figure 3.7: Single-Fuel Natural-Gas-Fired Generation Capacity Contribution to the Winter Generation Mix in 2025[49]

January 2025 Gas-Electric System Performance

The arctic events in January 2025 presented challenging conditions for the natural gas and electric systems, requiring close coordination between operators. A review of BPS and natural gas system performance following the January winter storms found notable improvement in the delivery of natural gas to BPS generators since winter storms Elliott and Uri with overall less natural gas production decline during cold weather and fewer natural gas infrastructure force majeures.[50] BPS generator outages climbed during the extreme cold due to equipment freezing issues and some gas supply issues.[51] The January 2025 arctic events demonstrated again how closely linked the reliability of the BPS is to natural gas supplies and infrastructure. Because natural gas infrastructure freeze protection mitigations are voluntary for the natural gas industry in most of North America, protections can be unevenly applied, resulting in continued supply risks during extreme conditions. Furthermore, timing misalignments between the natural gas and electric markets continue to challenge generator fuel procurement in advance of severe winter conditions that occur over winter holiday weekends.

Call to Action

NERC developed an Electricity-Natural Gas Strategy[52] to identify, assess, and facilitate ongoing and future treatment of the risks that arise from the growing reliance on natural gas for electricity generation. More information on NERC's response to the risks associated with gas-electric interdependence is provided on the NERC Reliability Initiatives[53] page.

Increasing Complexity of Protection and Control Systems

Together with the progression of interconnected power generation, transmission, and distribution assets, the landscape of automated tools and systems has transformed. This evolution spans an array of digital information platforms and microprocessor-driven devices, fostering a technologically diverse environment wherein operators can wield unprecedented control from virtually any location at a fraction of the historical

[49] *2025–2026 Winter Reliability Assessment*
[50] See *January 2025 Arctic Events | A System Performance Review*, April 2025
[51] PJM January 2025 Cold Weather Operations Presentation
[52] Electricity-Natural Gas Strategy
[53] Reliability Initiatives

cost. When meticulously designed and executed, these automated tools offer a means to enhance the reliable and secure use of the technologies and concepts in the BPS. However, the proliferation of these systems introduces an increasing web of rules, algorithms, and interdependencies that amplify the intricacy of operation. The swift decision-making capabilities of modern relays, tripping circuits, or initiating alternative actions within milliseconds epitomize the accelerated pace at which these systems must navigate intricate operational scenarios. The increasing integration of inverter-based resources (IBR) also expands this complexity, requiring the deployment of additional automated tools and systems. Navigating this expanding labyrinth demands not only vigilant maintenance, prudent asset replacement, and strategic upgrades but also a nuanced understanding of the dynamic interplay between diverse system components. As the scope and scale of these challenges continue to increase, it is imperative to cultivate agile, adaptive solutions.

Protection System Misoperation Trends

Figure 3.8 presents the annual misoperation rates across all Regional Entities and separately for each Regional Entity over the last five years. The comparison of the misoperation rate of the first four years to the most recent year shows a statistically significant decreasing trend for MRO. There is no statistically significant trend for other Regional Entities nor for the ERO as a whole. The overall count of misoperations in 2025 was the lowest over the past five years (**Table 3.4**).

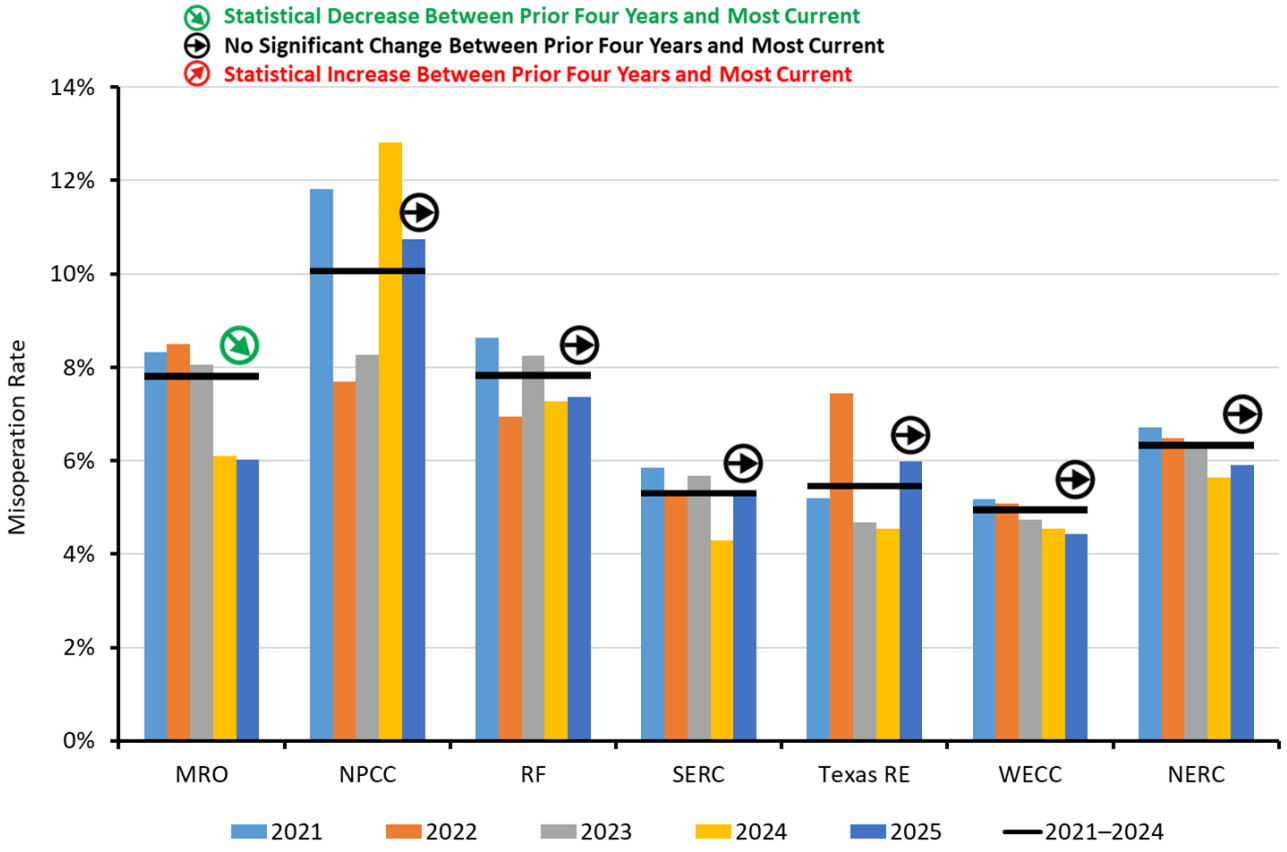


Figure 3.8: Changes and Trends in the Annual Misoperations Rate by Regional Entity[54]

[54] M-9, Protection System Misoperations Rate

Table 3.5: Five-Year Protection System Operations and Misoperations 2021–2025										
Area	Protection System Operations					Misoperations				
	2021	2022	2023	2024	2025	2021	2022	2023	2024	2025
All Regional Entities	17,454	17,804	17,871	19,325	18,397	1,172	1,153	1,118	1,089	1,087
MRO	2,618	3,238	2,977	3,097	3,267	218	275	240	189	197
NPCC	1,362	1,664	1,752	1,521	1,275	161	128	145	195	137
RF	1,867	2,061	1,867	1,843	2,010	161	143	154	134	148
SERC	4,617	4,775	4,954	5,701	5,058	270	252	281	245	265
Texas RE	2,599	1,991	2,183	2,461	2,542	135	148	102	112	152
WECC	4,391	4,075	4,138	4,702	4,245	227	207	196	214	188

Leading Causes of Misoperations

Figure 3.9 shows the distribution of misoperation causes over the past five years. Incorrect settings and relay failures/malfunctions remain the most common causes of misoperations. While a relative increase in Unknown/Unexplainable occurred from 2024 to 2025, historically the misoperation rate for this cause code decreases as ongoing investigations reveal additional information and corrective action plans (CAP) remedy the situations causing the misoperations. There were minimal changes in the relative frequency of other causes from 2024 to 2025.

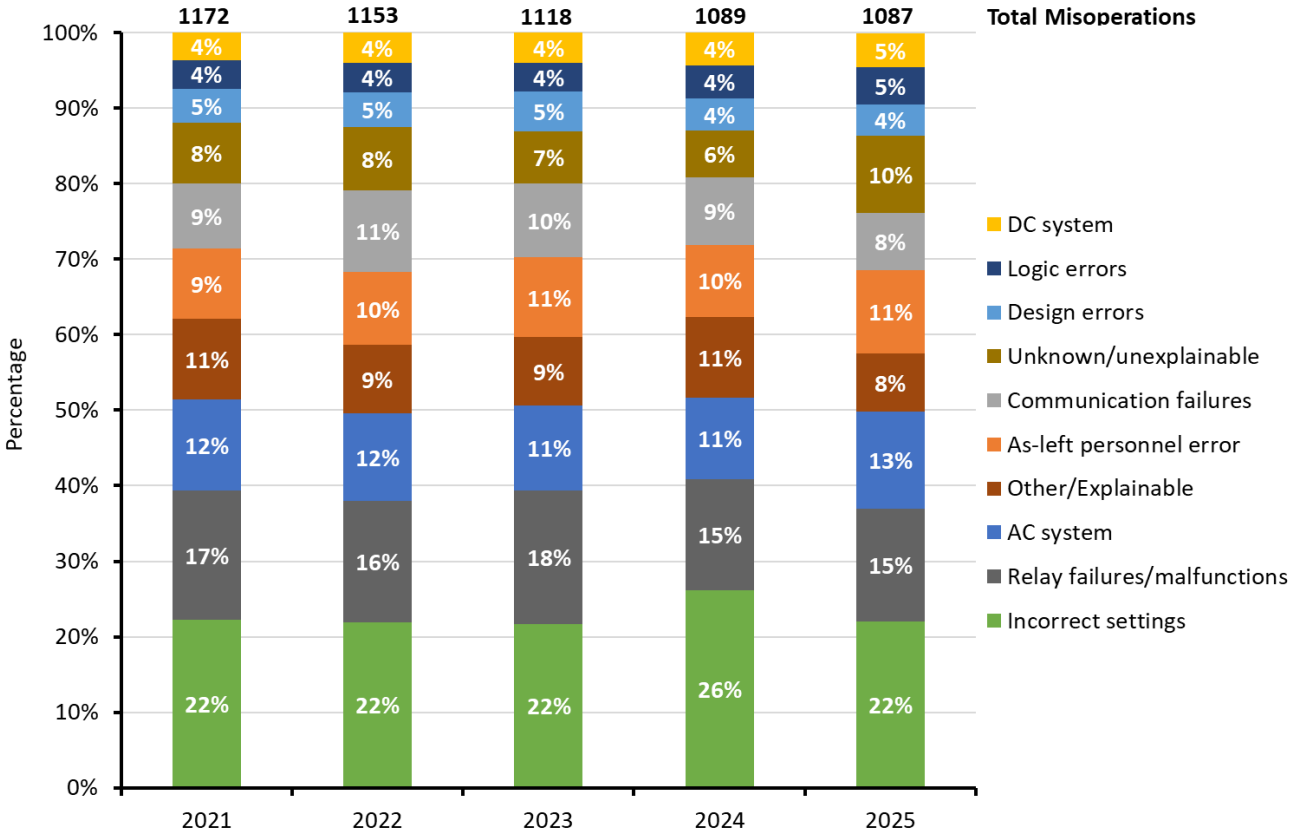


Figure 3.9: Percentage of Misoperations by Cause Code (2021–2025)

Misoperation Impact Score

The misoperation impact score measures the estimated impact of each misoperation on the BES, which is then aggregated to assess overall performance. This is done by summing weighted values for the facility voltage class, equipment type, cause, and category to determine the event's impact to BES reliability.[55] The maximum score of 1.0 implies the worst impact an event is projected to have on the BES, while a minimum score of 0.3034 reflects the least impact an event is projected to have on the BES.

In 2025, there was a statistically significant increase in the average misoperation impact score compared to the prior four years for Texas RE and NERC-wide (**Figure 3.10**). No statistically significant change occurred for any other Regional Entity. Further analysis identified that the Texas RE increase was primarily driven by an increase in misoperations reported by new Generator Owners (GO), increasing misoperations on 345 kV equipment (the highest voltage in the region) and the use of the "unknown" cause code.

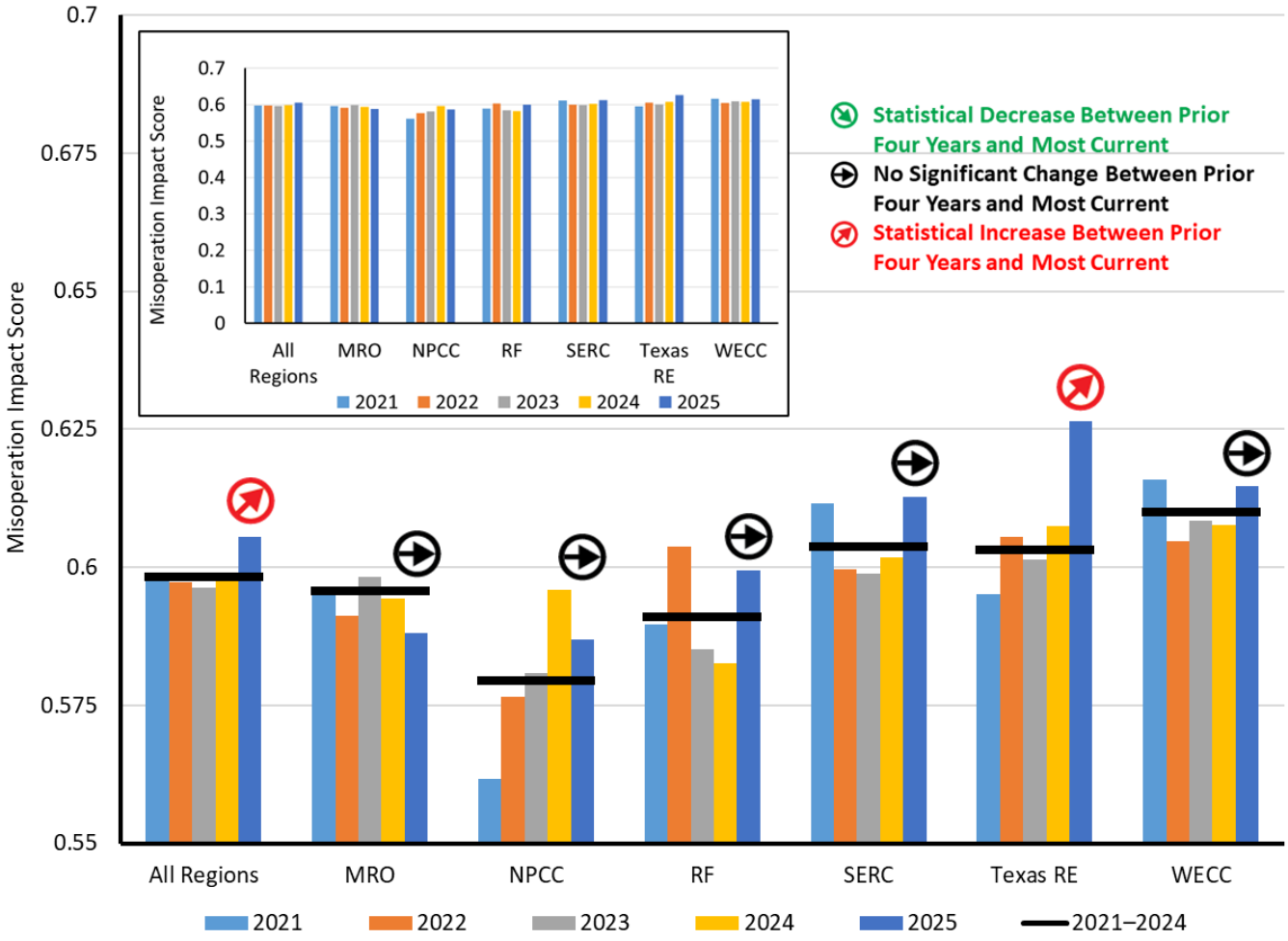


Figure 3.10: Misoperation Impact Score

Protection System Failures Leading to Transmission Outages

Protection system failures may result from or be the cause of transmission circuit outages, unnecessarily removing equipment from service. AC circuits saw a slight decrease in the number of outages due to protection system failures in 2025, but this decrease was not statistically significant. Transformers saw a statistically significant decrease in the number of outages for 2025 (**Figure 3.11**).

[55] Misoperations Impact Score

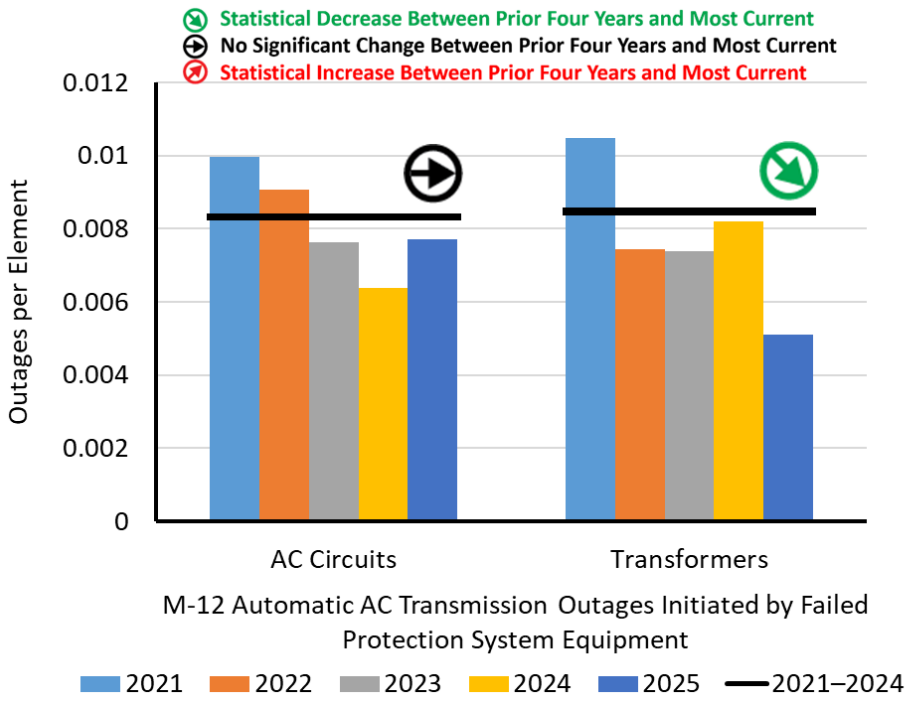


Figure 3.11: Failed Protection System Equipment Outages[56]

Event-Related Misoperations[57]

An analysis of events meeting published criteria[58] reported through the ERO Event Analysis Process (EAP) found that there were 51 transmission-related events in 2025, 32 of which (63%) involved misoperations (**Figure 3.12**). In comparison, 2024 saw 60 transmission-related events, of which 34 (57%) had associated misoperations. While the percentage of events with misoperations increased, the overall numbers for events and misoperations continue to decrease. This reduction is likely attributable in part to the ERO Enterprise and industry stakeholder efforts to reduce protection system misoperations through initiatives such as various task forces, workshops, and analytical efforts.

[56] M-12, Automatic AC Transmission Outages Initiated by Failed Protection System Equipment

[57] When reviewing ERO Event Analysis misoperations data, it is important to differentiate between it and analysis of MIDAS. These are different datasets and processes. This results in datasets that both relate to protection system misoperations and have overlap but often have significantly different sources, intents, and results.

[58] ERO Event Analysis Process - Version 5.0 (Effective January 1, 2024)

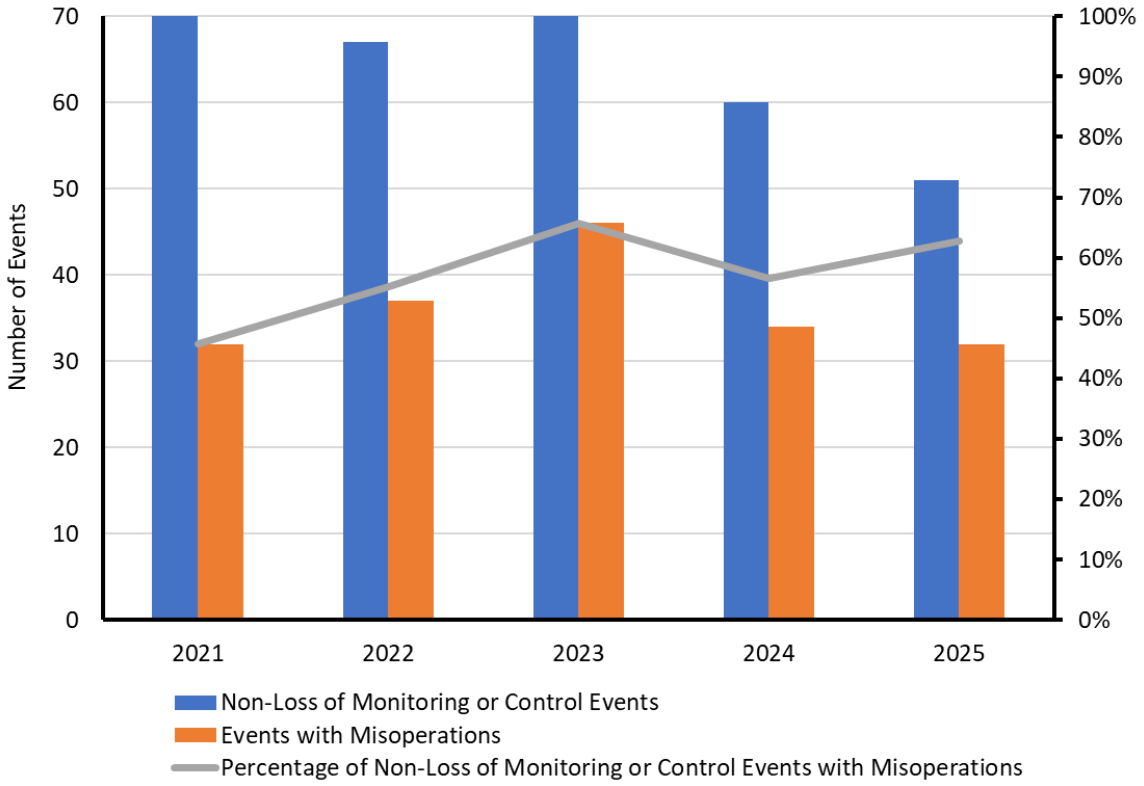


Figure 3.12: Events with Misoperations

Loss of Situational Awareness

The BPS operates in a dynamic environment where physical properties are constantly changing. To ensure reliability, it is essential to maintain situational awareness to anticipate events and respond effectively before or as they occur. Various tools are employed to support situational awareness and uphold BPS reliability. These tools include energy management systems (EMS), transmission outage planning, load forecasting, forecasting for geomagnetic disturbances and weather, data sharing with neighboring entities, and effective communication both within organizations and with adjacent systems.

Without the appropriate tools and up-to-date data, system operators may experience degraded situational awareness, which can affect their ability to make informed decisions about BPS reliability. Unexpected outages of communication systems or monitoring and control equipment, along with planned outages that lack proper coordination or oversight, can result in diminished visibility for operators. For system operators, the EMS is essential for maintaining situational awareness.

Impacts from the Loss of EMS

An EMS is a computer-based set of tools that system operators use to monitor, control, and optimize the performance of both the generation and transmission systems. The EMS enables operators to oversee and manage various factors, including frequency, the status (open or closed) of switching devices, and the real and reactive power flows on BES tie-lines and transmission facilities within their control area. Additionally, it provides oversight of critical EMS applications, such as state estimation (SE), RTCA, automatic generation control, and alarm management.

There were 36 categorized[59] events associated with an EMS in 2025; there were no categorized EMS-related events that caused loss of generation, transmission lines, or customer load. **Figure 3.13** illustrates a trend of the categorized EMS events by loss of EMS functions over the 2021–2025 period.

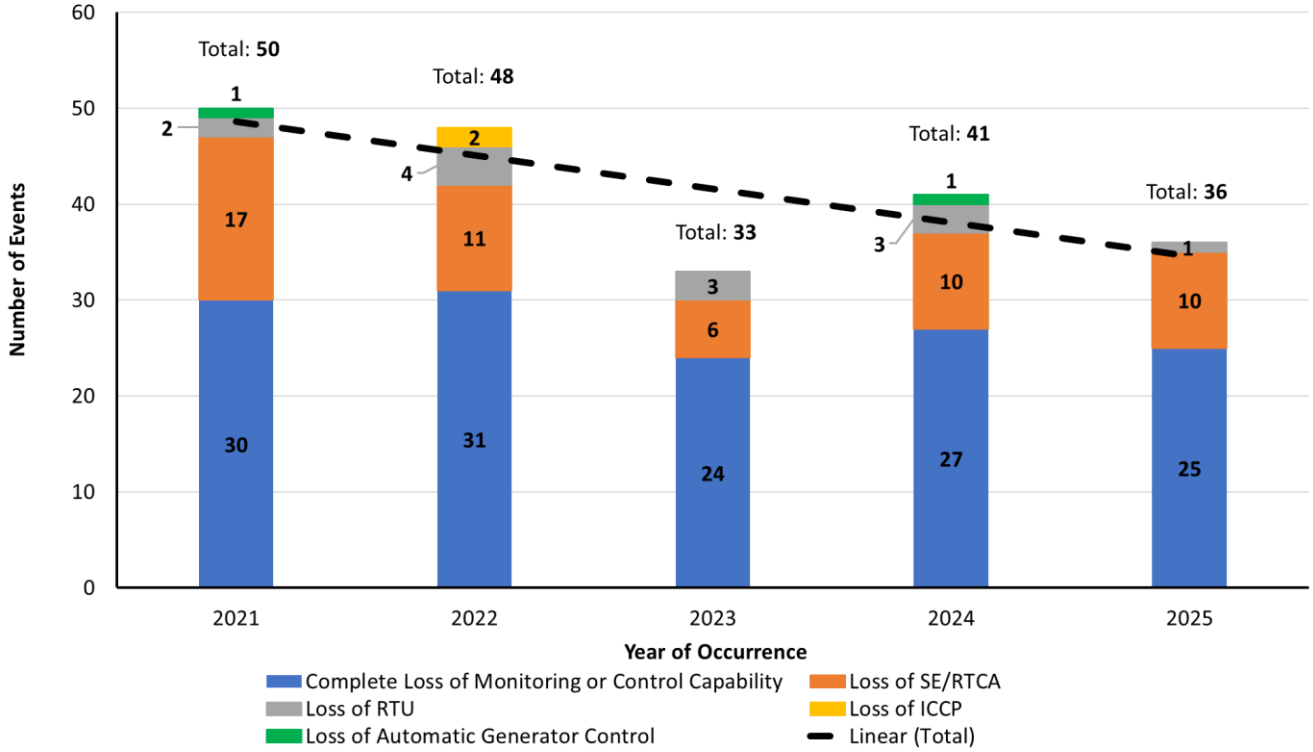


Figure 3.13: Number of EMS-Related Events (2021–2025)

In 2025, there were 25 categorized events involving a complete loss of monitoring[60] or control[61] capability. Two new themes to these events were identified:

- **Lack of effective communication between working departments**

  Maintenance typically involves the collaboration of various working departments, each playing a vital role in ensuring the efficiency and reliability of systems. Effective communication between these teams is crucial, especially when they handle the same equipment or systems that are interdependent. Prioritizing the clear exchange of work and maintenance schedules among departments will significantly reduce the likelihood of overlapping tasks that could negatively affect the utility's equipment and overall operations.

  To address the issues that have arisen from insufficient communication between working groups, a series of recommendations were developed during the analysis of the EMS events. These recommendations aim to foster a more cohesive approach to maintenance and ensure that all teams are informed and coordinated, ultimately enhancing operational safety and efficiency:

  - **Pre-Maintenance:** Planning and risk mitigation before the work starts.

[59] Category 1h. See Electric Reliability Organization Event Analysis Process Version 5.0
[60] The ability to accurately receive relevant information about the BPS in real time and evaluate system conditions using real-time data to assess existing (pre-contingency) and potential (post-contingency) operating conditions to maintain reliability of the BPS.
[61] The ability to take and/or direct actions to maintain the reliability of the BPS in real time via entity actions or by issuing operating instructions.

- Establish Communication Channels: Set up a bridge call with all stakeholders during the work to enable quick communication and coordination between groups.
- Move Active Server to Hot Standby: Move the active server to the hot standby site before work begins to reduce potential impact.
- Transfer Operational Activities: Shift all operational activities to an alternate location until the telecom work is finished.
- Verify Equipment Status: Perform a status check on all equipment prior to beginning any work.

- **During Maintenance:** Real-time monitoring and active communication
  - Monitor Progress: Supervision should actively monitor scheduled work to ensure no conflicts occur between groups.
  - Ensure Real-Time Status Updates: Communicate work status continuously between shifts and work groups, especially when multiple groups share the same equipment.
  - Implement Immediate Escalation: If schedules cannot be met, the group performing the work must immediately notify supervision and other scheduled teams.
- **Post-Maintenance:** Post-activity verification and closure
  - Ensure Final Status Handoff: Ensure the final equipment status is communicated to the next shift or work group before closing the bridge.
  - Verify System Reversion: Verify the system before moving traffic back to the primary servers.

- **Inadequate monitoring of operational support system resource usage**

  Operational support systems are vital for ensuring situational awareness and facilitating real-time decision-making across various operations. Unfortunately, several EMS events have arisen due to overwhelming demands for computer resources and the depletion of disk space. A recurring issue revealed through these incidents is the lack of a proactive framework for managing resource margins. This framework is essential for maintaining operating reserves akin to those established for ensuring BES reliability.

  To enhance the effectiveness of infrastructure monitoring, it is important to:

  - Incorporate a multi-tiered system of alert thresholds,
    - Perform a thorough trend analysis and detection of rate-of-change.
    - Enable early interventions to address issues before they escalate into emergencies.
  - Manage temporary file lifecycles and govern system logs as they are integral components of reliability controls.
    - Validate mechanism for cleanup in both normal operating conditions and potential failure scenarios.
    - Avoid unnecessary buildup of digital artifacts that could compromise system performance and reliability.

The loss of the categorized SE/RTCA was stable in 2025 (10 in both 2024 and 2025). External modeling was still the primary contributor to these events in 2025. Many entities have expanded their EMS models to monitor the impact of events and outages that occur beyond their own footprint. This expansion has raised

the risk of encountering inaccurate data points, faulty topology modeling, and communication issues that could lead to EMS events. Entities were encouraged to communicate changes to the BES, including the addition of new substations and new facilities and the removal of existing facilities, to neighboring entities well in advance. This proactive communication will allow neighboring entities to update their external EMS models promptly, ensuring that the data received through integrated communications control panel (ICCP) links is accurately aligned with the corresponding data points in their models.

Over the five-year period (2021–2025), the average partial or full function categorized EMS outage time (**Figure 3.14**) was 78 minutes, making the calculated EMS availability 99.994% during the term.

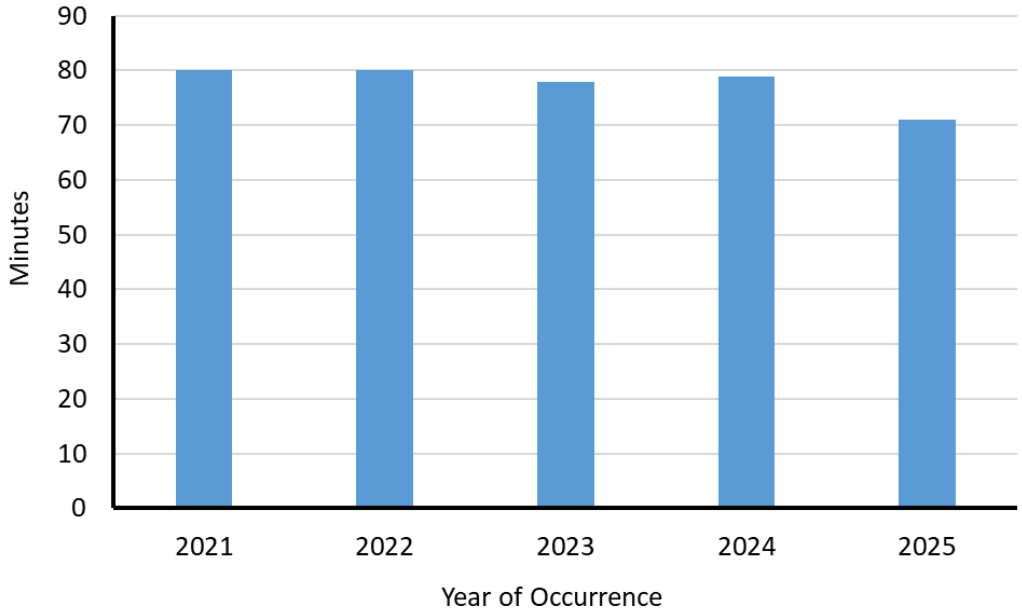


Figure 3.14: Average EMS Outage Time (2021–2025)

Largest Contributor to Loss of EMS

Reported EMS events can be grouped by the following attributes:

- **Software:** Software defects, modeling issues, database corruption, memory issues, etc.
- **Communications:** Device issues, less-than-adequate system interactions, etc.
- **Facility:** Loss of power to the control center or data center, fire alarm, ac failure, etc.
- **Maintenance:** System upgrades, job scoping, change management, software configuration, settings failure, etc.

Figure 3.15 illustrates that software was the primary contributor to EMS outages during the evaluation period from 2021 to 2025. This was followed by communication and maintenance challenges.

Figure 3.16 shows a trend in reported EMS events by the contributors of EMS function loss throughout the same period. In 2025, the main contributors were software and communications challenges, indicating a consistent overall trend from 2021 to 2025.

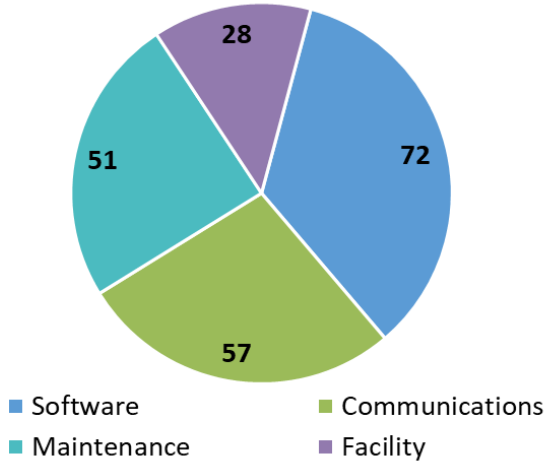


Figure 3.15: Overview of Contributors to Loss of EMS Functions (2021–2025)

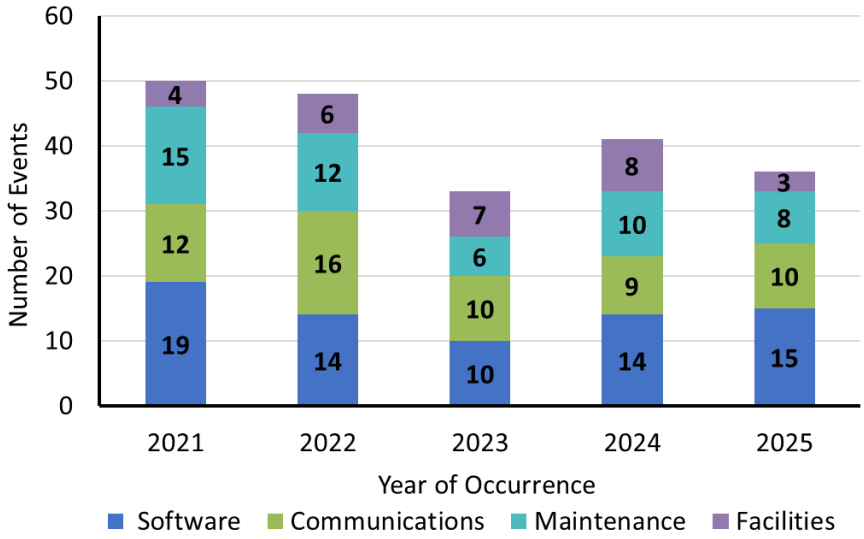


Figure 3.16: Trend of Contributors to Loss of EMS Functions (2021–2025)

Bugs often cause software failures, whether in vendor applications or in-house implementations. A software testing process should be in place to ensure that requirements are met. For effective systems and software assurance, a formal testing process model should be based on the development framework used to create the software. The testing scope should provide an assurance case for the software's operation under both known and unknown conditions and should include a data integrity check of the module. It is important to develop a team of dedicated and skilled in-house personnel who can troubleshoot and resolve issues. Providing in-house staff with real-time tools and training will enhance their knowledge and facilitate better knowledge transfer from software vendors.

Communications failure was typically related to device issues or less-than-adequate system interactions. The failure indicates that data exchange was degraded between substations and control rooms or between the entity and its RC/neighboring entities. An example is a spanning-tree protocol implementation in a network switch, causing a loop that generated an exceptionally high volume of traffic. The result was to shut down the communication network supporting the EMS. Another example is that the entity lost remote terminal unit (RTU) data from major substations as the telecom company's staff cut the fiber between the substations and the data center. Entities should maintain network devices on a schedule in accordance with

the latest vendor information, security bulletins, technical bulletins, and other recommended updates. Entities must also consider redesigning communications systems such that the most critical BES substations communicate simultaneously over entirely separate physical paths (and possibly separate vendors) to both control centers, eliminating the need for telecom company communication structure.

An analysis of the ERO EAP data reveals that 4.8% (or 10 out of 208) of the reportable EMS events lasting more than 30 minutes from 2021 to 2025 were linked to issues with external communication providers. This indicates that external communication provider-related problems are not a significant cause of EMS outages.

Human Causes

As human error can adversely impact the performance of the BPS and BES equipment, it is important to establish and adhere to robust processes to minimize the risks. In-depth analysis often identifies that primary human error causal factors are a result of latent errors as well as organizational and programmatic weaknesses. As the 2025 ERO *Reliability Risk Priorities Report*[62] states, "The BPS continues to evolve in complexity. The industry faces significant risk in staffing skilled workers due to new complexities, advanced technologies, the convergence of engineering and IT skillsets, and competition from other industries."

Transmission Outages

NERC's TADS collects transmission outage data, including on human error; human error as a cause of transmission outage is defined in the *TADS Data Reporting Instructions*.[63]

Statistical significance testing for automatic outages compared the event frequency of 2025 to the average event frequency of the prior four years. Statistical significance testing for operational outages was performed by outage frequency because they are not grouped into events. Automatic outage events involving human error improved a statistically significant amount, while operational outages did not change a significant amount for either ac circuits (**Figure 3.17**) or transformers (**Figure 3.18**).

[62] 2025 ERO Reliability Risk Priorities Report

[63] Human Error: relative human factor performance including any incorrect action traceable to employees and/or contractors of companies operating, maintaining, and/or assisting the Transmission Owner.

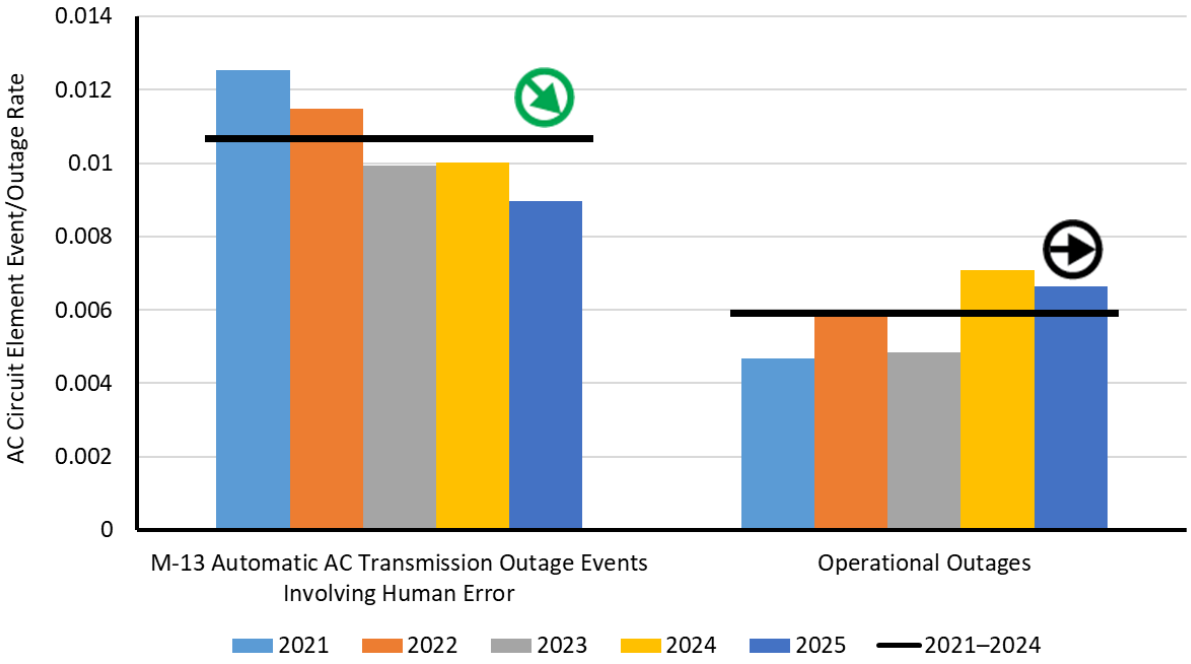


Figure 3.17: Automatic AC Transmission Outage Events and Operational Outages Involving Human Error[64]

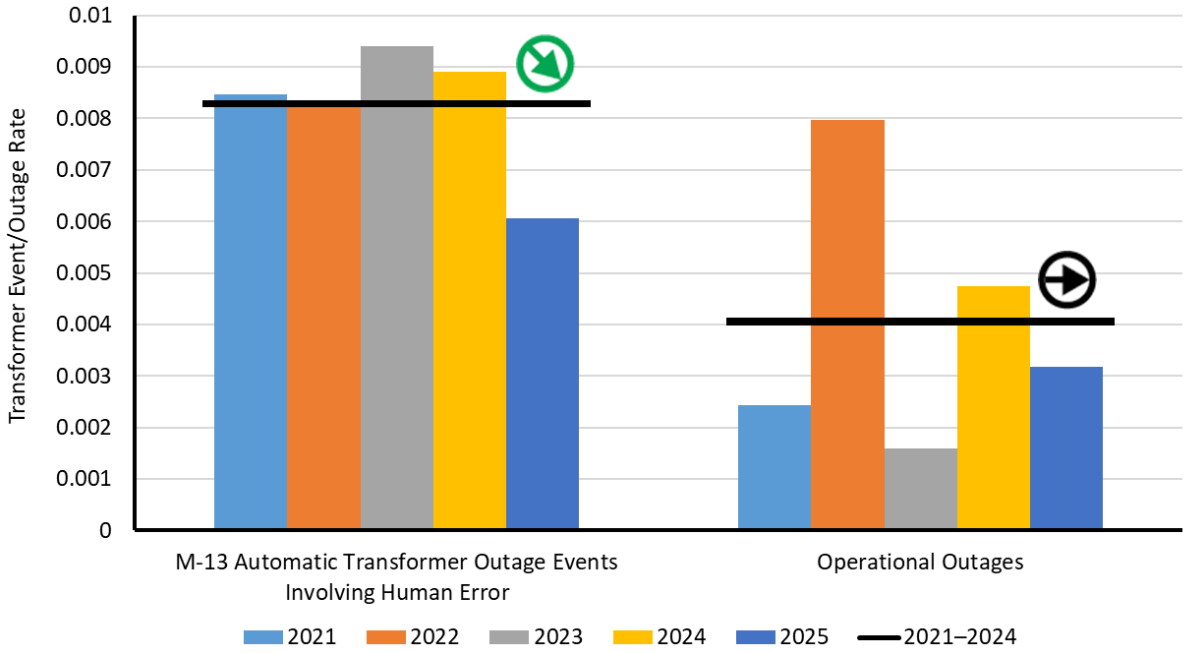


Figure 3.18: Automatic Transformer Outage Events and Operational Outages Involving Human Error[65]

Generation Outages

NERC's GADS collects generation availability data, including on outages associated with human error. While NERC continues tracking these outages, they historically represent approximately 1% of all forced outage

[64] M-13, Automatic AC Transmission Outage Events Involving Human Error
[65] Ibid.

events. Though there was a slight increase observed in 2025, it was not significant enough of a variance to warrant presentation.

Trends of Human and Organizational Root Causes[66,67]

In the ERO EAP, the cause sets of individual human performance and management/organization identify events or conditions that caused or contributed to the reported event. In 2025, organization/human performance was identified as the root cause for 41 processed events (**Figure 3.19**). This does not fully project the final 2025 number, as 66% of the 2025 events have been assigned a final root cause. The top five human and organizational performance root causes for the 2021–2025 period are listed in order of frequency below. These include the individual human error category, the management and organization performance category, and/or the design and engineering category:

- Design output scope less than adequate
- Job scoping did not identify special circumstances and/or conditions
- Management policy guidance or expectations are not well-defined, understood, or enforced
- Corrective action responses to a known or repetitive problem were untimely
- System interactions not considered or identified

Events from 2021 to 2025[68] saw the same top five human and organizational performance root cause identified events from 2020 to 2024.

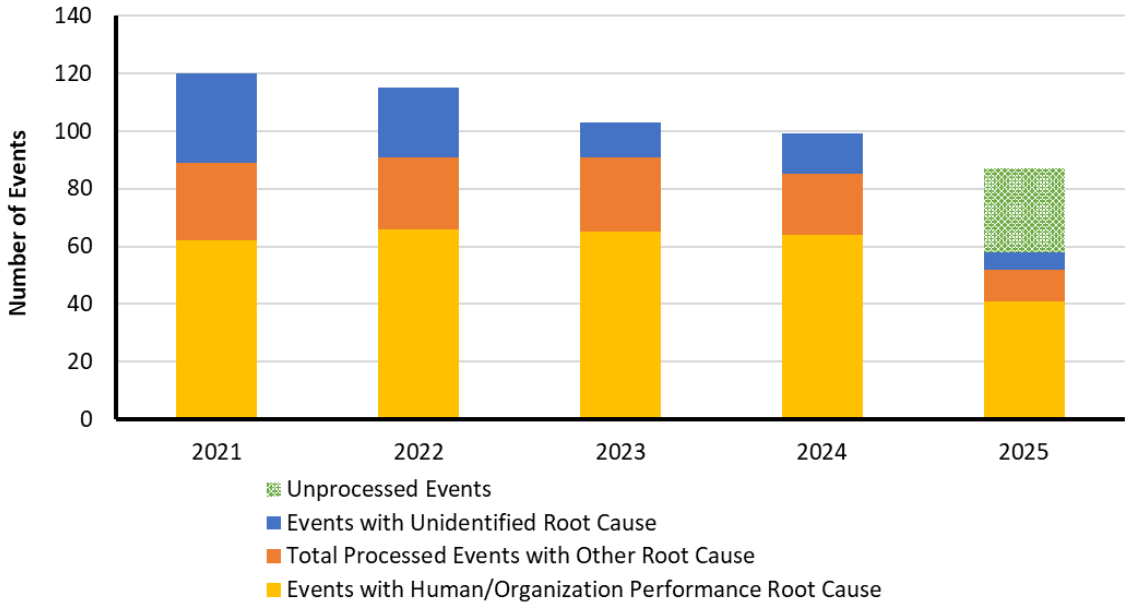


Figure 3.19: ERO EAP Organization/Human Performance Root Cause Identification by Year

Improvement opportunities exist for industry to increase BPS reliability through increased focus in the areas of management and organization performance and engineering and design. Management and organization

[66] Cause Code Assignment Process (Updated January 2026)

[67] When reviewing ERO Event Analysis Human and Organization Performance data, it is important to differentiate between it and GADS and TADS values. These are different datasets and processes. GADS and TADS are primarily focused on wholistic equipment availability and often not analyzed through the same methods nor depth used for the ERO event analysis (EA) process.

[68] Only includes 2025 events that have been processed as of data pull.

performance includes subcategories in which methods, actions, and/or practices are less than adequate. The engineering and design category includes ensuring that the engineering group employs a robust peer-review process to identify procedural errors and all considerations a design needs to be accountable. Some ways to improve human and organization performance would be to establish robust internal control mechanisms to ensure that processes and procedures such as peer reviews are in place to assist project leaders when considering the potential impacts and dependencies that may exist elsewhere on the system and to implement causal analysis when appropriate.

Protection System Misoperations

Human performance-related misoperations remain common, representing 42% of misoperations in 2025 and consisting of 11% As-Left Personnel Error, 4% Design Errors, 22% Incorrect Settings, and 5% Logic Errors (**Figure 3.9**). **Figure 3.20** additionally shows the number of misoperations related to human error by Regional Entity for the past five years.

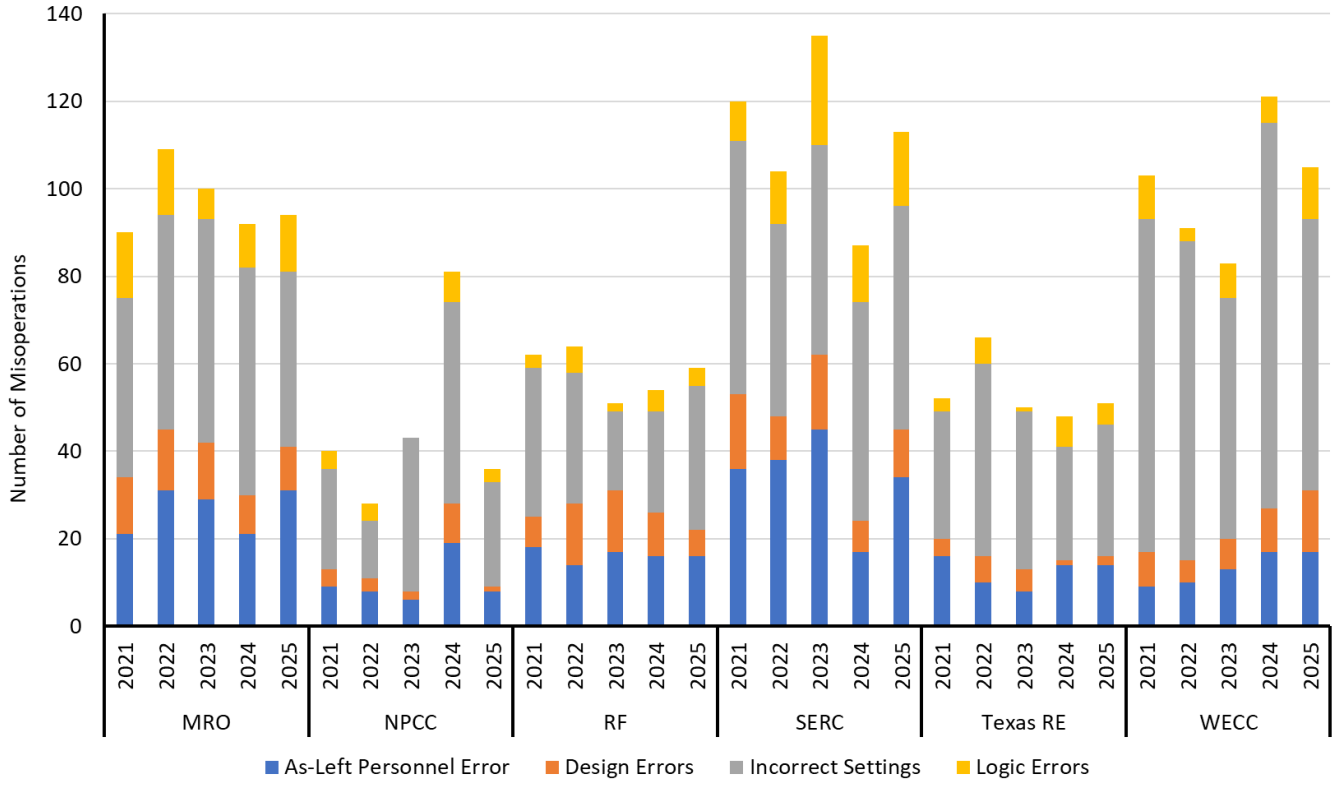


Figure 3.20: MIDAS Protection System Misoperations Due to Human Error by Regional Entity

Chapter 4: Grid Performance

Grid performance is evaluated through established reliability metrics and more in-depth analysis of specific aspects of the BPS:

- Reliability Metrics
- Frequency Response Performance
- Generation Performance and Availability
- Transmission Performance and Unavailability

Reliability Metrics

By calculating 2025 reliability metrics[69] and comparing the results to the previous years as well as the five-year average values, the reliability metrics discussed in this report can be categorized as either Improving, Stable, Monitor, or Actionable. Measuring and trending the relative state of the BPS and BES in this manner supports NERC's obligation to assess the capability of the BPS. **Table 4.1** shows the status of the reliability metrics and includes a reference to the specific metric.

Table 4.1: Reliability Indicators

Metric Name		Metric Performance Status
M-1: Reserve Margin		**Monitor: NPCC-Maritimes (Winter)**
M-2: Transmission-Related Events Resulting in Loss of Load (Excluding Weather)		**Monitor[70]**
M-3: System Voltage Performance		**Retired**
M-4: Interconnection Frequency Response	Eastern	**Improving**
	Texas	**Improving**
	Western	**Improving**
	Québec	**Stable**
M-4.1: Inertia and Rate-of-Change-of-Frequency	Eastern	**Improving**
	Texas	**Improving**
	Western	**Improving**
	Québec	**Actionable[71]**
M-5: Activation of Under Frequency Load Shedding		**Retired**
M-6: Disturbance Control Standard Failures		**Proposed Retirement**
M-7: Disturbance Control Events Greater than Most Severe Single Contingency		**Proposed Retirement**
M-8: Interconnection Reliability Operating Limit (IROL) Exceedance		**Monitor**
M-9: Protection System Misoperations Rate		**Stable**
M-10: Transmission Constraint Mitigation		**Retired**
M-11: Energy Emergency Alerts		**Improving**
M-12: Automatic AC Transmission Outages Initiated by Failed Protection System Equipment	AC Circuits	**Stable**

[69] Current Approved Reliability Metrics; Metrics M-3, M-5, and M-10 are retired.
[70] Average lost load increased, but number of events decreased.
[71] See 2025 Interconnection Frequency Response section for details.

Table 4.1: Reliability Indicators		
Metric Name		**Metric Performance Status**
	Transformers	**Improving**
M-13 Automatic AC Transmission Events Involving Human Error[72]	AC Circuits	**Improving**
	Transformers	**Improving**
M-14: Automatic AC Transmission Outages Initiated by Failed AC Substation Equipment	AC Circuits	**Stable**
	Transformers	**Monitor**
M-15: Automatic AC Transmission Outages Initiated by Failed AC Circuit Equipment (Number of Outages per 100 miles)		**Improving**
M-16: Transmission Element Availability Percentage and Unavailability Percentage	AC Circuits	**Stable**
	Transformers	**Monitor**
M-17: Transmission Outage Severity		**Stable**
M-18: TADS Physical Security Metric		**Stable**

Frequency Response Performance

2025 Interconnection Frequency Response

2025 analysis of frequency response performance and trends below indicates an adequate level of reliability. Further analysis is provided in NERC's *Frequency Response Annual Analysis* (FRAA).[73]

- For the stabilizing period (M4 metric), the EI, WI, and Texas Interconnection (TI) showed statistically significant improvements from 2021 through 2025, while the QI showed no statistically significant changes for the stabilizing period.
- For the arresting period (M4.1 metric), the EI, WI, and TI showed statistically significant improvements from 2021 through 2025, while the QI showed a statistically significant decline. It was noted in the 2024 SOR report that the decreasing trend in the arresting period metric for the QI was due to an overrepresentation of events in Summer 2023 (months that typically have lower inertia) compared to other years, in part due to the wildfire events in the region. A large number of events were also recorded in Summer 2025, which contributed to the declining trend. The QI has been experiencing low hydraulicity conditions since 2023. In 2025, this resulted in reduced energy exports and increased energy imports. Therefore, fewer hydro generating units were synchronized within the QI, particularly under summer light-load conditions, leading to lower system inertia during this period.
- For the underfrequency load shedding (UFLS) margin metric, the EI showed a statistically significant decline from 2021 through 2025. Although the decline is statistically significant, the magnitude of the decline, while measurable, is a very small magnitude. The year-over-year reduction in the mean and median UFLS margin values was only .003 Hz. During the five-year period, there have been changes to both the interconnection frequency response obligations (IFRO) and the minimum frequency bias settings, which will all have an impact on the UFLS margin metric. With UFLS starting

[72] Metric was revised in 2025 to evaluate the number of TADS events instead of outages. The change was made because a small number of events had resulted in a large number of outages. By tracking the frequency of human error events, the metric now tracks how often human error occurs instead of how many outages each instance happens to cause.

[73] 2025 FRAA Report

at .5 Hz off of nominal, the reduction is de minimis to reliability when the remaining margin to UFLS is taken into account.

- The number of valid events for the TI continues to decline. This was also noted in the 2024 SOR report. It was also noted in the 2024 SOR report that there was a declining trend for the number of events in the WI; however, the number of events measured in 2025 was back to within historical norms. This trend in the reduction of valid M4 events is suspected to be due to the retirement of large conventional generation as well as the ongoing integration of battery energy storage facilities in both Interconnections and is considered to be a positive indicator when considering impacts to Interconnection reliability.
- In both 2024 and 2025, there were multiple outlier events in the WI. The WI outlier events were reviewed and were not considered to be anomalous. This was also noted in the 2024 SOR report. These events represent the frequency response performance of the WI when a BA with a large battery energy storage system (BESS) fleet experiences a large resource loss. These events are becoming common place in both the WI and TI.

During the five-year period (**Table 4.2**), the WI had two events within the five-year period where the measured frequency response was less than the IFRO for the Interconnection. This was noted in the *2024 SOR*. Both events occurred in 2023 and had a starting frequency well above 60.00Hz and had a confirmed MW loss under 500 MW. These two factors combined eliminate any concerns that the WI frequency response is insufficient. The EI, TI, and QI did not have any events within the five-year period where the measured frequency response was less than the IFRO for the respective Interconnection.

Table 4.2: Five-Year Statistical Time Trend

Interconnection	M4 Stabilizing Period	M4.1 Arresting Period	Margin-C-UFLS	Comment
Eastern	Increasing	Increasing	Decreasing	No M4 events with FRM below IFRO
Texas	Increasing	Increasing	Increasing	No M4 events with FRM below IFRO
Western	Increasing	Increasing	Neither Increasing nor Decreasing	Two M4 events with FRM below IFRO in 2023
Québec	Neither Increasing nor Decreasing	Decreasing	Neither Increasing nor Decreasing	No M4 events with FRM below IFRO

Frequency response for all Interconnections indicates stable and improving performance for the stabilizing period as shown in **Table 4.3** below.

Table 4.3: 2025 Frequency Response Performance Statistics for Stabilizing Period										
2025 Operating Year Stabilizing Period Performance										
	Number of Events					Mean Frequency Response	Median	Minimum	Maximum	Number of events with FRM below the IFRO
	2021	2022	2023	2024	2025	MW per 0.1 Hz				
Eastern	29	46	47	44	37	2,824	2,443	1,107	6,784	0
Texas	44	33	39	23	22	1,634	1,376	961	3,509	0
Québec	42	22	65	61[74]	63	1,319	644	225	23,800	0
Western	43	30	28	15	29	2,953	2,600	1,256	7,650	0

During the arresting period, the goal is to arrest the frequency decline for credible contingencies before the activation of UFLS. The calculation for IFRO under BAL-003 is based on arresting the point C nadir before the first step of UFLS for resource contingencies at or above the resource loss protection criteria (RLPC)[75] for the Interconnection. Measuring and tracking the margin between the first step UFLS setpoint and the Point C nadir is an important indicator of risk for each Interconnection. **Figure 4.1** indicates the measurement periods used for analysis of the arresting period of events by looking at the frequency response between Value A and Point C as well as at the margin between Point C and the first step UFLS setpoint.

During the stabilizing period, the goal is to stabilize system frequency following a disturbance primarily due to generator governor action. **Figure 4.1** indicates the measurement periods used for analysis of the stabilizing period of events by looking at the frequency response between Value A and Value B.

Frequency response for the EI, WI, and TI indicates stable and improving performance for the arresting period for 2025. Frequency response for the QI indicates a declining trend for the arresting period for 2025 as shown in **Table 4.4** below.

Table 4.4: 2025 Frequency Response Performance Statistics for Arresting Period												
2025 Operating Year Arresting Performance												
	Number of Events					Mean Frequency Response	Median	Min	Max	Mean UFLS Margin	Median UFLS Margin	Min. UFLS Margin
	2021	2022	2023	2024	2025					For Loss of Generation M4 Events Only		
						MW per 0.1 Hz				Hz		
Eastern	29	46	47	44	37	2,104	1,980	1,036	3,400	0.452	0.451	0.439
Texas	44	33	39	23	22	786	764	504	1,382	0.608	0.610	0.544
Québec	42	22	65	63	63	119	123	51	196	1.078	1.149	0.649
Western	43	30	28	15	29	979	918	755	1,506	0.416	0.425	0.334

[74] GADS Events for 2024 has been updated

[75] BAL-003-2 specifies that the RLPC be based on the two largest potential resource losses in an Interconnection or the largest resource loss due to an N-2 RAS. This value is updated annually through the BAL-003-2 data collection process.

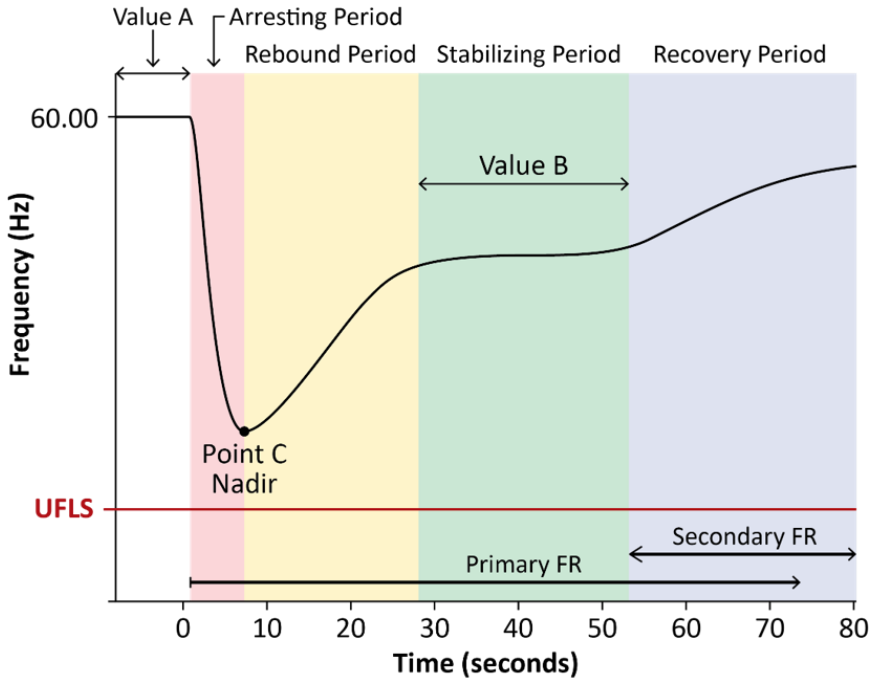


Figure 4.1: Frequency Response Methodology

Figure 4.2 represents an analysis of the arresting period of frequency response events. The Y-axis shows the percent UFLS margin from 100% (60 Hz) to 0% (first UFLS set point for the Interconnection). The X-axis represents the MW loss for the event, expressed as a percentage of the RLPC for the Interconnection. There were no events within the five-year period larger than the RLPC for any of the Interconnections. The largest events for the EI and TI were 50% as measured by percentage of RLPC. The largest events for the WI and QI were 88% and 96%, respectively, as measured by percentage of RLPC.

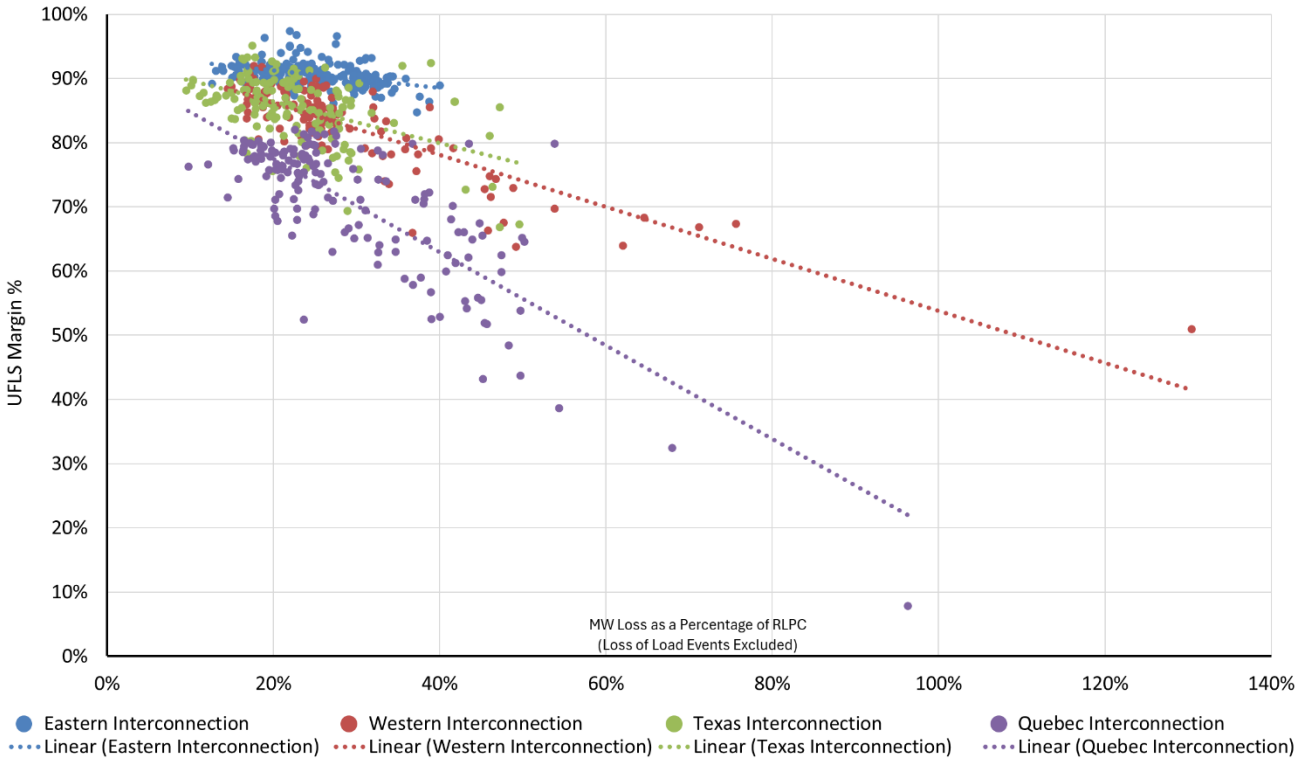


Figure 4.2: Operating Year 2021–2025 Qualified Frequency Disturbances and Remaining UFLS Margin

Interconnection Reliability Operating Limit Exceedances

2025 Performance and Trends

An IROL[76] is an SOL that, if exceeded, could lead to system instability, uncontrolled separation, or cascading that may adversely impact the reliability of the BES. The maximum time that an IROL can be exceeded is the IROL Tv. The IROL Tv must be less than or equal to 30 minutes. Each RC has a different methodology for determining IROLs based on the makeup of their area and what constitutes an operating condition that is less than desirable.

IROLs are established to ensure that corrective actions are taken to prevent and mitigate the exceedance of limits to either return to the Normal state or stay within the Alert state for certain conditions and contingencies that could otherwise cause the BPS to enter the extreme state, being at high risk of system instability, cascading, and uncontrolled separation.

The Texas and Western Interconnections both maintained stable trends with no IROL exceedances reported in 2025. In the Eastern–Québec Interconnections, there were 19 exceedances that lasted more than 10 minutes in 2025, more than the five-year rolling average of 11.8 exceedances as shown in **Figure 4.3**. The 10- to 20-minute range increased from a single exceedance in 2024 to 18 exceedances in 2025, while one exceedance lasted more than 20 minutes. The five-year average still declined slightly as year 2020 rolled off with 20 total exceedances.

[76] M-8, IROL Exceedance

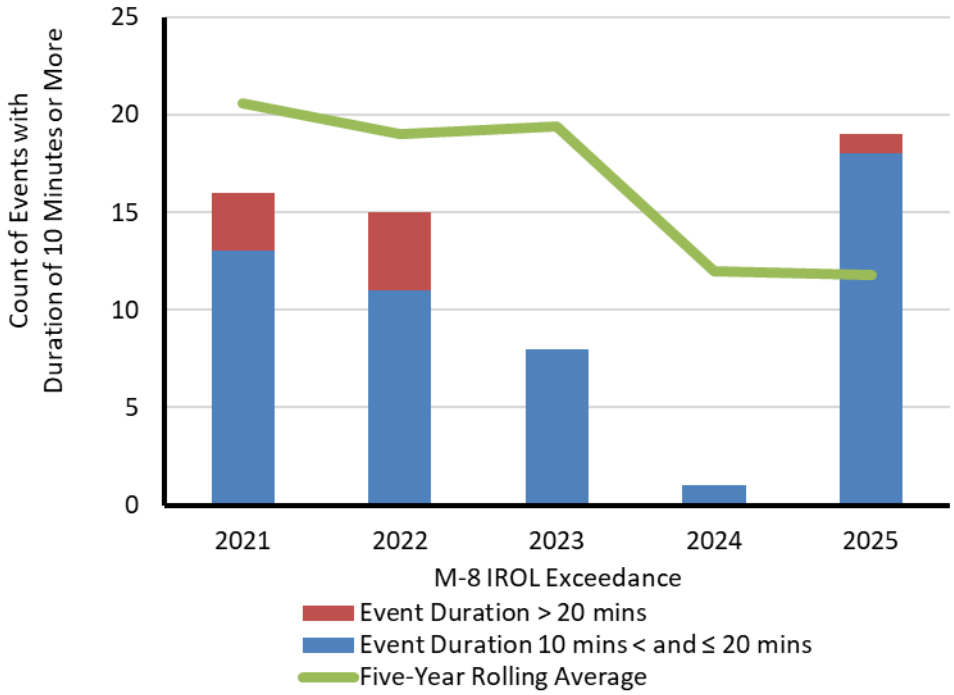


Figure 4.3: IROL Exceedance Counts

Generation Performance and Availability

GADS contains information that can be used to compute reliability measures, such as the weighted equivalent forced outage rate (WEFOR). GADS collects and stores unit operating information by pooling individual unit information, generating unit availability, performance, and calculated metrics.

Conventional Generation WEFOR

The horizontal lines in **Figure 4.4** show the annual WEFOR compared to the monthly WEFOR columns; the solid horizontal bar shows the WEFOR for all years in the analysis period of 8.1%. The 2025 WEFOR rate of 9.2% is a notable increase over 2024 (7.6%) and above recent historical norms in the 7–8% range.

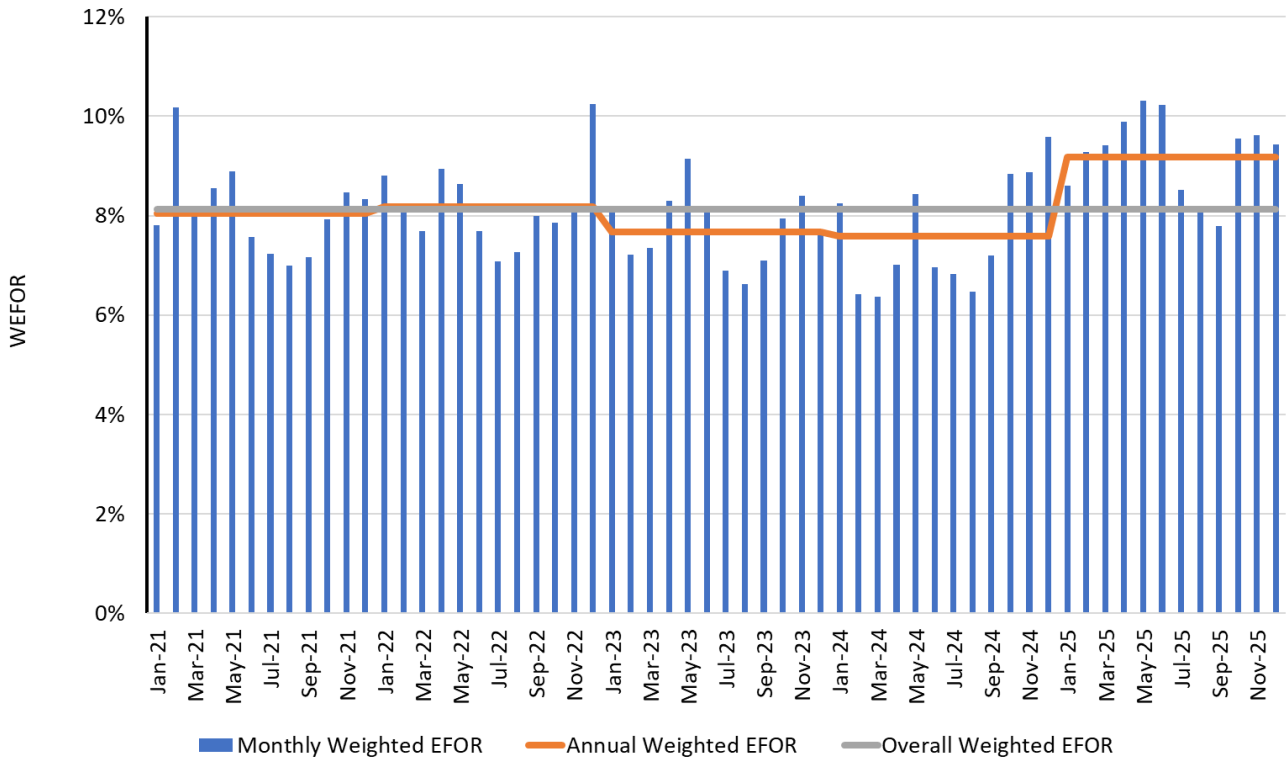


Figure 4.4: Monthly, Annual, and Five-Year WEFOR

Additional analysis identified that the increase is driven by combustion-based generators as shown in **Table 4.5**; further details are provided in the *2026 SOR Overview* report.

Table 4.5: Primary Fuel Type Year-Over-Year Change in MWh

Primary Fuel Type	2024 vs 2025 Year-Over-Year Change in GWh[77]	2024 WEFOR	2025 WEFOR
Gas - Steam Turbine	8,772	19.2%	22.4%
Gas - Simple Cycle Combustion Turbine	5,938	20.7%	22.8%
Gas – Simple Cycle w/Heat Recovery Steam Generator (HRSG)	-203	7.7%	7.0%
Combined Cycle	19,154	4.2%	5.7%
Coal	39,835	11.2%	14.1%
Oil - Steam Turbine	1,857	24.6%	25.6%
Oil - Combustion Turbine	2,427	48.2%	69.4%
Hydro	-3,171	8.4%	7.7%
Nuclear	-3,862	2.7%	2.2%
Other	-2,308	11.1%	8.4%
Total	68,440	7.6%	9.2%

[77] Measured by WEFOR numerator:
$\sum(([Forced\ Outage\ Hours] + [Equivalent\ Forced\ Derate\ Hours]) * [Net\ Maximum\ Capacity])$

The monthly WEFOR for major contributing fuel types is shown as a layered area chart with a relative capacity breakdown pie chart in **Figure 4.5**. The dashed line shows the monthly WEFOR of all fuel types reported to NERC, and the red line shows the mean outage rate of all fuel types reported to NERC over the five years in the analysis period. As stated above, in 2025, the annual WEFOR increased to 9.2%. Observing individual fuel types, coal experienced a fairly consistent increase in WEFOR throughout the year, simple cycle gas turbines experienced normal peak outage rates but with prolonged recovery, and combined cycle experienced both a baseline increase as well as two abnormal peak outage periods in early summer and early winter. These trends can be further contextualized by comparing the change in MWh of lost production due to forced unavailability from 2024 to 2025 in **Table 4.5**, examining each fuel's capacity percentage (**Figure 4.5**), and annual net actual generation (**Figure 4.6**).

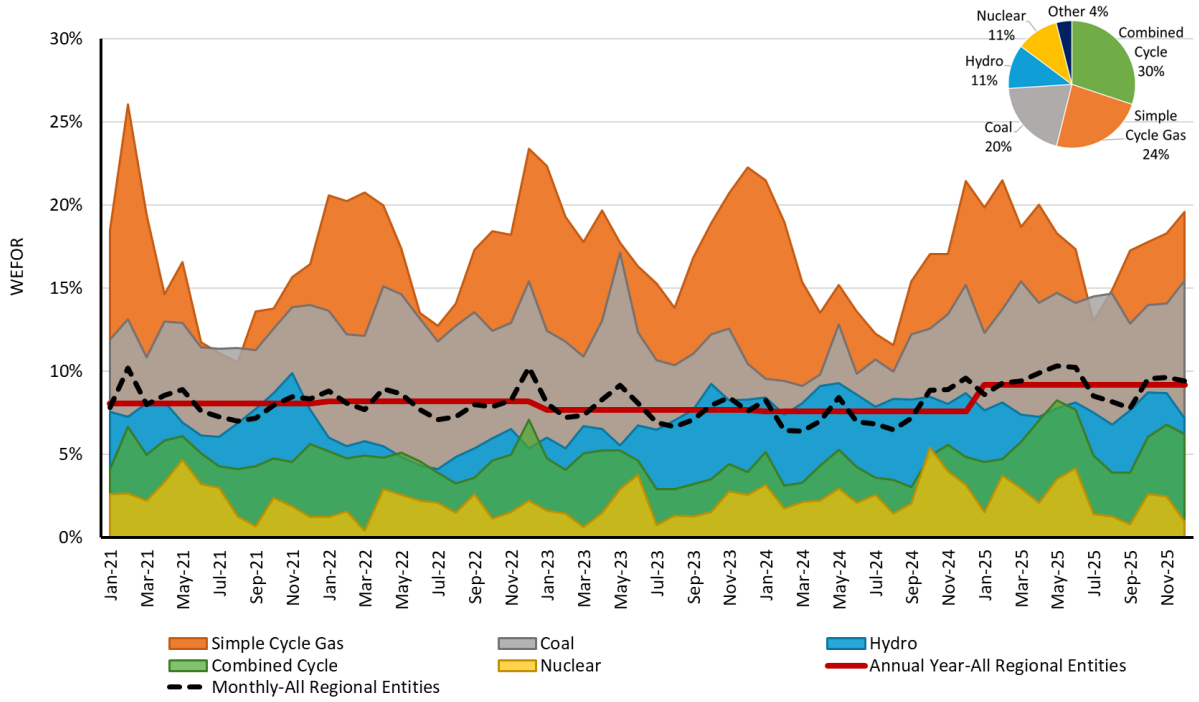


Figure 4.5: Five-Year WEFOR by Fuel Type and 2025 Resource Mix by Net Maximum Capacity

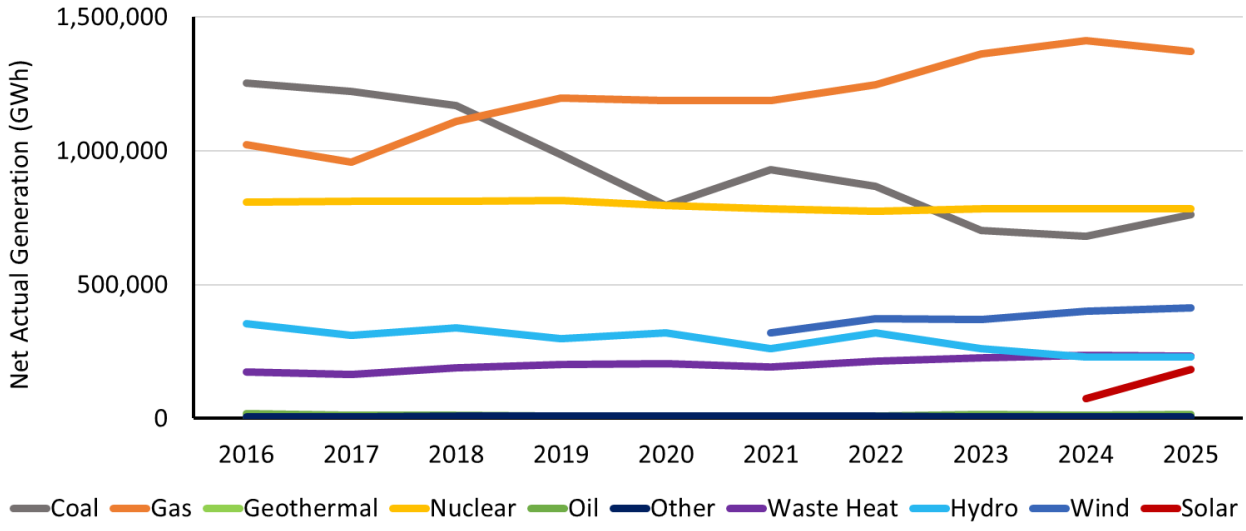


Figure 4.6: 10-Year Annual Net Actual Generation (GWh) by Fuel Type

Wind and Solar[78] Generation Weighted Factors

Figure 4.7–**Figure 4.9** present various weighted factors for wind[79] plant data collected in GADS. Because no exact analog to conventional generation's WEFOR calculation exists, the data is broken down into different factors representing what percentage of the month the plants were in each state and presented as a stacked area chart representing the entire duration of the month. For the purposes of this report, the following calculation and data modifications have been made:

- Resource forced outage factor has been separated into resource forced outage factor (representing forced equipment outages) and resource unavailable outage factor (representing forced outages due to a lack of generating resource).
- Resource reserve shutdown factor is calculated the same way as other factors, with reserve shutdown as the numerator.
- Generation losses due to sub-optimal resource conditions are calculated by subtracting the resource net capacity factor from the resource generating factor. The value represents the portion of the month in which the plant was producing at less than full capacity. For example, if a wind plant has 100 MW of installed capacity but due to wind speed is only producing 60 MW and has no other constraints, this value would be 40%.

Wind data is presented in **Figure 4.7**–**Figure 4.9**, with each figure showing a different stage of data collection: plants >200 MW, 100–199 MW, and 75–99 MW.

NERC is continuing to develop unbiased, representative analysis for wind and solar analysis to best understand trends in the data and draw comparisons to more conventional resources. In 2025, equipment performances across all wind plant sizes were comparable to one another and would not be considered problematic compared to conventional generation, with a resource forced outage factor (RFOF) most like hydro generation's WEFOR. Energy generation at plants >200 MW declined in 2025, warranting further investigation.

[78] During this year's data analysis, NERC identified significant GADS solar data reporting errors and numerous missing plants compared to EIA 860 data. NERC will be coordinating with Regional Entity staff to perform industry outreach and resolve these errors in 2026.

[79] 2025_GADS_Wind_DRI

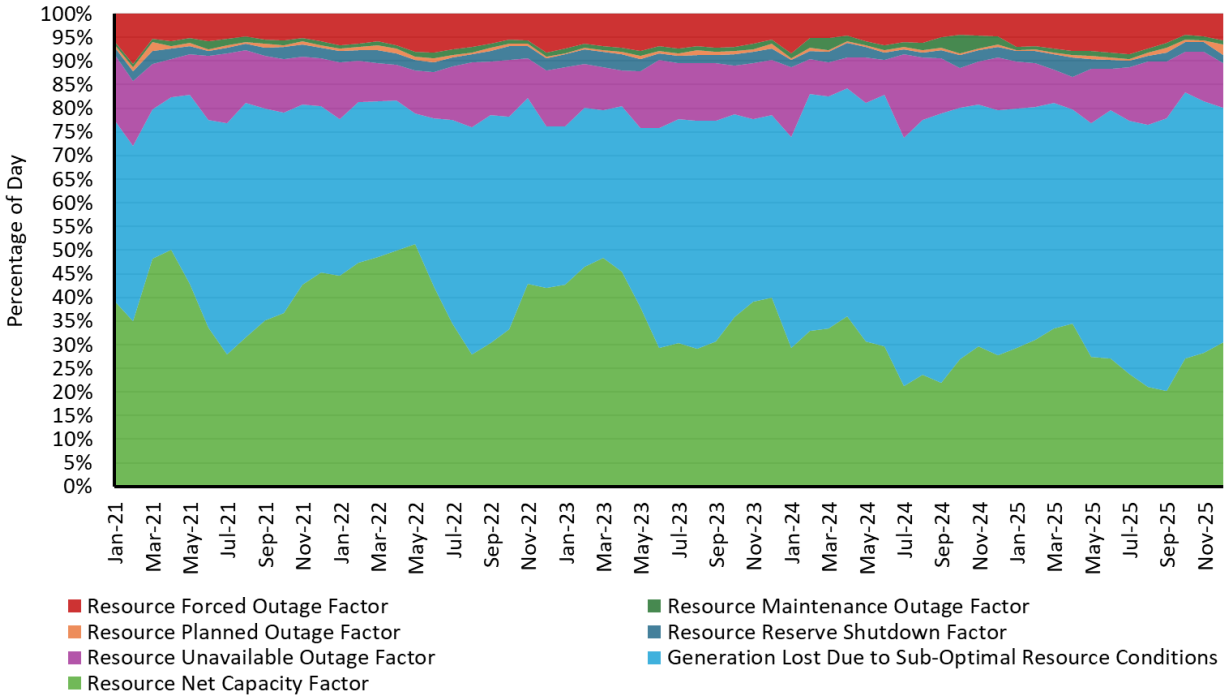


Figure 4.7: Monthly Net Output Factor and Weighted Resource Forced Outage Rate (WRFOR) Wind Plant Reporting Group 200 MW+

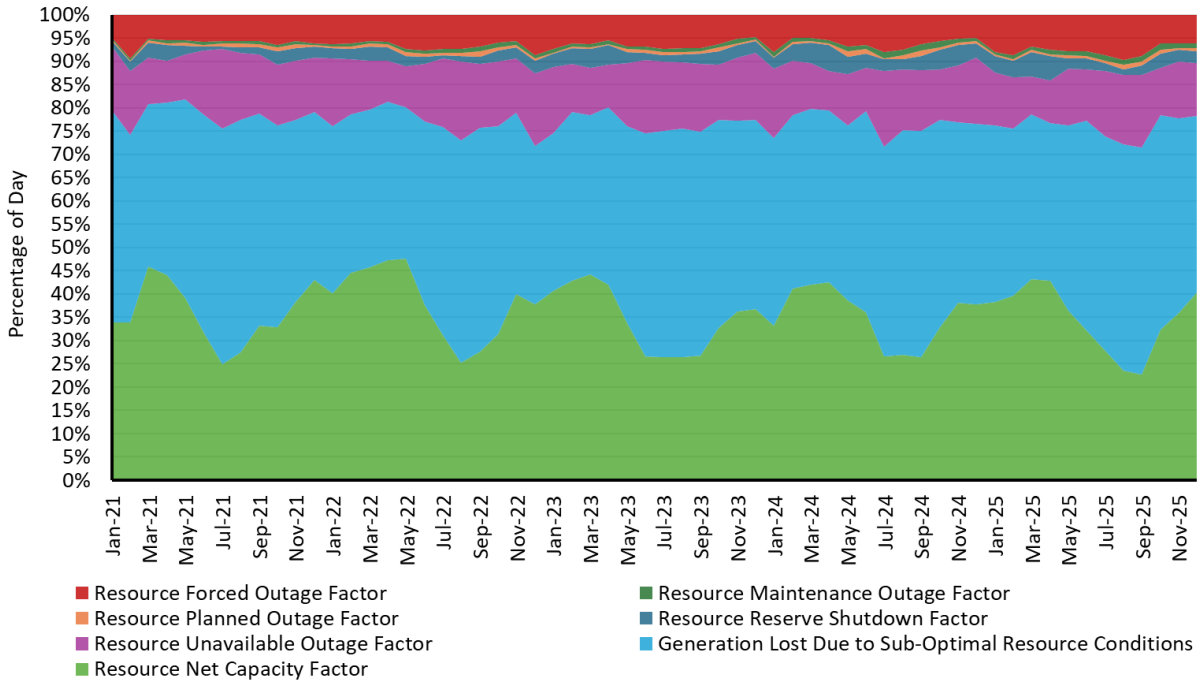


Figure 4.8: Monthly Net Output Factor and WRFOR Wind Plant Reporting Group 100–199 MW

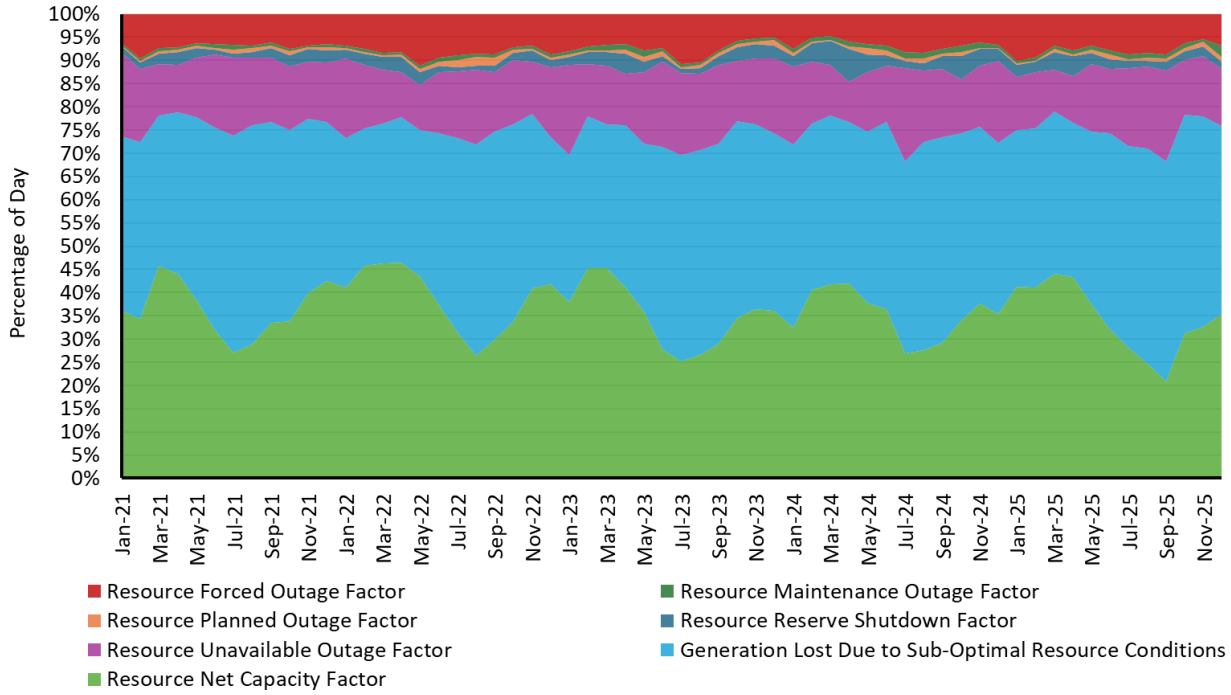


Figure 4.9: Monthly Net Output Factor and WRFOR Wind Plant Reporting Group 75–99 MW

Transmission Performance and Unavailability

When evaluating transmission reliability, an important concept is that transmission line outages have different impacts on BPS reliability. Some impacts can be very severe, such as those that affect other transmission lines and load loss. Additionally, some outages are longer than others, leaving the transmission system at risk for extended periods of time. Reliability indicators for the transmission system are measured by using qualified event analysis reporting not related to weather and outages reported to TADS.

Transmission-Related Events Resulting in Loss of Load

In 2025, a total of six distinct non-weather-related transmission events resulted in a loss of firm load that met the ERO EAP reporting criteria (**Figure 4.10**). The median firm load loss over the past five years was 88.0 MW, which is a decrease from 2020–2024's 90 MW. In 2024 the median load loss was 85.5 MW or 47.0 MW below the 2020–2023 median, and 2025 saw the median increase to 132.5 MW, which is 44.5 MW above the 2021–2024 median.

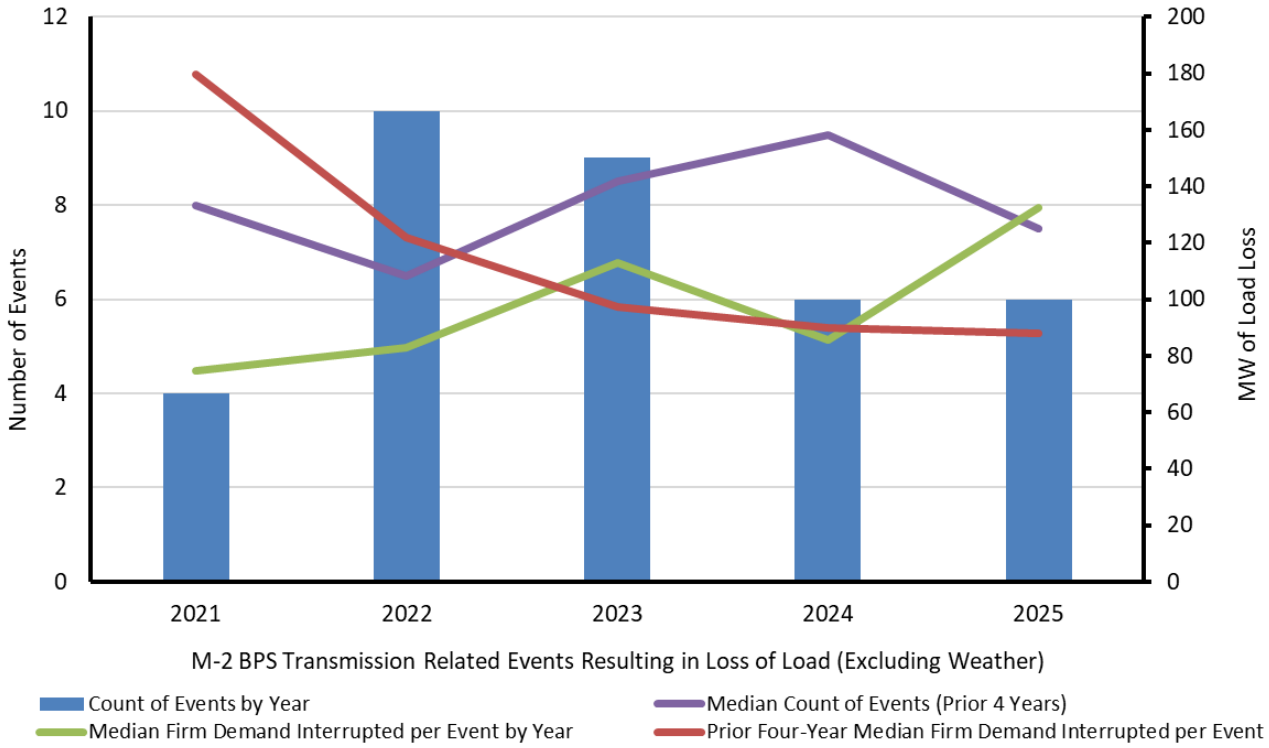


Figure 4.10: Transmission-Related Events Resulting in Loss of Firm Load and Median Amount of Firm Load Loss Excluding Weather-Related Events[80]

TADS Reliability Indicators

A TADS event is an unplanned transmission incident that results in the automatic outage (sustained or momentary) of one or more elements. TADS event information was analyzed for the following indicators in this section:

- **Transmission Outage Severity**
- **Automatic AC Transmission Outages**
- **Transmission Element Unavailability**

Transmission Outage Severity

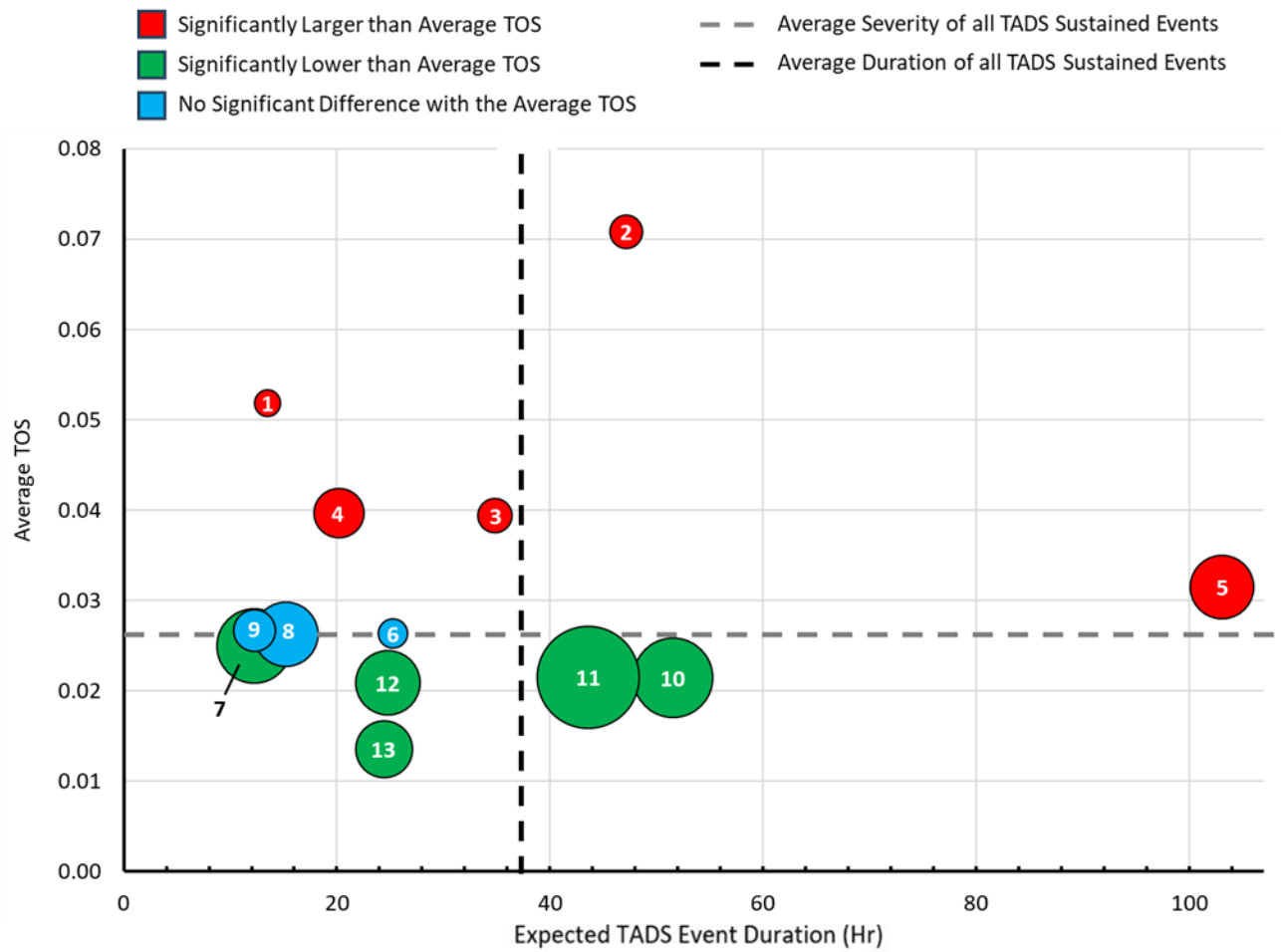
The impact of a TADS event on BPS reliability is called the transmission outage severity (TOS) of the event, which is defined by the number of sustained outages in the event and by the type and voltage class of transmission elements involved in the event. TADS events are categorized by initiating cause codes (ICC). These ICCs facilitate the study of cause-effect relationships between each event's ICC and event severity.

The number of events per hour, average event duration, and average TOS for each ICC group are shown in **Table 4.6**.

[80] M-2, BPS Transmission Related Events Resulting in Loss of Load (Excluding Weather)

Table 4.6: TOS vs. Expected TADS Event Duration				
TADS Event	Events per Hour	TOS		Average Event Duration (Hours)
		Average	Maximum	
Combined Smaller ICC Groups	0.018	0.039	0.318	34.9
Failed AC Circuit Equipment	0.099	0.021	0.249	51.5
Failed AC Substation Equipment	0.063	0.032	0.414	103.1
Fire	0.017	0.071	0.652	47.2
Foreign Interference	0.064	0.021	0.196	24.8
Human Error	0.027	0.027	0.377	12.3
Lightning	0.064	0.026	0.519	15.2
Misoperation	0.038	0.040	0.732	20.2
Other	0.013	0.026	0.327	25.2
Power System Condition	0.011	0.052	0.998	13.5
Unknown	0.086	0.025	0.365	12.2
Vegetation	0.050	0.014	0.494	24.4
Weather, Excluding Lightning	0.163	0.022	0.654	43.6

By examining the average TOS, duration, and frequency of occurrence for events with different ICCs (**Figure 4.11**) it is possible to determine which ICCs contribute most to reliability performance for the period under consideration. The average TOS for events with a specific ICC is displayed on the Y-axis. A higher TOS for an ICC indicates that more sustained outages or higher voltage elements were involved in an event. The average duration for events with a specific ICC is displayed on the X-axis; generally, events with a longer duration pose a greater risk to the BPS. The number of ICC occurrences is represented by the bubble size; larger bubbles indicate that an ICC occurs more often. Lastly, the bubble colors indicate a statistical significance of a difference in the average TOS of this group and the events from other groups.



1. Power System Condition
2. Fire
3. Combined Smaller ICC Groups
4. Misoperation
5. Failed AC Substation Equipment
6. Other
7. Unknown
8. Lightning
9. Human Error
10. Failed AC Circuit Equipment
11. Weather, Excluding Lightning
12. Foreign Interference
13. Vegetation

Figure 4.11: TOS vs. Expected TADS Event Duration

An analysis of the total TOS by year indicates that 2025 shows an improving trend compared to 2024, with the Unknown category improving to the point that it went from the No Significant Difference category (blue) in 2024 to the Significantly Lower than Average TOS category (green) in 2025. All other categories remained the same. **Figure 4.12** shows the annual TOS, which is the lowest since TADS data collection began.

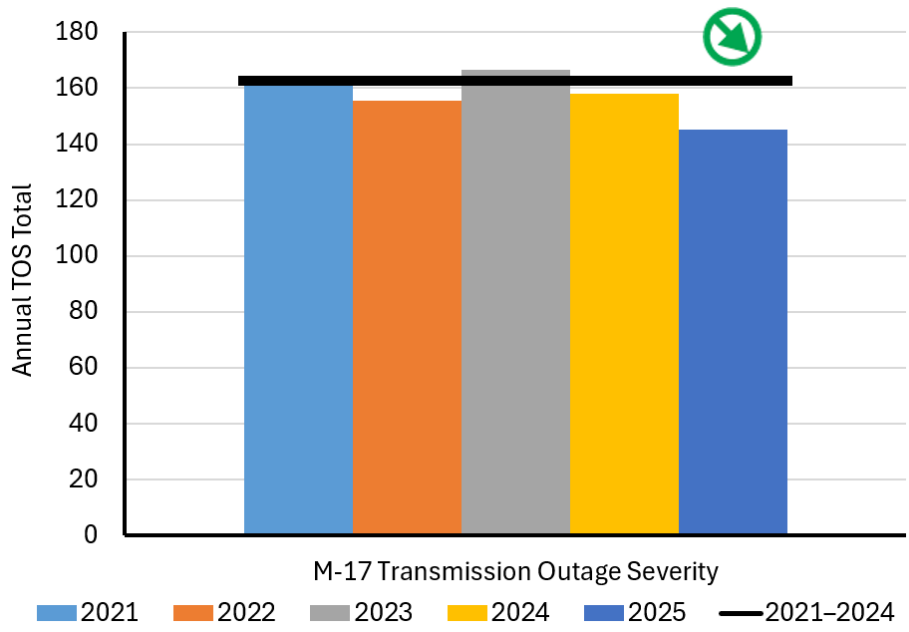


Figure 4.12: TOS of TADS Sustained Events of 100 kV+ AC Circuits and Transformers by Year[81]

Automatic AC Transmission Outages

The average number of outages per circuit due to failed ac substation equipment slightly decreased from 2024 to 2025 and is effectively equal to the previous four-year average (**Figure 4.13**). The number of sustained outages due to failed ac circuit equipment per 100 miles decreased in 2025 to the lowest of the past five years (**Figure 4.14**).

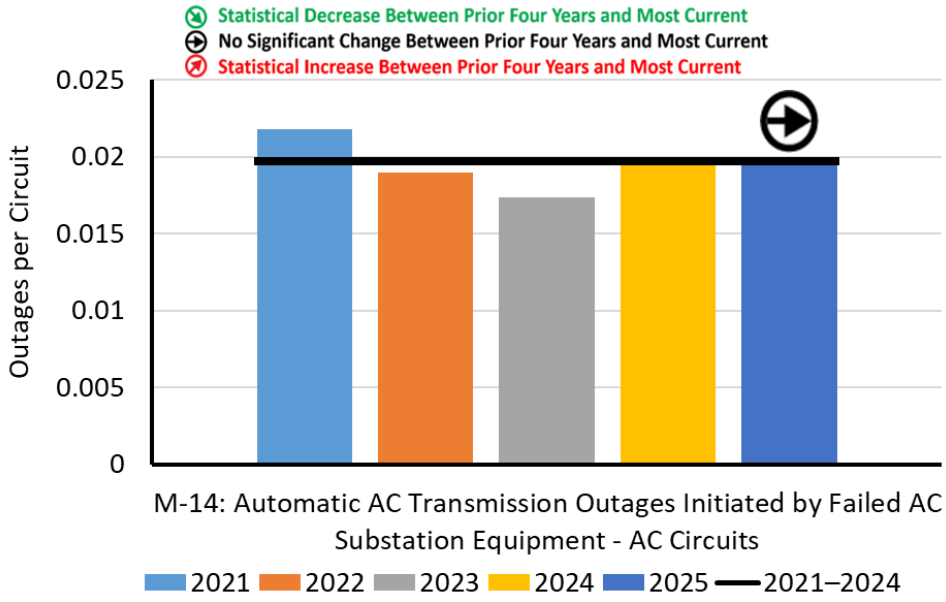


Figure 4.13: Number of Outages Per AC Circuit Due to Failed AC Substation Equipment[82]

[81] M-17, Transmission Outage Severity
[82] M-14, Automatic AC Transmission Outages Initiated by Failed AC Substation Equipment

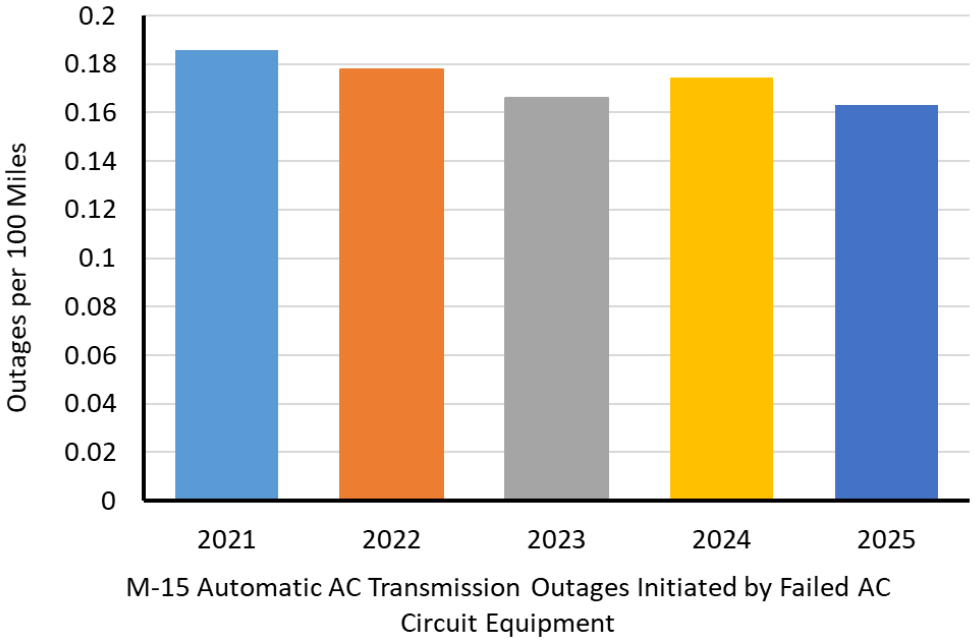


Figure 4.14: Number of Outages Per 100 Miles Due to Failed AC Circuit Equipment[83]

Automatic AC Transformer Outages

In 2025, there was a slight decrease in the number of automatic ac transformer outages per element caused by failed ac substation equipment, but there was no significant change compared to the prior four years. Though the decrease in outages is not statistically significant, as can be seen in **Figure 4.15**, this number remains the second highest over the past five years.

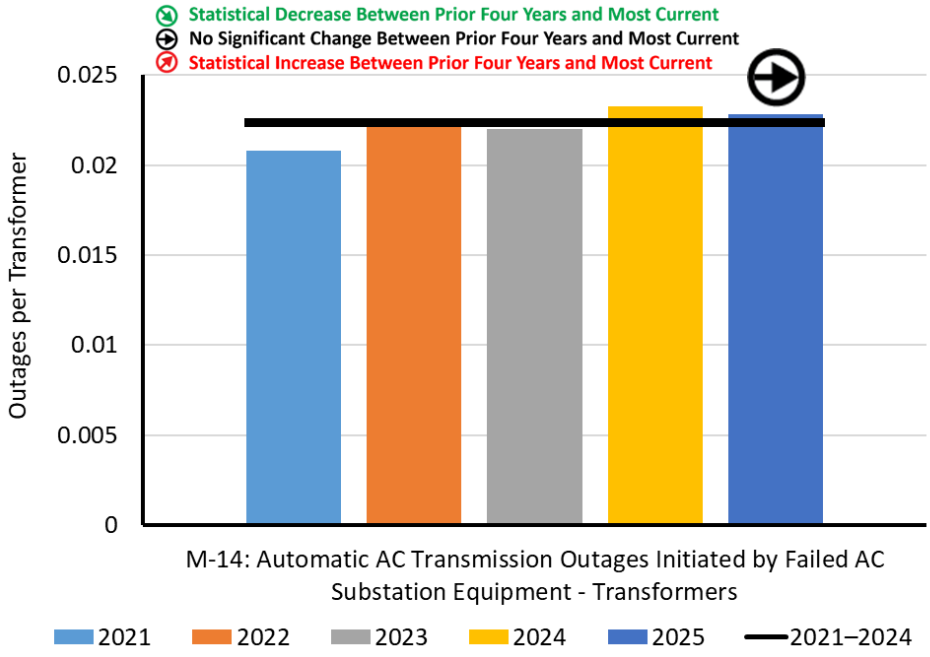


Figure 4.15: Number of Outages Per Transformer Due to Failed AC Substation Equipment[84]

[83] M-15, Automatic AC Transmission Outages Initiated by Failed AC Circuit Equipment
[84] M-14, Automatic AC Transmission Outages Initiated by Failed AC Substation Equipment

Transmission Element Unavailability

In 2025, ac circuits over 200 kV across North America had an unavailability rate of 0.22%, representing the chance that a specific transmission circuit is unavailable due to sustained automatic and operational outages at any given time. Transformers also had an unavailability rate of 0.35% in 2025. **Figure 4.16** shows that while there was a decrease in ac circuit availability in 2025, it was not statistically significant when compared to the prior four years.

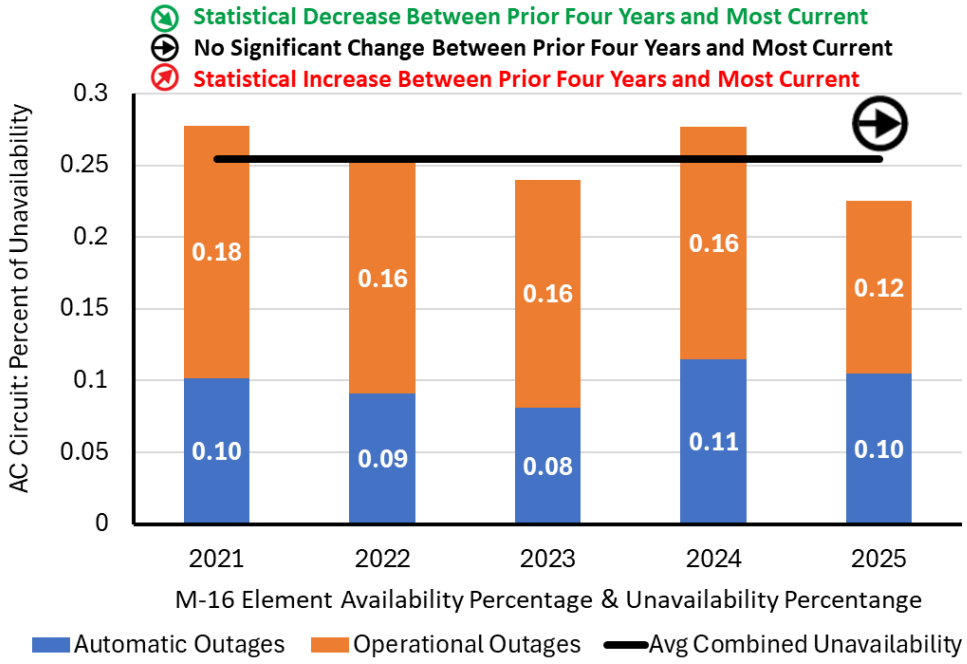


Figure 4.16: AC Circuit Unavailability >200 kV[85]

Figure 4.17 shows that 2025 is the highest year for transformer unavailability of the five-year analysis period, in large part due to an increase in the number of operational outages. Responses from voluntary outreach to utilities with the longest operational transformer outages in 2025 aligned with historically provided reasons for prolonged outages and did not indicate the need for immediate action. In addition to several one-off scenarios, common themes included removing transformers temporarily multiple times to maintain system reliability, system redundancy reducing restoration urgency, and two instances where supply chain constraints in the form of known long lead times prolonged outages.

[85] M-16, Element Availability Percentage (APC) & Unavailability Percentage

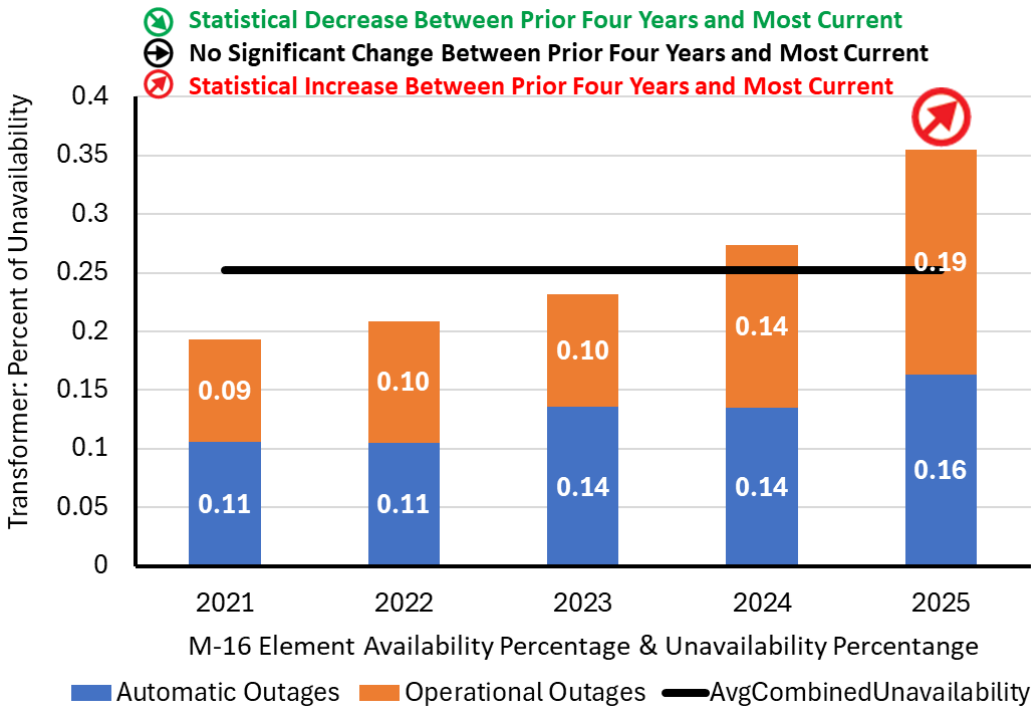


Figure 4.17: Transformer Unavailability >200 kV [86]

TADS Physical Security Metric

Over the past several years, there has been an increase in physical attacks on the BPS. To help measure the impact of these transmission physical security events on the BES and identify trends, a new metric was introduced, the TADS Physical Security Metric (M18), described as follows.

- The TADS Physical Security metric uses the data from TADS sustained physical security-related outages for transmission elements reportable in TADS with a voltage of 100 kV and above. Prior to 2024, these outages were reported using the initiating or sustained cause code labeled Vandalism, Terrorism, or Malicious Acts. Since 2024, these outages have been reported using the initiating or sustained cause code labeled Physical Security Incident. The metric is calculated by adding the number of outages, their average equivalent MVA, and their average duration, for a rolling five-year period that is then statistically compared to identify trends.
- The bubble chart in **Figure 4.18** shows a rolling comparison of the TADS Physical Security metric of 2021–2025 to 2020–2024. The size of a bubble represents the total number of physical security outages (displayed in the center of each bubble). The X-axis of a bubble shows the average duration of the outages (in hours), and the Y-axis shows the average MVA capacity impacted for those outages.

[86] M-16, Element Availability Percentage (APC) & Unavailability Percentage

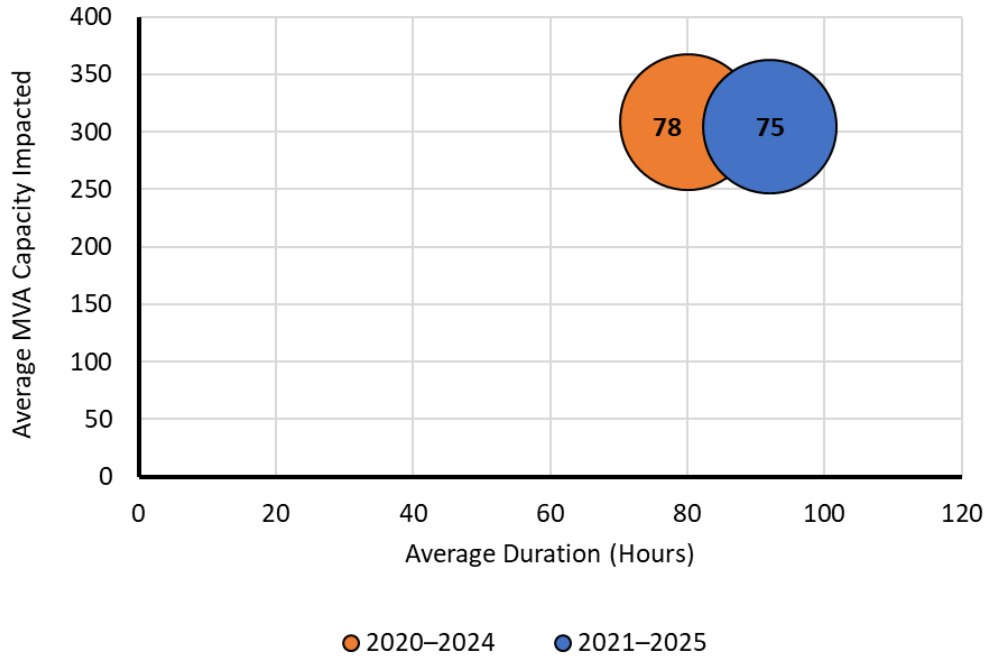


Figure 4.18: Comparison of TADS Physical Security Metric for 2020–2024 vs. 2021–2025[87]

Figure 4.18 shows a decreasing trend in both the total number of physical security outages (from 78 to 75) and average MVA capacity (from 308.5 MVA to 304.6 MVA) and an increase in the average duration for those outages (from 80 hours to 92 hours). Based on the rating criteria for this metric, the assessment rating for this metric is Stable.

Table 4.7: 2025 M-18 TADS Physical Security Metric		
	2020–2024	2021–2025
Outage Count	78	75
Average MVA	308.5	304.57
Average Duration (Hours)	80.15	92.03

Incident Tracking Context/Background

The E-ISAC tracks physical security incidents shared by asset owners across North America to reduce physical security risks to the sector by monitoring and reporting on relevant trends such as the criminal threat environment and the tactics, techniques, and procedures that result in operational impacts to the North American grid. In addition to physical security incidents reported to the ERO through mandatory mechanisms such as the DOE-417 and EOP-004 forms, the E-ISAC tracks incidents shared voluntarily by members on the E-ISAC Portal or shared directly with the E-ISAC through the Bulk Data Program. Approximately 91% of incidents tracked by the E-ISAC since 2021 were received through voluntary methods. Since 2021, the E-ISAC has tracked over 17,000 physical security incidents within the following categories: Assault, Ballistic Damage, Intrusion, Theft, Threat, Surveillance, Suspicious Activity, and Other. Of these 17,000, less than 3% have resulted in operational impacts since 2021 (**Table 4.8**), though the proportion typically fluctuates within shorter time periods between 2% and 4%.

[87] M-18, TADS Physical Security

Table 4.8: E-ISAC Severity Level Definitions and Data Summary (2021–2025)[88]		
Severity Level	**Definition**	**% of incidents**
Level 0	Non-criminal, potential security nexus	11%
Level 1	Likely criminal activity with no operational impacts; only monetary.	86%
Level 2	Some operational impacts; including limited customer outages, generation unavailability, or partial loss of control and monitoring.	2%
Level 3	Significant operational impacts; including extensive customer outages, generation unavailability or loss of control and monitoring.	<1%

Operational Impacts Increasing

Since 2021, Level 2 and Level 3 incidents shared with the E-ISAC have increased (**Figure 4.19**). While 2023 saw an increase in Ballistic Damage incidents resulting in operational impacts, the primary tactics that increased throughout 2024 and 2025 involved Theft or Vandalism. The change in tactics reflects the changing risk environment and can be attributed to copper market spikes and supply chain constraints, leading to increased targeting of copper through Theft and Vandalism. In 2025, the E-ISAC observed sustained levels of Vandalism and Ballistic Damage compared to historic norms, paired with an increase in operational impacts from Theft and continued targeting of fiber infrastructure.

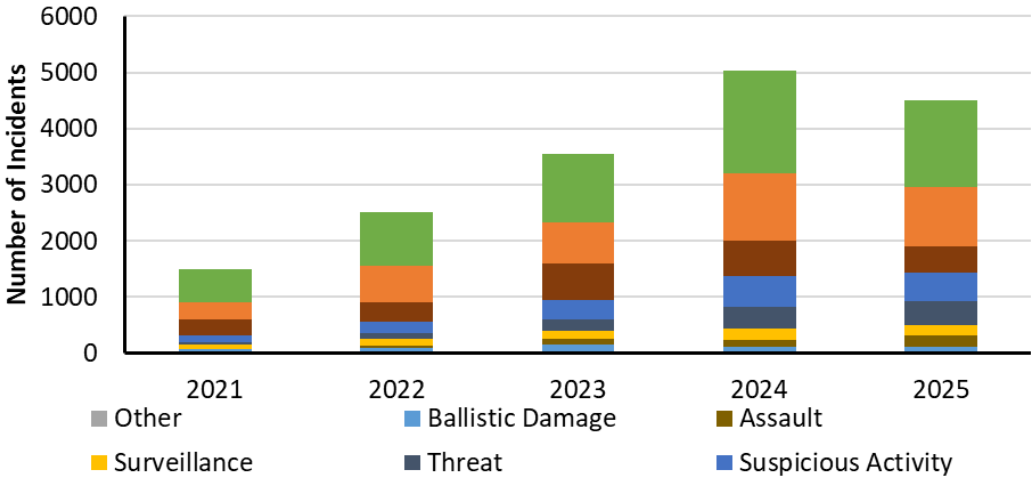


Figure 4.19: Incidents Resulting in Operational Impacts (Severity Level 2 and Level 3) by Tactic (2021–2025)

Unlike Operational Impacts, Overall Incidents Decreased

In 2025, overall incidents shared with the E-ISAC decreased by 11% compared with 2024 (**Figure 4.19**); this decline was relatively consistent between mandatory/voluntarily shared incidents for all severity levels. This is in contrast to incidents discussed above resulting in operational impacts. The differing volume trend observed between all incidents versus those resulting in operational impacts can be attributed to a shifting tactical focus by adversaries, with copper thefts increasingly affecting energized distribution (non-substation) assets, resulting in customer outages.

For more insight into the risks to industry related to physical security incidents that result in operational impacts, see the E-ISAC's annual Grid-Impacting Report (available to E-ISAC members on the Portal).

[88] https://www.eisac.com/portal/article/124886-Physical-Security-Incident-Severity-Level-Categorization

Appendix A: Supplemental Analysis at Interconnection Level

Severity Risk Index by Interconnection

Eastern and Québec Interconnections

The cumulative SRI for the EI and QI in **Table A.1** shows a 3% increase compared to the average of the four-year period of 2021–2024. The 2025 cumulative SRI was the second highest among the five years analyzed.

Table A.1: Annual Cumulative SRI, Eastern and Québec Interconnections

Year	Cumulative Weighted Generation	Cumulative Weighted Transmission	Cumulative Weighted Load Loss	Annual Cumulative SRI	Average Daily SRI
2021	346.3	53.7	65.8	465.9	1.28
2022	385.1	52.3	53.0	490.4	1.34
2023	324.5	64.4	47.2	436.1	1.19
2024	358.7	59.5	52.0	470.2	1.28
2025	**367.5**	**52.7**	**46.8**	**467.0**	**1.28**

The top 10 SRI days of the EI and QI were distributed throughout the year as shown in **Figure A.1** (numbered circles). A total of 7 of the top 10 days that occurred in the EI and QI aligned with the top 10 SRI days reported for North America.

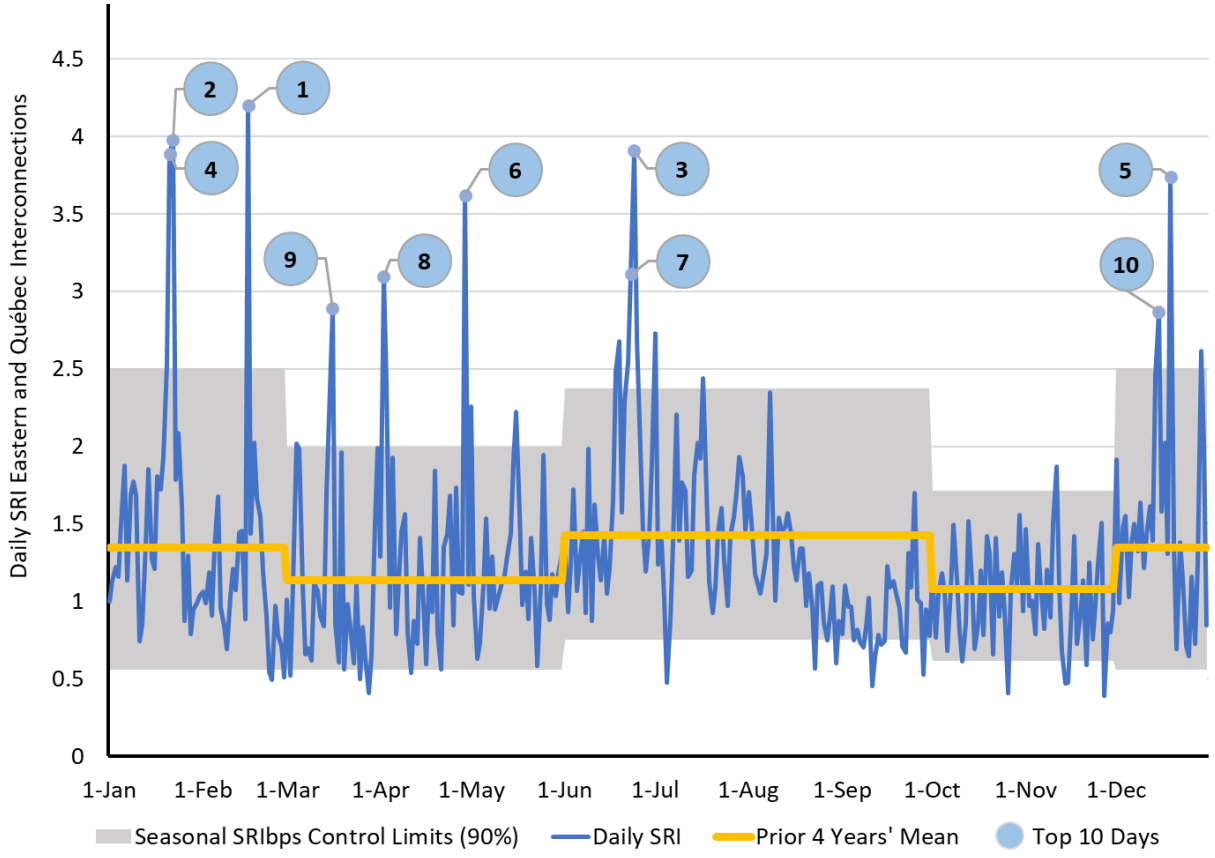


Figure A.1: 2025 Eastern and Québec Interconnections Daily SRI with Top 10 Days Labeled, 90% Confidence Interval

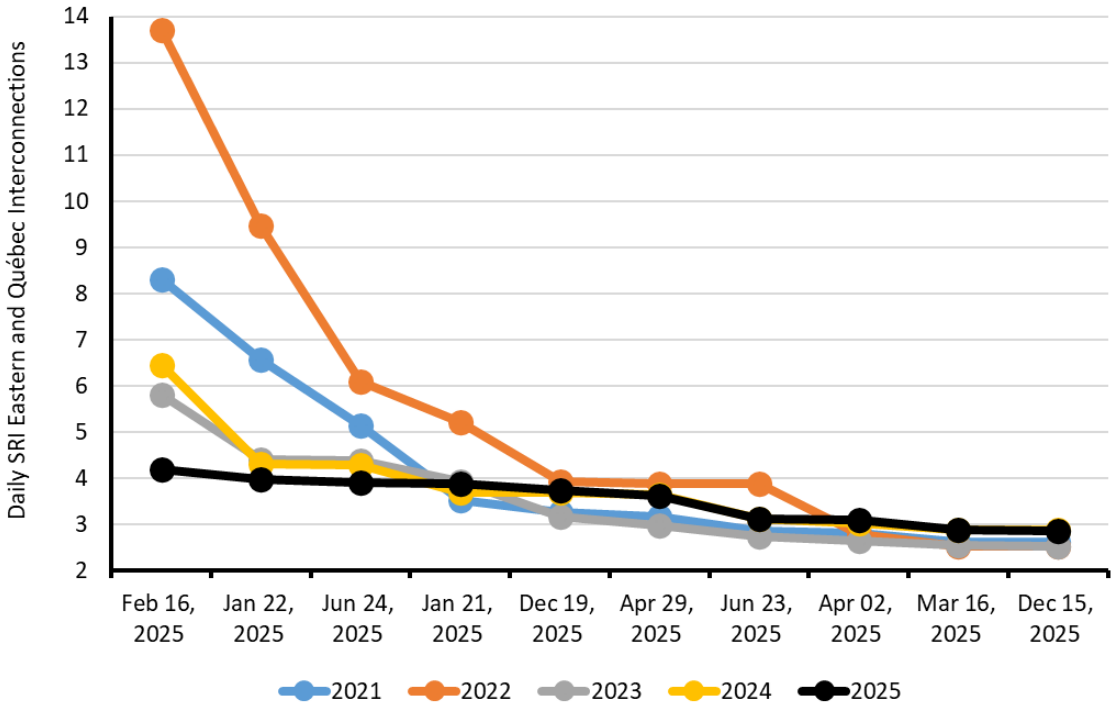


Figure A.2: Eastern and Québec Interconnections Top Annual Daily SRI Days, Sorted Descending

Figure A.2 shows the EI and QI's top 10 SRI days in 2025 relative to the four prior years, while **Table A.2** provides details on each component's contribution to the top 10 SRI days. Out of the top 10 SRI days for the EI and QI, three were driven by load loss, one was driven by a combination of generation and load loss, none were driven by transmission, and the rest were predominantly driven by generation.

Table A.2: 2025 Top 10 SRI Days, Eastern and Québec Interconnections

Rank	Date	SRI and Weighted Components 2025				Atypical Weather Conditions	Regional Entities
		SRI	Weighted Generation	Weighted Transmission	Weighted Load Loss		
1	February 16, 2025	4.20	2.20	0.31	1.68	Northwestern Atmospheric River	WECC
2	January 22, 2025	3.98	3.74	0.15	0.08	Winter Storm Enzo	RF, SERC
3	June 24, 2025	3.91	3.09	0.26	0.55	Thunderstorms	NPCC, RF, SERC
4	January 21, 2025	3.89	3.71	0.10	0.07	Winter Storm Enzo	RF, SERC
5	December 19, 2025	3.74	1.70	0.29	1.76	Northwestern Atmospheric River	WECC
6	April 29, 2025	3.62	1.06	0.37	2.19	Thunderstorms	MRO, NPCC, RF
7	June 23, 2025	3.11	2.13	0.16	0.82	Thunderstorms	NPCC, RF, SERC
8	April 2, 2025	3.09	0.99	0.55	1.56	Tornadoes & Severe Storms	MRO, RF, SERC
9	March 16, 2025	2.89	0.50	0.34	2.05	Tornadoes	MRO, RF, SERC
10	December 15, 2025	2.87	2.51	0.07	0.29	Winter Storm	RF, SERC, Texas RE

Table A.3 shows the top 10 SRI days for the EI and QI over the last five years with no dates in 2025.

Table A.3: 2021–2025 Top 10 SRI Days, Eastern and Québec Interconnections

Rank	Date	SRI and Weighted Components 2025				Atypical Weather Conditions	Regional Entities
		SRI	Weighted Generation	Weighted Transmission	Weighted Load Loss		
1	December 23, 2022	13.70	8.88	0.90	3.92	Winter Storm Elliott	All
2	December 24, 2022	9.46	8.12	1.27	0.07	Winter Storm Elliott	All
3	February 16, 2021	8.31	4.10	0.58	3.63	Cold Weather Event	MRO, RF, SERC
4	December 11, 2021	6.57	0.92	0.92	4.73	Severe Storms	NPCC, RF, SERC
5	September 27, 2024	6.45	1.62	3.61	1.23	Hurricane Helene	SERC
6	June 14, 2022	6.09	1.70	0.49	3.90	High Temperatures and Derecho	All
7	April 1, 2023	5.80	0.74	0.63	4.43	Widespread Storms and Tornadoes	MRO, RF, SERC
8	June 15, 2022	5.22	1.63	0.24	3.36	Hurricane Isaias	NPCC, RF, SERC
9	February 15, 2021	5.15	3.62	0.54	0.99	Unnamed Tropical Storm	RF, SERC
10	June 22, 2023	4.42	1.34	2.95	0.13	High Temperatures and Derecho	All

Western Interconnection

The 2025 cumulative SRI for the WI shows an 9% decrease over the prior four-year period of 2021–2024. The 2025 cumulative SRI was the lowest among the five years analyzed (**Table A.4**).

Table A.4: Annual Cumulative SRI, Western Interconnection

Year	Cumulative Weighted Generation	Cumulative Weighted Transmission	Cumulative Weighted Load Loss	Annual Cumulative SRI	Average Daily SRI
2021	426.8	98.2	97.8	622.7	1.71
2022	423.8	87.3	60.1	571.2	1.57
2023	423.1	68.6	59.6	551.3	1.51
2024	418.0	74.3	50.1	542.4	1.48
2025	**402.5**	**76.2**	**42.2**	**521.0**	**1.43**

The top 10 SRI days of the WI for 2024 were distributed throughout the year as shown in **Figure A.3**. A total of 2 of the top 10 days that occurred in the WI aligned with the top 10 SRI days reported for North America.

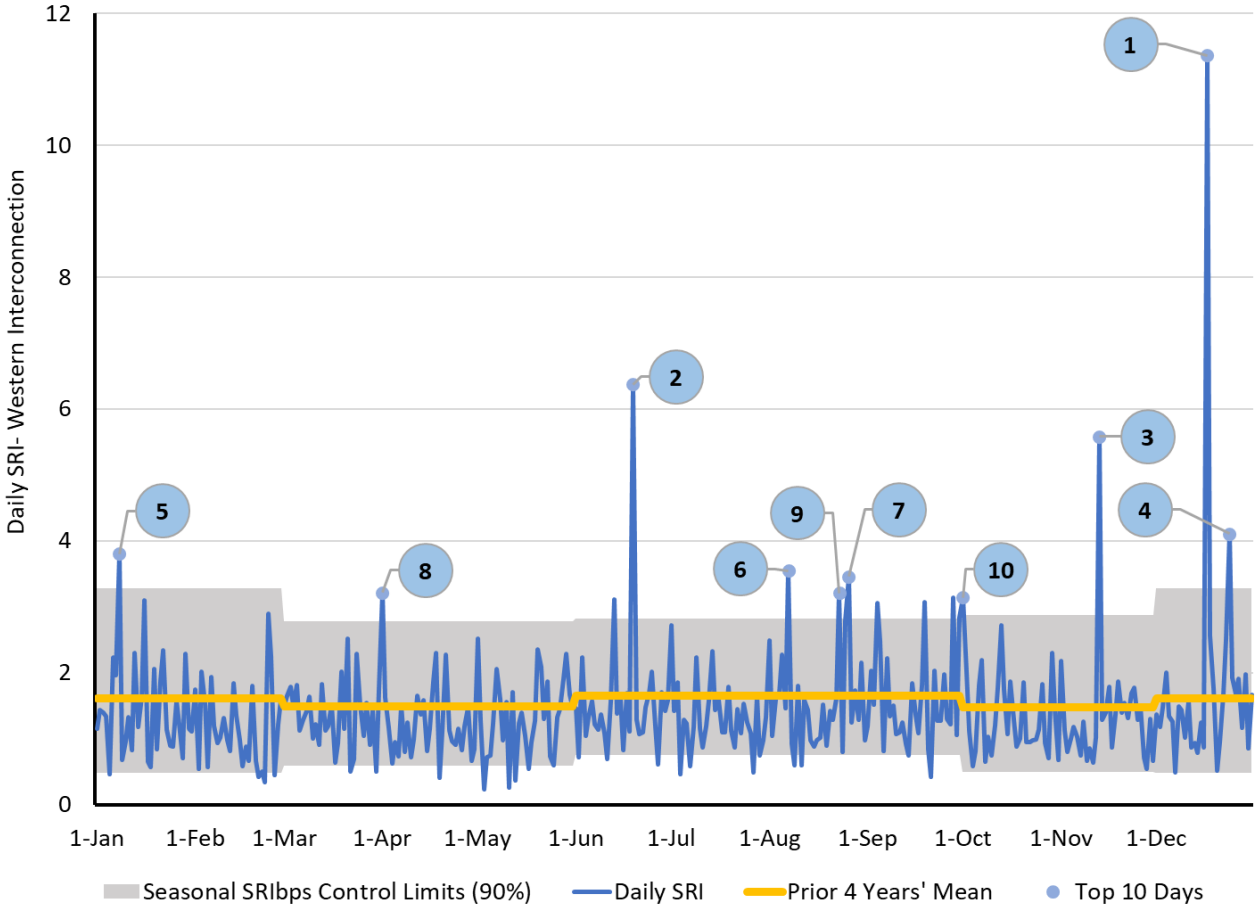


Figure A.3: 2025 Western Interconnection Daily SRI with Top 10 Days Labeled, 90% Confidence Interval

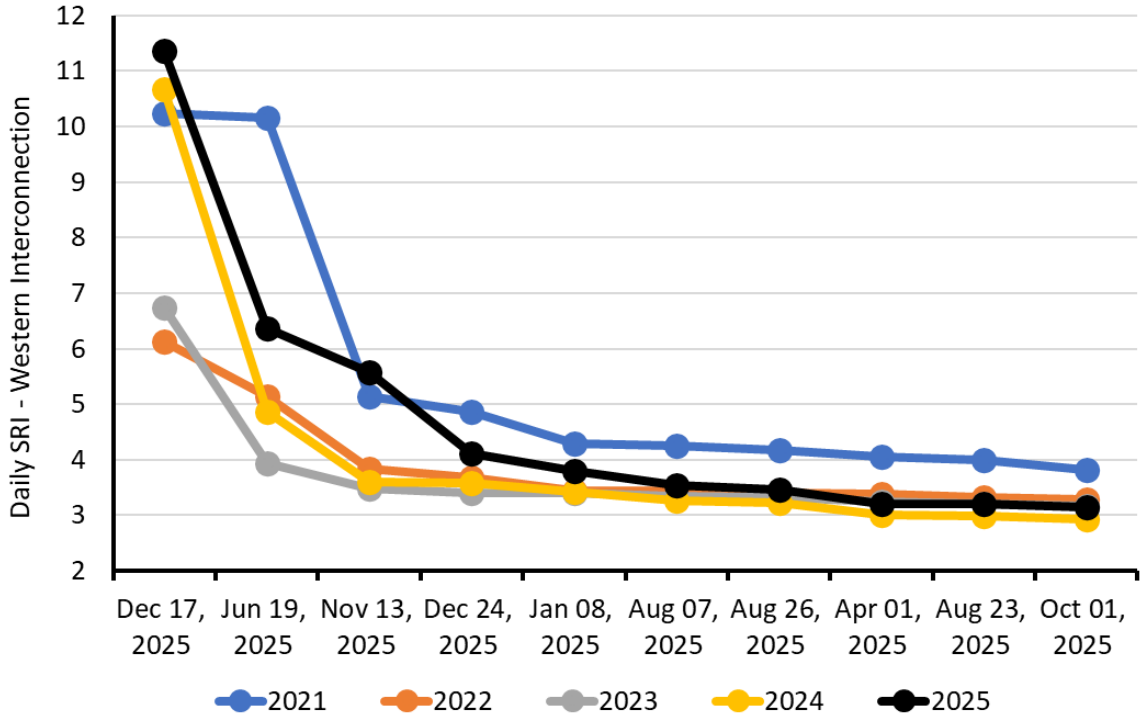


Figure A.4: Western Interconnection Top Annual Daily SRI Days Sorted Descending

Table A.5 details each component's contribution to the top 10 SRI days for the WI; WECC is the only Regional Entity in the WI. Out of the top 10 SRI days for the WI, one was driven by load loss, two were driven by a combination of transmission and generation, and the rest were predominantly driven by generation.

Table A.5: 2025 Top 10 SRI Days, Western Interconnection

Rank	Date	SRI and Weighted Components 2025				Atypical Weather Conditions Regional Entities
		SRI	Weighted Generation	Weighted Transmission	Weighted Load Loss	
1	December 17, 2025	11.36	4.54	4.02	2.80	Northwestern Atmospheric River
2	June 19, 2025	6.38	0.87	0.44	5.07	Thunderstorms, Tornadoes
3	November 13, 2025	5.58	3.23	2.35	0.00	Wyoming System Event
4	December 24, 2025	4.11	1.07	0.87	2.16	Winter Storm
5	January 8, 2025	3.81	1.54	1.73	0.53	High Wind Conditions
6	August 7, 2025	3.55	2.73	0.67	0.14	Extreme Heat
7	August 26, 2025	3.46	1.99	0.57	0.90	Extreme Heat
8	April 1, 2025	3.21	2.80	0.18	0.23	Thunderstorms, Tornadoes
9	August 23, 2025	3.21	1.26	0.80	1.15	Extreme Heat
10	October 1, 2025	3.14	2.76	0.38	0.00	Thunderstorms

Table A.6 shows the top 10 SRI days for the WI over the last five years, with three days in 2025 highlighted in red.

Table A.6: 2021–2025 Top 10 SRI Days, Western Interconnection

Rank	Date	SRI and Weighted Components 2025				Atypical Weather Conditions
		SRI	Weighted Generation	Weighted Transmission	Weighted Load Loss	
1	December 17, 2025	11.36	4.54	4.02	2.80	Northwestern Atmospheric River
2	February 4, 2024	10.67	0.34	0.31	10.02	Atmospheric River
3	November 15, 2021	10.23	1.42	0.40	8.41	Atmospheric River
4	January 13, 2021	10.16	1.86	3.83	4.48	Northwest Winter Weather
5	February 24, 2023	6.75	2.61	0.88	3.26	Winter Storm
6	June 19, 2025	6.38	0.87	0.44	5.07	Tornadoes, High Winds
7	November 5, 2022	6.13	1.75	1.77	2.61	Severe Weather

Table A.6: 2021–2025 Top 10 SRI Days, Western Interconnection						
Rank	Date	SRI and Weighted Components 2025				Atypical Weather Conditions
		SRI	Weighted Generation	Weighted Transmission	Weighted Load Loss	
8	November 13, 2025	5.58	3.23	2.35	0.00	Wyoming System Event
9	December 20, 2022	5.14	1.05	0.15	3.93	Winter Storm
10	February 13, 2021	5.14	1.14	1.30	2.70	Winter Storm Uri

Extreme-Day Analysis by Interconnection

The extreme-day analyses for transmission and generation for 2025 are presented by Interconnection. The maximum TADS reported MVA capacity or GADS reported net maximum capacity for 2025 is shown in the upper right or left corners of **Figure A.5**–**Figure A.10**. The largest outliers and extreme days correlating with NERC-wide extreme days have been labeled with any atypical weather conditions during those days. Interconnection extreme days that do not align with NERC-wide extreme days are dated, but the underlying conditions are not identified. The number of customers interrupted (CI) due to transmission or generation sources for the day is obtained from the IEEE PES Distribution Reliability Working Group (DRWG) benchmark data. All dates are shown in UTC.

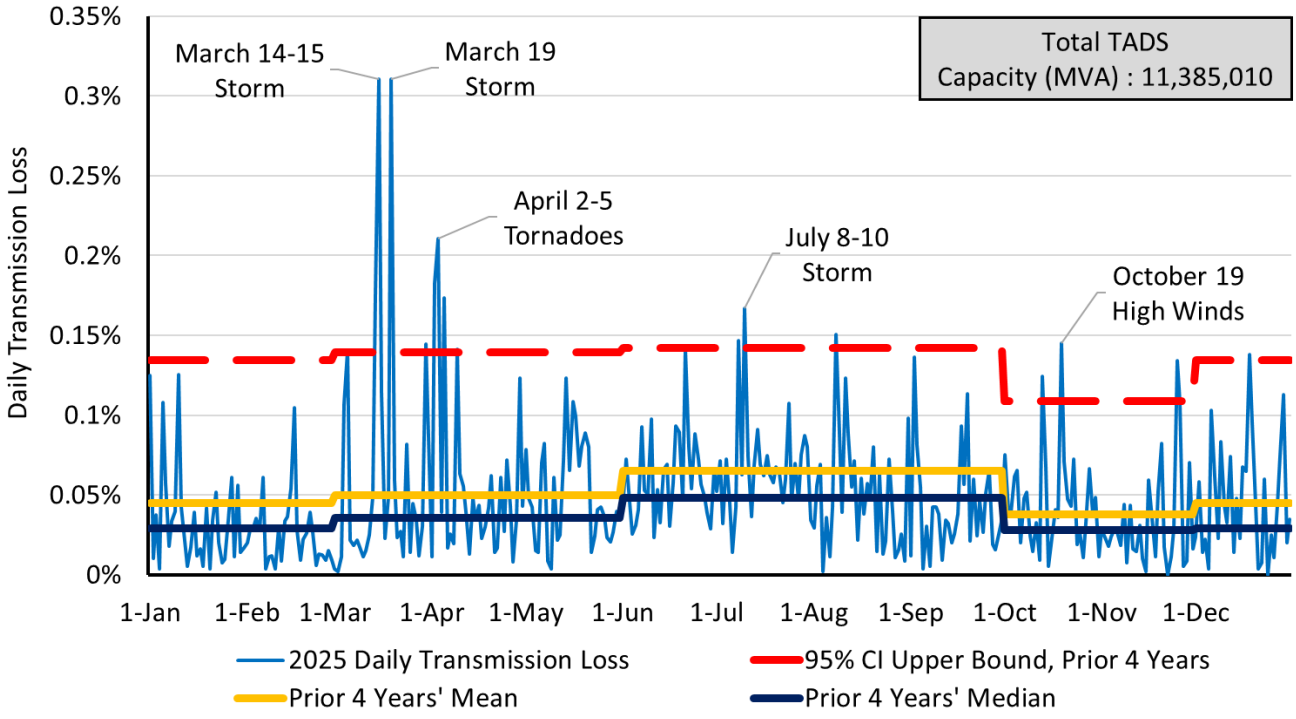


Figure A.5: Eastern and Québec Interconnections—Transmission Impacts During Extreme Days of 2025

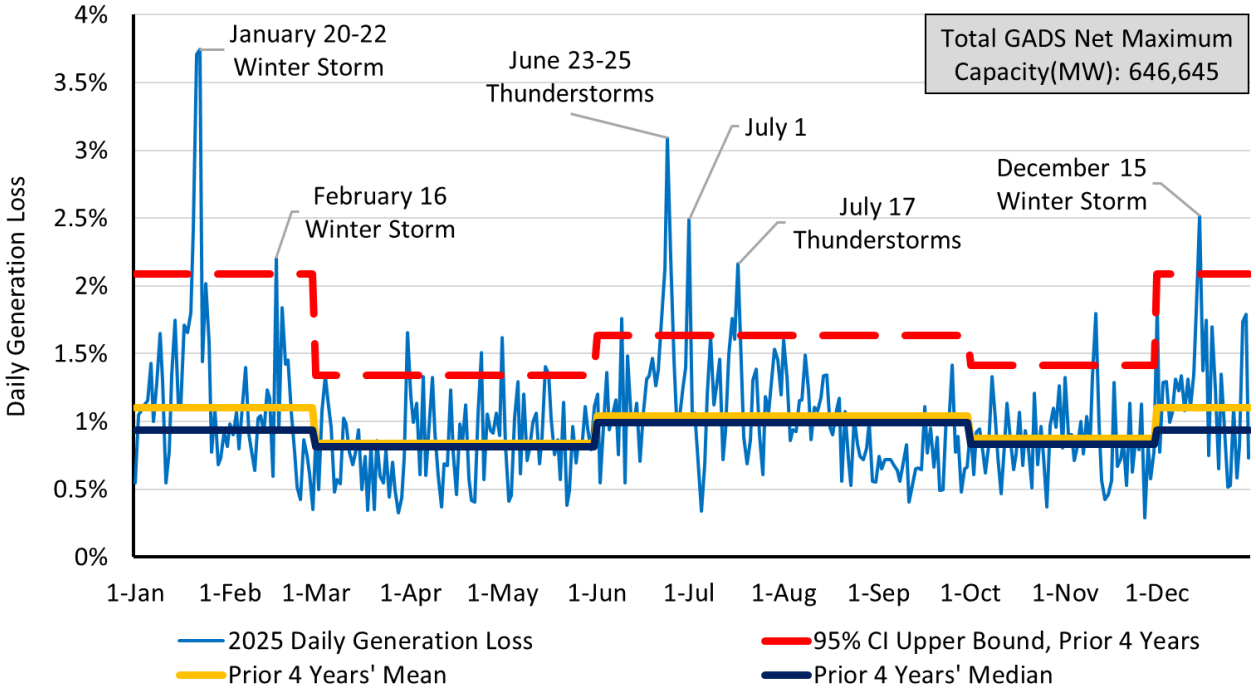


Figure A.6: Eastern and Québec Interconnections—Generation Impacts During Extreme Days of 2025

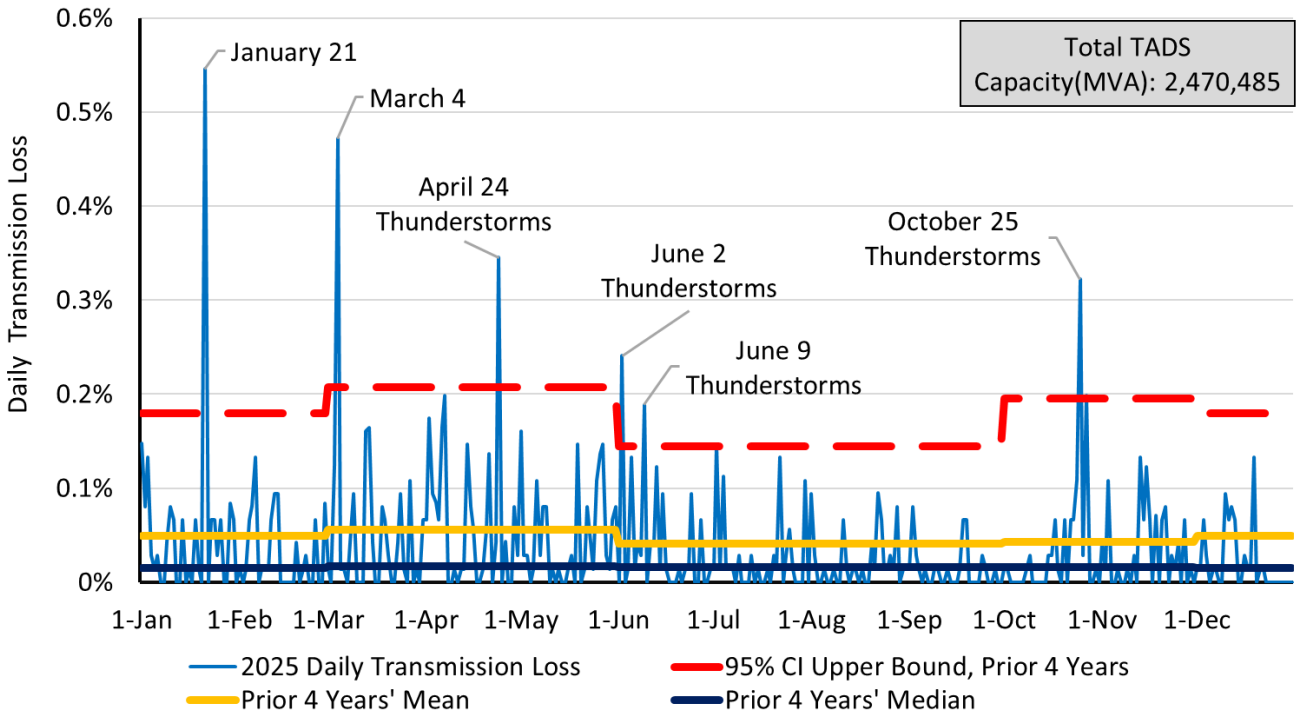


Figure A.7: Texas Interconnection—Transmission Impacts During Extreme Days of 2025

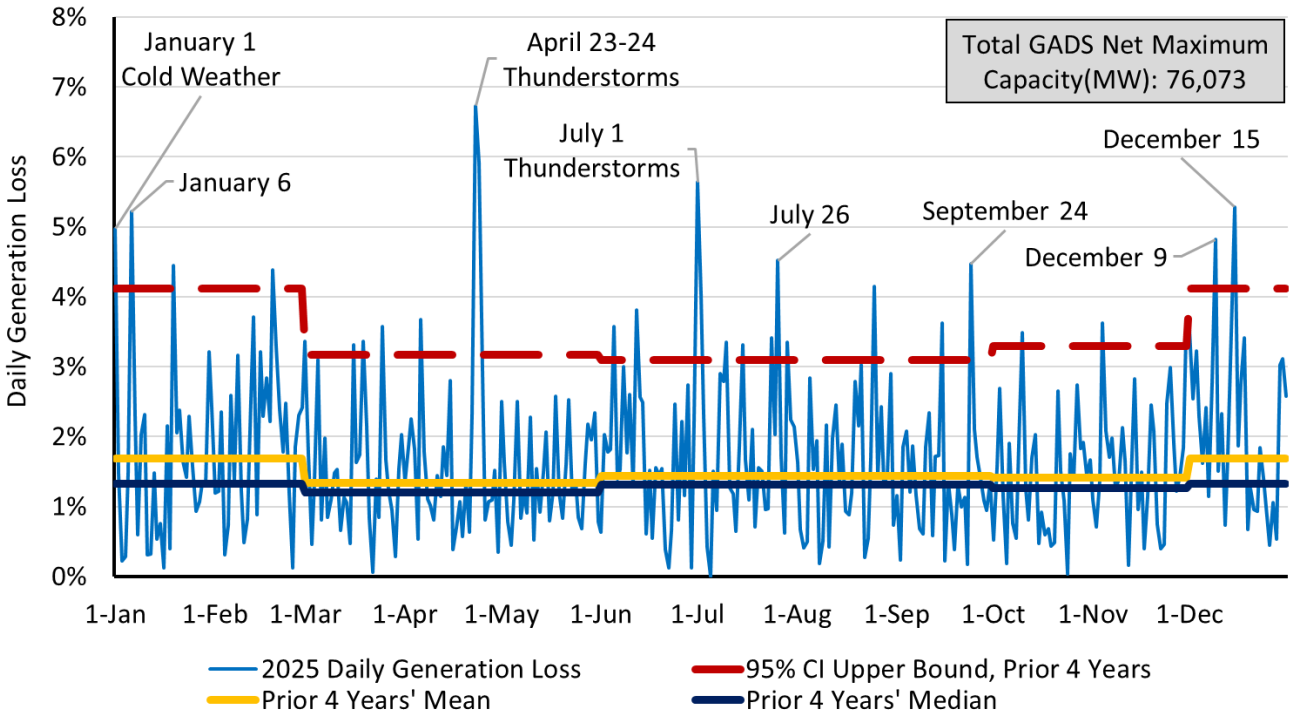


Figure A.8: Texas Interconnection—Generation Impacts During Extreme Days of 2025

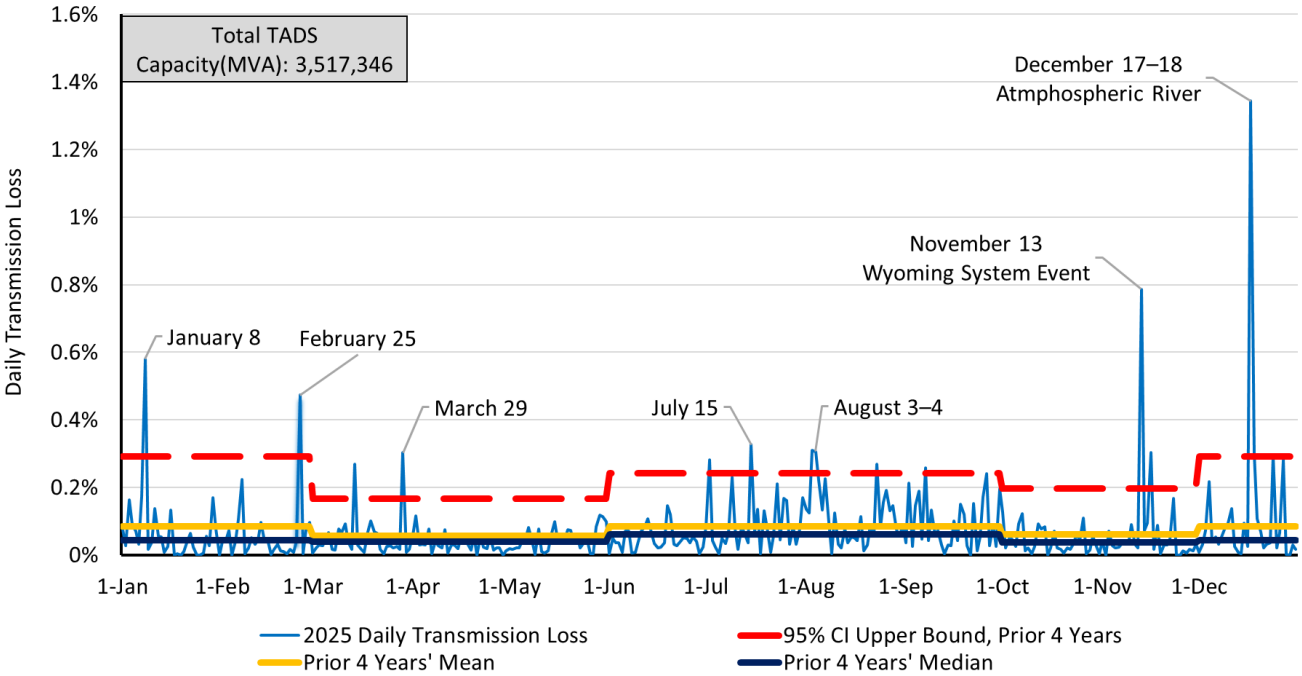


Figure A.9: Western Interconnection—Transmission Impacts During Extreme Days of 2025

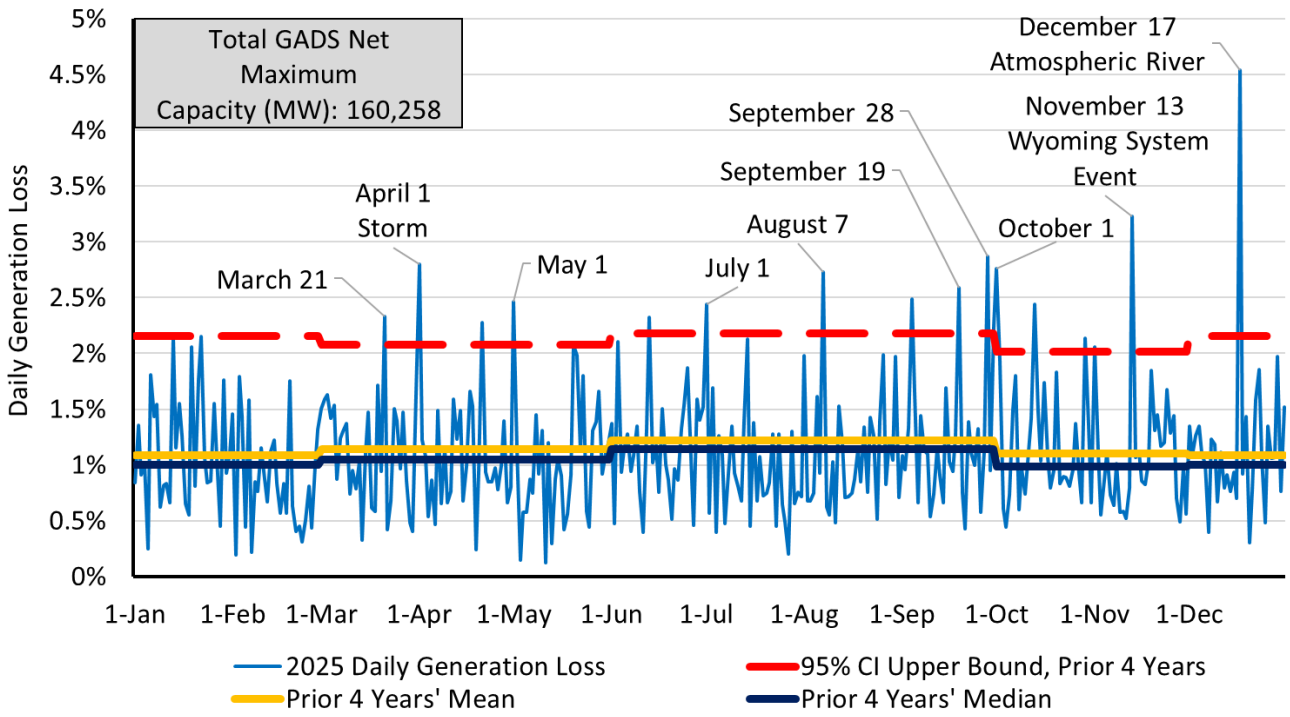


Figure A.10: Western Interconnection—Generation Impacts During Extreme Weather Days

Appendix B: Acknowledgements

NERC Industry Group Acknowledgements	
Group	**Officers**
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Incident Review

Load-Pocket Shoulder Season Challenges

Primary Takeaways

In recent years, shoulder seasons have become increasingly challenging for bulk power system (BPS) operators to manage. This review details 4 of 6 incidents over a 13-month period that resulted in pre-contingent load shedding. All these load-shed incidents had similar contributing circumstances: All incidents occurred during what is commonly known as the "shoulder seasons" and had unavailable generation that was either planned or unplanned, unavailable transmission that was either planned or unplanned, and more load than forecasted. Load was shed in all instances because of real-time contingency analysis (RTCA) results that indicated significant issues related to the next loss of a transmission element. These issues would have involved either significant overloads that could lead to cascading or significantly low voltages bordering on voltage instability.

During RTCA, which is important for operating the power system, analysis is performed on the system's current operating state. This differs from operational planning analysis (OPA), which studies the system for forecasted operating conditions. Very often, the real-time operating conditions are different than the forecasted operating conditions.

RTCA is the safety net used to ensure that the system is operating in a secure state in its current configuration and loading levels. Planned and unplanned outages, variable energy resources (VER), and variable weather conditions leading to variations in load can drive real-time conditions that necessitate load shed to maintain BPS reliability.

Background

Shoulder seasons are the spring and fall periods that are between the summer and winter peak load periods. These seasons have historically been used for planned BPS maintenance and construction in preparation for the upcoming peak load season. For instance, generating resources require periodic maintenance to ensure their availability during peak seasons. This periodic maintenance requires an outage of the generating facility. Market rules and other economic incentives have caused generation planned maintenance outages to be concentrated into the shoulder seasons, leading to increasing numbers of generators being out for maintenance simultaneously. Additionally, transmission lines require periodic maintenance, such as insulator, crossarm, or structure replacement, leading to planned outages during shoulder seasons.

Furthermore, the BPS is in a cycle of growth and transition, and significant new transmission development is occurring. To facilitate the construction of new transmission facilities, outages on existing BPS transmission facilities are required. This work is also concentrated in the shoulder seasons.

Historically, BPS reserve margins have been sufficient for the shoulder seasons to accommodate these outages without much difficulty, but reserve margins have shrunk in recent years. In its *2024–2025 Winter Reliability Assessment*,[1] NERC identified significant reductions in thermal generation from the previous winter. In many instances, this thermal generation has been replaced by VERs, such as wind and solar. However, VERs present

[1] https://www.nerc.com/globalassets/programs/rapa/ra/nerc_wra_2024.pdf

challenges and uncertainties for system operators in combination with facility outages during the shoulder seasons.

Another factor is load magnitude, of which temperature was historically the major driver with the largest percentage of load being residential and commercial building cooling and heating. Cold temperatures in the winter and hot temperatures in the summer caused loads to peak in those seasons, with lower loads in the shoulder seasons. However, loads that have a flat demand curve regardless of temperature have recently grown significantly, causing the delta between peak and shoulder seasons to shrink. Temperatures in the shoulder seasons were also historically temperate, meaning that operators could count on temperature-sensitive load to not be high in magnitude. In recent years, shoulder season temperatures have varied more significantly than historical norms. Compounding the challenges, especially in spring, thunderstorms and tornadoes create unplanned (forced) equipment outages.

All these factors must be considered when determining whether to grant equipment outage requests. The outages are typically planned weeks, if not months, in advance, as operators must forecast system conditions to determine whether the outage request is feasible. If conditions are much different than those predicted weeks or months earlier, load shed may be required to maintain a secure operating state, which is what occurred in the incidents described in this incident review.

Summary of the Incidents

This incident review summarizes four shoulder season load-shed incidents. Each is unique, but all share some of the aforementioned common difficulties. These incidents all occurred in a smaller area within a Balancing Authority (BA) area footprint, referred to as a load pocket.[2] Load pockets have varying degrees of transmission lines that connect the pockets to the larger grid. Energy imports on these transmission lines, along with the generation internal to the load pocket, serve as the energy source for load within the pocket. The magnitude of the load within the pocket, offset by the internal generation, determines the import capability that is needed to serve the load pocket. The needed import capability determines the required number or total capacity of the connecting transmission lines. Entities will sometimes create a transmission "ring" around the load pocket. Conceptual diagrams of simple and complex load pockets are depicted in **Figure 1** and **Figure 2**.

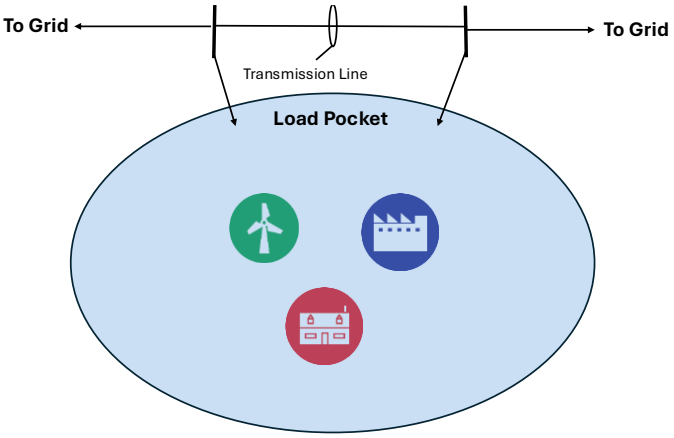


Figure 1: Simple Load Pocket

[2] A "load pocket" is a concentrated area of load that typically contains some generation.

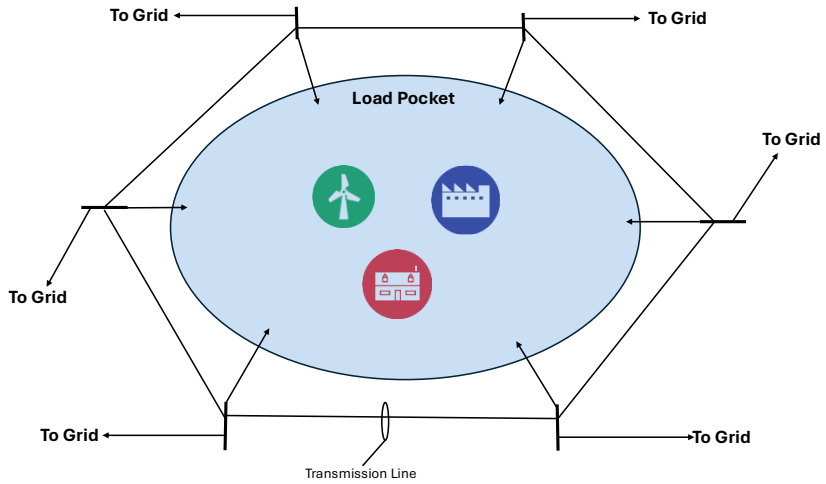


Figure 2: Complex Load Pocket

Incident Details

Entity A Incidents

Entity A experienced three load-shed incidents in the same load pocket in 2024 and 2025. Details are included for two of those incidents. This load pocket has seen rapid and significant load growth in the past few years, driving increased reliability risk in the shoulder season. Transmission projects are planned to increase the capacity into the load pocket but are still a few years from being in service. Consequently, the capacity margin for this load pocket, which contains a substantial amount of VERs consisting of wind and solar facilities, has been reduced from previous levels.

Each of the three incidents contained a combination of the following contributing factors:

- Unavailable Generation
  - Planned Maintenance Outages
  - Unplanned/Forced Outages
  - Low Wind Generation Output
  - Solar Generation Evening Ramp Down
  - Emission Constraints

  Planned and unplanned generation outages or derates within the load pocket contributed to these incidents. Unavailable generation internal to the load pocket places an increased need for capacity on the transmission lines that connect the load pocket to the rest of the electric grid.

- **Load Forecast Error**
  In each incident, there was a significant difference between actual and forecast load, with a significant portion of this extra load attributable to line losses on the transmission system. These increased losses

resulted from increased power flow on the transmission system due to reduced generation output internal to the load pocket.

- **Transmission Outages**
  - Planned Outages
  - Unplanned/Forced Outages

  In both the load-shed incidents being examined, unplanned/forced outages of 345 kV transmission lines due to faults contributed significantly to the potential voltage instability.

- **Solar Generation Evening Ramp Off**
  Evening solar generation ramp down presents a significant challenge for grid operators, as, in the shoulder seasons, it coincides with the daily peak load. In one of Entity A's incidents, the solar generation ramp down from 200 MW at 18:30 to 25 MW at 19:30 was coincident with the entity's daily peak load and coincided with minimum wind generation internal to the load pocket.

- **Low Wind Generation Output**
  This load pocket contains a significant amount of wind generation, but during one of the load-shed incidents, the wind generation was approximately 2% of nameplate.

Incident 1

In this April event, a 345 kV transmission line was forced out of service due to a sustained fault. This outage, coupled with a planned maintenance outage on another 345 kV line, resulted in an increased dependence on generation internal to the load pocket due to decreased transmission import capability. Low wind speeds that day resulted in only 100 MW of wind generation internal to the load pocket, compared to 4,700 MW of nameplate capacity. As peak load was approaching later in the day, a generator inside the load pocket that was planned to help meet the daily peak load failed to start. At very close to the same time, the solar evening ramp off also began with solar ramping down from 200 MW to 25 MW in one hour, coincident with load ***increasing*** to its daily peak value. RTCA, when accounting for these transmission and generator outages/unavailability, indicated that voltage instability would occur with the next contingency, requiring the operators to shed load pre-contingency. To return the system to a secure operating state as soon as possible, the operators shed approximately 150 MW of load.

Incident 2

In this March event, the load pocket experienced a significant internal unforecasted wind generation reduction that led to increased flows on the transmission system, resulting in increased line losses. At the time of the unexpected wind generation reduction, there were extensive planned and unplanned/forced outages of flexible/dispatchable generation, which is a key element to respond to unplanned/unforecasted generation shortages. Additionally, a key 345 kV transmission line was out of service for planned maintenance.

The generation reduction, increased flows, and resulting increased line losses on the transmission system led the RTCA to indicate voltage instability in the pocket for the next contingency. This circumstance required the operator to shed load pre-contingency—specifically shedding 122 MW of load to return the system to a secure operating state as quickly as possible.

Entity B Incidents

Entity B experienced two load-shed events in the same load pocket in April 2025. Both incidents were prompted by RTCA analysis indicating voltage instability—severe enough to require pre-contingent load shedding—for a next contingency loss. These incidents resulted in load sheds of 115 MW and 140 MW, respectively, to maintain reliability of the BPS. This load pocket has experienced significant generation retirements during the last 10 years, resulting in less reserve margin within the load pocket and leading to less flexibility for operators to respond to unanticipated conditions.

Contributing Factors for the April 26 Incident[3]

Generation planned maintenance outages contributed significantly to this incident, as 3,000 MW of generation was unavailable due to planned maintenance outages inside the load pocket. At the time of the outage requests months earlier, analysis did not reveal any issues with the outages based on the forecasted assumptions.

A 345 kV line and a dc tie transmission line were out of service on the day of the incident, significantly reducing the import capacity into the load pocket.

Grid operators perform OPA studies to identify any potential issues for the next-day operating conditions. This gives the grid operator time to develop mitigations for any identified issues. This analysis must use forecasted conditions, such as load, generation, and network topology. Differences between the actual real-time conditions and those forecasted in the OPA could result in unanticipated challenges. In this instance, a few real-time differences arose, as follows:

- The load pocket experienced a high temperature exceeding the daily forecast by approximately 5 degrees, resulting in a load 300 MW over the forecasted load.
- A 185 MW natural-gas-fired unit was off-line in real time.
- The network power flow differed significantly from the flow predicated in the OPA, which anticipated a north to south power flow. The actual flow in real time during the incident was south to north.

In addition to the grid operator performing day-ahead reliability planning studies, the market function performs day-ahead market analysis to determine the generation plan for the next day. As the market analysis determined that a 348 MW natural gas generator internal to the load pocket was not needed for economic or reliability purposes, the unit was placed in reserve shutdown mode.

Entity C Incident

In this May incident, a combination of extensive planned and unplanned generation outages, higher-than-forecasted load, and a critical 500 kV transmission line outage led to a transmission system emergency resulting in a need to shed 600 MW of load to maintain reliable operations.

Both planned and unplanned generation outages internal to the load pocket contributed significantly to this incident; 74% of the generation internal to the load pocket was unavailable on that day, and a 500 kV transmission line had previously been forced out of service due to structure failures caused by severe weather.

[3] 4-26-2025 Load Shed Event

These factors led to a 1,732 MW decrease in transmission capacity into the load pocket. In total, the load pocket's available capacity was reduced by 9,332 MW.

Table 1: Load Pocket Capacity Reductions	
Load-Pocket Unavailable Generation	**Reduction (MW)**
Planned Outages	2,600
Unplanned Outages	3,900
Derates	1,100
Total	7,600
Unavailable 500 kV line Capacity	1,732
Total Unavailable Capacity Into Load Pocket	9,332

Additionally, the temperature in the load pocket on that day was 92 degrees, approximately 5 degrees hotter than normal, resulting in a substantial increase in load and causing the actual load to exceed the forecasted load level.

The day prior to the load-shed incident, operators identified that a 230 kV line would overload if the loss of a 500 kV line occurred. The day-ahead analysis did not indicate an overload greater than 125%, and a plan was formulated to initiate post-contingent load shed to alleviate the overload should the 500 kV line be lost.

On the day of the load shed, the increased transmission line loading resulted in the need to adjust the system to address other transmission lines exceeding their rating. These adjustments, in addition to the increased loading, resulted in the RTCA indicating that the overload on the 230 kV line was greater than 125% for the next worse contingency: the loss of the 500 kV line.

The entity's operating procedure states that contingent overloads greater than 125% require further analysis to assess the potential for cascading. If this analysis identifies a load loss of 1,000 MW or more when removing elements loaded greater than 125%, a temporary interconnection reliability limit (TIROL) is identified and pre-contingent load shed is required, as happened on this day for the entity. After the TIROL was identified, the entity declared a transmission system emergency and initiated 600 MW of load shed to alleviate the TIROL.

Future Considerations

All these incidents occurred in shoulder seasons. Each incident had significant amounts of planned and unplanned outages, higher-than-forecasted temperatures, and RTCA results for a next contingency that required pre-contingent load shedding.

As interconnections are changing in both resource mix and load characteristics coupled with weather variability during shoulder seasons, a different approach may be needed when coordinating facility outages. Entities should consider the following:

- Planning a higher level of operating margin and committing additional generation in load pockets to account for larger real-time variabilities in generation, load, and weather
- Including demand-side management in the mitigation plans for insufficient capacity in load pockets
- Considering more extreme scenarios when determining which outage requests to approve

- Considering PRC-023 loadability requirements when determining contingent overload thresholds that trigger cascading analysis
- Periodically revisiting planned outages and considering updated and expected system conditions to determine whether such outages should be postponed
- In market areas, reviewing processes to ensure that reliability studies (OPA) are using accurate generation dispatch and availability as determined from the latest day-ahead market analysis (Coordinating processes that eliminate discrepancies between the day-ahead market unit commitment plan and the OPA studies.)

For more information, please contact:
NERC – Event Analysis

Date of Publication: March 4, 2026

DOE/SEA-04

Special Environmental Analysis

For Actions Taken under U.S. Department of Energy Emergency Orders Regarding Operation of the Potomac River Generating Station in Alexandria, Virginia

November 2006

U.S. Department of Energy
Washington, D.C.

COVER SHEET

Responsible Agency:
U.S. Department of Energy (DOE)

Cooperating Agency:
U.S. Environmental Protection Agency

Title:
Special Environmental Analysis for Actions Taken under DOE Emergency Orders Regarding Operation of the Potomac River Generating Station in Alexandria, Virginia

Location:
Alexandria, VA, and Washington, DC

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Abstract:

On December 20, 2005, the Secretary of Energy issued an emergency order, DOE Order 202-05-03, requiring Mirant's Potomac River Generating Station in Alexandria, Virginia, to operate under limited circumstances. On September 28, 2006, the Secretary extended the Order, including all of its terms and conditions, DOE Order 202-06-2, until December 1, 2006. This SEA includes descriptions of the DOE emergency orders; assessments of the direct, indirect, and cumulative impacts resulting from the emergency orders; and descriptions of alternative actions for potential future decision-making that include mitigation. This SEA covers a period of about 24 months beginning in December 2005.

Public Comment:
Simultaneously with issuance of this SEA, the Secretary is issuing another temporary extension of the emergency order, including all of its terms and conditions, DOE Order 202-07-1, until February 1, 2007. DOE is placing the document on DOE's internet websites (http://www.oe.energy.gov/permitting/372.htm and http://www.eh.doe.gov/nepa/documentspub.html) and making it available at the public reading room at DOE headquarters. An announcement of the availability of the SEA is also being made in the *Federal Register*. Comments on this SEA are due on January 8, 2007, and will be considered in any future decision-making on this matter. Due to postal security procedures, comments sent through U.S. mail may be delayed, and DOE recommends that commentors use other means.

SUMMARY

On December 20, 2005, the Secretary of Energy issued an emergency order ("DOE Order" or "Order") to Mirant Potomac River, LLC (Mirant) pursuant to Section 202(c) of the Federal Power Act (FPA). The Order directed Mirant to operate its Potomac River Generating Station ("the Plant") in Alexandria, Virginia, in specific and limited circumstances in order to reduce the risk of a blackout in the Central Washington, D.C. area, while avoiding, to the extent possible, exceedances of the National Ambient Air Quality Standards (NAAQS) (text box). The Order was to expire on September 30, 2006, but DOE issued a temporary extension of the Order, until December 1, 2006, to allow for completion of this Special Environmental Analysis (SEA). This SEA assesses impacts resulting from the Orders and from potential future alternative actions DOE may take in this matter. DOE is accepting public comment on this SEA and will consider all comments submitted in any future decision-making.

National Ambient Air Quality Standards (NAAQS)

The Clean Air Act, which was last amended in 1990, requires the Environmental Protection Agency (EPA) to set NAAQS for pollutants considered harmful to public health and the environment. EPA has set NAAQS for seven "criteria" pollutants: sulfur dioxide (SO_2), nitrogen dioxide (NO_2), lead, carbon monoxide (CO), ozone, particulate matter less than or equal to 10 μm in aerodynamic diameter (PM_{10}), and particulate matter less than or equal to 2.5 μm in aerodynamic diameter ($PM_{2.5}$). Each NAAQS has a specific averaging time (e.g., 3-hour or 24-hour SO_2 standard) that represents the time period over which modeled air pollutant concentrations are analyzed for the purpose of determining attainment with the NAAQS. The NAAQS are implemented at the state level through State Implementation Plans (SIPs). SIPs use individual source emissions limitations to help attain and maintain the NAAQS.

In emergency situations, pursuant to 40 CFR 1506.11, the Council on Environmental Quality's (CEQ) National Environmental Policy Act of 1969 (NEPA) regulations call for agencies to consult with CEQ to determine what alternative arrangements the agency will take in lieu of preparing an environmental impact statement (EIS) that might otherwise be required for the relevant action. DOE is issuing this SEA in compliance with the "alternative arrangements" plan agreed upon with CEQ.

Background

The Plant is a 482-MW electricity generating facility located on the Potomac River in Alexandria, Virginia, about five miles (8 km) from the U.S. Capitol building (Figure S-1). The Plant consists of five generating units, each with its own exhaust stack. Because the Plant is located three miles (5 km) from the Ronald Reagan Washington National Airport and is within the flight path of the airplanes that fly in and out of that airport, it has stacks that are shorter than

normal for similar facilities. The Plant uses oil to pre-heat each of its units and then burns coal, which it receives via rail car, to generate electricity. The generated electricity is transmitted to the central business district of Washington, D.C., many Federal institutions, the Georgetown area, as well as other portions of Northwest D.C. and the D.C. Water and Sewer Authority's Blue Plains Wastewater Treatment Plant (collectively called the "Central D.C. area").

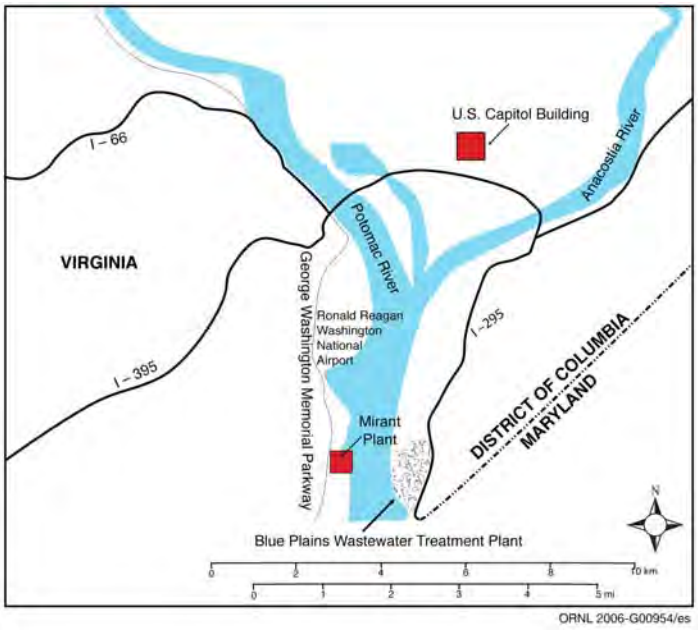


Figure S-1. The location of the Plant in relation to the central Washington, D.C. area.

The Plant site was relatively remote in 1949 when the Plant began operation. However, residential communities and commercial properties have grown up and around the Plant over the last 50 years, notably a condominium building, Marina Towers, built only 300 yards (270 m) from the Plant in the 1960s. Since 2001, residents of Marina Towers have complained about air quality impacts and associated health impacts of the Plant's operation. Since 2003, state and Federal environmental agencies have been working with Mirant to settle alleged violations of the Plant's operating permit limit for nitrogen oxide (NO_x) emissions. The alleged violations resulted in a judicial consent decree (EPA 2004) in September 2004 and an amended judicial consent decree in May 2006 (EPA 2006g). Part of the 2004 settlement required Mirant to perform a modeling analysis to predict the effect of "downwash"[1] from the Plant on ambient concentrations of several NAAQS pollutants. The study showed significant modeled exceedances of three NAAQS pollutants from downwash: sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and particulate matter finer than 10 μm in aerodynamic diameter (PM_{10}). As a result of the study, on August 19, 2005, the Virginia Department of Environmental Quality (VDEQ) issued a letter to Mirant requesting that Mirant "undertake such action as is necessary to ensure protection of human health and the environment, in the area surrounding the Potomac River Generating Station, including the potential reduction of levels of operation, or potential shutdown of the facility." On August 24, 2005, in response to VDEQ's August 19, 2005, letter, Mirant decided to shut down all five generating units at the Plant.

[1] The September 23, 2004, judicial consent decree (EPA 2004) defined downwash as "the effect that occurs when aerodynamic turbulence induced by nearby structures causes pollutants from an elevated source (such as a smokestack) to be mixed rapidly towards the ground resulting in higher ground-level concentrations of pollutants."

DOE Action

On August 24, 2005, the District of Columbia Public Service Commission (DCPSC) filed an Emergency Petition and Complaint ("Petition") with DOE pursuant to Section 202(c) of the FPA. The Petition requested the Secretary of Energy to find that an emergency existed under Section 202(c) of the FPA and to issue an order directing Mirant to continue operation of the Plant. Section 202(c) of the FPA authorizes DOE, upon determination that an emergency exists, to "require by order such temporary connections of facilities and such generation, delivery, interchange, or transmission of electric energy as in its judgment will best meet the emergency and serve the public interest." The basis of the DCPSC's Petition was that the shutdown of the Plant had a drastic and potentially immediate effect on the reliability of the electricity supply of the Central D.C. area.

After receiving the Petition, DOE spent four months reviewing the facts to gather information on the shutdown of the Plant and its effect on the reliability of the Central D.C. electricity system. DOE met with private entities responsible for electricity transmission in the Central D.C. area and the regional electricity system to determine the role of the Plant in electricity reliability. DOE also met with officials from the Environmental Protection Agency (EPA) to understand the environmental situation posed by the Plant's operation, particularly with regard to the NAAQS. Meanwhile, on September 21, 2005, Mirant unilaterally restarted the Plant's unit 1 in an 8-8-8 capacity (that is, in any given 24-hour period, the unit ran for 8 hours at its maximum level, 8 hours at its minimum level, and did not run for 8 hours). Mirant also began experimental use of measures to control SO_2, specifically combustion of low-sulfur coal and injection of trona (a substance similar to baking soda) into flue gases.

During its investigation, DOE learned of the Plant's key role in providing electricity reliability to the Central D.C. area. The Plant is one of only three sources of electricity to the Central D.C. area. The other sources are two 230-kV transmission lines that deliver electricity from other regional generating sources. The Potomac Electric Power Company (Pepco) is in the process of installing two additional 230-kV transmission lines to the Central D.C. area that will provide a high level of electricity reliability to the area even in the absence of the Plant. These lines are currently expected to be placed in service in June 2007. Until then, if the Plant is not available to generate electricity and one of the two existing transmission lines goes out of service (either unexpectedly or for maintenance), the Central D.C. area would only be served by the remaining line. If the remaining line then failed, a blackout would occur, affecting many government agencies; a large number of residents and workers; and hospitals, police, and fire facilities. Since 2000, there have been 34 one-line planned outages, seven one-line unplanned outages, and two times where both lines failed simultaneously. Indeed, on December 15, 2005, during DOE's investigation, one of the 230-kV transmission lines failed unexpectedly, and the supply of electricity to the Central D.C. area depended solely on the remaining line until the morning of December 16, 2005.

After DOE's investigation, on December 20, 2005, the Secretary issued the Order stating:

> I find that in the circumstances presented here, an emergency exists that justifies the issuance of a section 202(c) order. My determination is not based on any single factor, but on the combination of all relevant facts and circumstances. In particular, I find that an emergency exists because of the reasonable possibility an outage will occur that would cause a blackout, the number and importance of facilities and operations in our Nation's Capital that would be potentially affected by such a blackout, the extended number of hours of any blackout that might in fact occur, and the fact that the current situation violates applicable reliability standards.

DOE's Order did not direct Mirant to simply generate full power at the Plant, even though continuous, unrestricted, operation of the Plant, at all times, was requested in the Petition and would have assured a high level of electricity reliability to the Central D.C. area. Instead, the Order sought to strike an appropriate balance between environmental concerns and electricity reliability by directing Mirant to operate the Plant, but only in certain circumstances and only to limited capacity. Specifically, the Order required Mirant to (1) operate the Plant to produce the amount of power necessary to meet demand in the Central D.C. area during a planned or unplanned outage of one of the 230-kV lines and (2) in situations where both 230-kV lines are functioning, keep as many generating units in operation and take all other measures to reduce the start-up time of units not in operation for the purpose of providing electricity reliability, without causing an exceedance of the NAAQS. The Order further required Mirant to utilize pollution control equipment and measures to the maximum extent possible to minimize the magnitude and duration of any exceedance of the NAAQS during a planned or unplanned transmission line outage. The Order also contemplated continued DOE cooperation with EPA and suggested that DOE would modify the Order at a later date if EPA decided to issue an order to Mirant.

On June 1, 2006, EPA issued an Administrative Compliance Order (ACO) to Mirant. The ACO directs Mirant to operate the Plant under conditions specified in the DOE Order during line outage situations, but requires Mirant to take all reasonable steps to limit SO_2, PM_{10}, and NO_x emissions and to optimize use of trona to minimize SO_2 emissions. In non-line outage situations (i.e., in the normal course of operation), the ACO authorizes Mirant to operate the Plant under "daily predictive modeling" after certain conditions are met. Under daily predictive modeling Mirant is to model a specific operating mode for the Plant based on predicted weather conditions for the following day and operate under that mode only where the daily modeling run demonstrates that the Plant will not cause or contribute to a modeled exceedance of the 3-hr and 24-hr SO_2 and PM_{10} NAAQS. The ACO also requires Mirant to maintain alarms that alert the Plant operators if monitored average concentrations reach 80% of the standards for SO_2, including the annual SO_2 standard. In addition, the ACO requires Mirant to install and operate six new SO_2 ambient monitoring stations in the vicinity where elevated pollutant concentrations have been predicted and to conduct actual monitoring of ambient SO_2 concentrations. On

June 2, 2006, DOE directed Mirant to operate under the ACO during non-line outage situations, for the purpose of providing electricity reliability, and to continue operation in accordance with the DOE Order in line-outage situations.

DOE believes that the Order and the ACO are the product of the best available balance between providing electricity reliability to the Central D.C. area and protecting the environment and human health in Alexandria, Virginia, until the additional 230-kV lines are in service. The Order and the ACO both contain provisions to prevent NAAQS exceedances in the normal course of operation of the Plant. The only time a possible exceedance of the NAAQS is contemplated is during line-outage situations. In addition, while unplanned transmission line outages cannot be predicted, planned transmission line outages are scheduled in 2006-2007 for periods of time when demand for electricity in the Central D.C. area (and hence emissions from the Plant) is at its lowest. The 2006 amended judicial consent decree, after it is implemented, will provide limitations on NO_x emissions from the Plant.

NEPA Process and this SEA

Major Federal actions significantly affecting the human environment generally call for DOE to prepare an EIS before taking the action to analyze impacts in compliance with NEPA. However, in emergency situations, pursuant to 40 CFR 1506.11, the CEQ's NEPA regulations provide that agencies consult with CEQ to determine what alternative arrangements the agency will take in lieu of preparing an EIS. Before issuing the Order, DOE consulted with CEQ pursuant to 40 CFR 1506.11. As part of its "alternative arrangements plan," DOE agreed to provide opportunity for public involvement, continue Agency consultation, and identify alternatives for mitigation (DOE 2006). In addition, as an alternative to an EIS, CEQ agreed to preparation of this SEA. This SEA does not include an impact assessment of alternative actions that DOE might have taken instead of issuing its Order on December 20, 2005. DOE will not issue a record of decision (ROD) based on this SEA.

In the January 20, 2006, *Federal Register* notice announcing the alternative arrangements (DOE 2006), DOE requested public comments on issues to be addressed in the SEA. Comments were provided by the following organizations: the Mount Vernon group and the Virginia Chapter of the Sierra Club; the Southern Environmental Law Center on behalf of itself and the American Lung Association of Virginia; the City of Alexandria; and the Institute for Public Representation on behalf of the Potomac Riverkeeper, Inc., the Patuxent Riverkeeper, and the Anacostia Riverkeeper at Earth Conservation Corps. Commentors on the notice expressed particular concern about the following issues that are within the scope of this SEA:

- impacts on health of increased particulate emissions, especially particulate matter smaller than 2.5 microns ($PM_{2.5}$), and of increased emissions of trace metals and hazardous air pollutants (especially arsenic, beryllium, lead, chromium, cadmium, nickel, and mercury);

- the potential for any increased emissions of SO_2 and NO_x to contribute to acid rain, nutrient loading to aquatic systems, and deposition of heavy metals, and the subsequent impacts on the aquatic resources of the Chesapeake Bay and several of its tributaries, specifically the Potomac, Anacostia, and Patuxent rivers;
- impacts of trona utilization; and
- potential mitigation measures, such as use of existing transmission lines along the railroad rights-of-way of the National Railroad Passenger Corporation ("AMTRAK") and CSX Corporation and notification of nearby residents about potential NO_x exceedances.

A commentor also expressed concern about possible adverse effects of trona utilization on Plant equipment. This concern is not addressed because it is not considered to be an environmental impact.

The aim of this SEA is to describe the impacts resulting from the Order and from potential future alternative actions DOE may take in this matter. Such potential future alternative actions include allowing the Order to expire; extending the Order until the expected June 2007 in-service date of the two additional 230-kV transmission lines (or until December 2007, to account for unlikely, but possible, delays in installation); or extending the Order in modified form to include measures to mitigate impacts. Because allowing the Order to expire would place the Central D.C. area at risk of a potential blackout, this SEA describes potential impacts associated with a blackout. Potential mitigation alternatives discussed in this SEA include measures to, among other things, reduce demand for electricity in the Central D.C. area, require storage of sufficient trona at the Plant, and expedite the installation of the additional 230-kV transmission lines.

In order to give the reader a contextual way to understand the assessed impacts attributable to the Order and from a potential extension of the Order until the two new 230-kV transmission lines are in service, DOE uses assessed impacts from two different earlier Plant operating modes as a basis for comparison: the "pre-shutdown" mode of operations and the "pre-Order" operating mode. The "pre-shutdown" operating mode is based on operations in the year preceding the August 24, 2005, shutdown. The "pre-Order" mode is based on operation of the Plant during its restart of unit 1 in the 8-8-8 operating mode (approximately September - December 2005).

DOE's assessment of the effects of Plant operations considered the following resource areas and impact topics:

- Effects of any increased *air emissions*;
- *Health* effects on Plant workers and the public of any increased air pollution;
- Effects on *water quality* due to atmospheric deposition of air pollutants from the Plant and changes in Plant water use and releases;
- *Ecological* effects due to acid deposition, changes in water quality, and changes in water use, including impacts to special status species;
- *Waste management* impacts, particularly impacts of trona utilization;

- *Transportation impacts* from increased shipping of coal and trona to the Plant and of wastes away from the Plant; and
- *Environmental justice* impacts.

It is important to understand the process DOE used to assess impacts from the Order and from a potential additional extension of the Order. Understanding DOE's approach for modeling air quality impacts is particularly important because (1) air quality is the most significant environmental concern associated with the Plant's operation and (2) many other impacts, including impacts to human health, are based on modeled estimates of air impacts. For its air analysis DOE used EPA's AERMOD model to assess modeled concentrations of SO_2 and PM_{10} as a result of the Order (split into two time periods: before the ACO and after the ACO) and a potential extension of the Order (until July 2007 and December 2007). DOE focused on modeling concentrations of SO_2 and PM_{10} because the original downwash study that prompted the shutdown of the Plant emphasized SO_2, PM_{10}, and NO_x (and the amended judicial consent decree between EPA and Mirant [EPA 2006g] deals with NO_x.) In modeling concentrations of SO_2 and PM_{10}, DOE used several simplifications and made a number of key assumptions that are essential to understand before interpreting the modeled results:

- *Assumptions in Modeling*
  - DOE's modeling of SO_2 and PM_{10} assumed weather conditions from 2001 because EPA had shown that 2001 resulted in predictions of more adverse air quality than any of the other years during the period from 2000 through 2004. Therefore, DOE's modeling results likely overestimate impacts.
  - DOE's assessment of impacts to the health of people living near the Plant is based on estimated exposures to $PM_{2.5}$. DOE used air dispersion modeling for PM_{10} to estimate exposures to $PM_{2.5}$. Therefore, to the extent that DOE's modeled air quality results overestimate impacts, the health results also likely overestimate impacts. In addition, DOE did not analyze factors such as health status or activity level that affect the likelihood of actual health impacts to specific individuals. Consequently, the results of DOE's health impact analysis represents an estimate of the impact to the population, rather than the likely impact to any specific individual.

- *Assumptions and Simplifications about Operations*
  - For the period from December 21, 2005, through March 31, 2006, DOE used hourly emissions data provided by Mirant to model SO_2 and PM_{10} emissions. (For the two days for which data were not provided, DOE assumed operations were identical to the preceding day.) To model the air quality impacts of operations during the period April 1 through May 31, 2006, DOE assumed that Mirant operated the Plant to the maximum level described in the operating plan supplements that Mirant provided to DOE.

- For operations during daily predictive modeling, DOE assumed that the Plant would generate the maximum allowed power by using a combination of increased trona injection and reduced power levels to assure that its operations would not contribute to an exceedance of the 24-hour-average NAAQS limit for SO_2 concentrations in the normal course of business (i.e., no line outage). DOE did not simulate predictive modeling for the 3-hour SO_2 standard because the computational effort required to calculate average concentrations for all possible 3-hour periods for each of the over 1,700 modeled locations near the Plant was judged to be excessively large for the information to be gained. Consequently, the SEA reports modest modeled exceedances of the 3-hour SO_2 standard that are not expected to actually occur. The SEA also reports exceedances of the annual standard because operating close to the 24-hour limit day after day raises the long-term average. However, because the ACO requires Mirant to monitor SO_2 concentrations and adjust operation of the Plant to meet SO_2 standards for all averaging periods, actual exceedances of the annual standard are not expected to occur.

Preliminary data from the six new SO_2 monitoring stations that Mirant installed during the summer of 2006, pursuant to the ACO, provides an initial look at actual impacts from the Plant under the ACO's daily predictive modeling. DOE's modeling results are not directly comparable to the monitored data because DOE's modeling used average emissions and historical weather data rather than current-year data. However, monitored data can be compared with the follow-up modeling that Mirant is conducting under the ACO, using actual concurrent emissions and weather data. For the period June 17, 2006, to September 17, 2006, the maximum monitored daily-average SO_2 concentration for the monitors ranged from 4 to 63 $\mu g/m^3$, whereas Mirant's follow-up modeling gave maximum daily-average SO_2 concentrations from 25 to 570 $\mu g/m^3$. Thus, monitored concentrations of SO_2 are much lower than Mirant's follow-up modeled concentrations. EPA will be evaluating the reasons for this large discrepancy between the actual monitored data and follow-up modeling throughout the course of the ACO. Should DOE extend the Order on December 1, 2006, DOE will make monitored data (as submitted by Mirant to EPA under the ACO) available on the website it maintains to provide information about this matter, http://www.oe.energy.gov/permitting/372.htm.

Table S.1 summarizes the assessed impacts of the Order, both before and after the initiation of daily predictive modeling. It also includes impacts of the temporary extension of the Order and a potential additional extension of the Order until December 2007, assuming a 6-month delay in the installation of the additional 230-kV lines. Finally, the table presents the assessed impacts associated with the "pre-shutdown" and "pre-Order" modes of operation of the Plant to give the reader a basis for comparison.

Table S.1 Summary of impacts of Plant operations (See text for details.)

Resources and Topics	Pre-shutdown (prior to August 24, 2005)	Pre-Order (Sept. - Dec. 20, 2005)	Order (Dec. 20, 2005 - Oct. 1, 2006)	Temporary extension of Order (until Dec. 1, 2006) and potential extension until Dec. 2007 [1]
AIR QUALITY				
SO_2	Modeled maximum concentration values for SO_2 in ambient air exceed NAAQS limits for all averaging periods (i.e., 3-hour, 24-hour, and annual).	Modeling shows no exceedance of NAAQS limit for any averaging period.	For operations before the commencement of daily predictive modeling (i.e., before July 1, 2006), there are no modeled SO_2 or NO_x exceedances during non-line outage situations. For operations during line outages (21 days in January 2006) modeled maximum concentration values for SO_2 in ambient air exceed SO_2 NAAQS limits for all averaging periods. For operations after the commencement of daily predictive modeling (i.e., starting July 1, 2006), modeling shows no exceedances of 24-hour average SO_2 NAAQS limit because of requirements of predictive modeling. Modeling shows exceedances for other averaging periods, but because the ACO requires compliance with SO_2 NAAQS in non-line outage situations, actual exceedances are not expected.	For operations during non-line outage periods, modeling shows no exceedances of 24-hour average SO_2 NAAQS limit because of requirements of predictive modeling. Modeling shows exceedances for other averaging periods, but because the ACO requires compliance with SO_2 NAAQS in non-line outage situations, actual exceedances are not expected. For operations during line outages, modeled maximum concentration values for SO_2 in ambient air exceed SO_2 NAAQS limits for all averaging periods.

Table S.1 (Continued)

Resources and Topics	Pre-shutdown (prior to August 24, 2005)	Pre-Order (Sept. - Dec. 20, 2005)	Order (Dec. 20, 2005 - Oct. 1, 2006)	Temporary extension of Order (until Dec. 1, 2006) and potential extension until Dec. 2007 [1]
PM_{10}	Modeled maximum concentration values for PM_{10} in ambient air meet NAAQS annual standard but exceed limit for 24-hour averaging period. [2]	Modeled maximum concentration values for PM_{10} in ambient air meet NAAQS standards for both the annual and 24-hour averaging periods. [3]		
$PM_{2.5}$	Background concentrations measured by VDEQ while the Plant was operating at pre-shutdown levels are below the current NAAQS limit for 24-hour averaging period (65 $\mu g/m^3$) and are slightly below the current NAAQS annual limit (15 $\mu g/m^3$), but exceed the NAAQS limit for the 24-hour averaging period (35 $\mu g/m^3$) that will take effect in December 2006. As a result of the background contribution, estimated maximum concentration values in ambient air (including background) for all operating modes exceed the NAAQS annual limit and the December 2006 limit for the 24-hour averaging period, both at ground level and the top of Marina Towers. Adding estimated Plant contributions to background concentrations involves some double counting of Plant effects.			
	Estimated maximum concentration values in ambient air (including background) at ground level and the top of Marina Towers exceed current and future NAAQS limits for both 24-hour and annual averaging periods.	Estimated maximum concentration values in ambient air (including background) at ground level and the top of Marina Towers are lower than for pre-shutdown operations and meet the current NAAQS limit for the 24-hour averaging period, but exceed the annual and 24-hr limits that will take affect in December 2006.	Estimated maximum concentration values in ambient air (including background) at ground level are lower than for pre-shutdown operations but higher than for pre-Order operations and meet the current NAAQS limit for the 24-hour averaging period but exceed the annual and 24-hr limits that will take affect in December 2006. Estimated maximum concentration values at the top of Marina Towers are lower than for pre-shutdown operations, but exceed current and future NAAQS limits for both 24-hour and annual averaging periods.	

Table S.1 (Continued)

Resources and Topics	Pre-shutdown (prior to August 24, 2005)	Pre-Order (Sept. - Dec. 20, 2005)	Order (Dec. 20, 2005 - Oct. 1, 2006)	Temporary extension of Order (until Dec. 1, 2006) and potential extension until Dec. 2007 [1]
$PM_{2.5}$ (continued)	Plant contributions to ground-level $PM_{2.5}$: 38 $\mu g/m^3$ for 24-hr 5.7 $\mu g/m^3$ for annual	Plant contributions to ground-level $PM_{2.5}$: 9.2 $\mu g/m^3$ for 24-hr 2.0 $\mu g/m^3$ for annual	Plant contributions to ground-level $PM_{2.5}$: 25 $\mu g/m^3$ for 24-hr 2.4 $\mu g/m^3$ for annual	Plant contributions to ground-level $PM_{2.5}$: 23 $\mu g/m^3$ for 24-hr 4.0 $\mu g/m^3$ for annual
	Plant contributions to $PM_{2.5}$ at the top of Marina Towers: 76 $\mu g/m^3$ for 24-hr 7.8 $\mu g/m^3$ for annual	Plant contributions to $PM_{2.5}$ at the top of Marina Towers: 4.8 $\mu g/m^3$ for 24-hr 1.0 $\mu g/m^3$ for annual	Plant contributions to $PM_{2.5}$ at the top of Marina Towers: 41 $\mu g/m^3$ for 24-hr 3.9 $\mu g/m^3$ for annual	Plant contributions to $PM_{2.5}$ at the top of Marina Towers: 43 $\mu g/m^3$ for 24-hr 5.7 $\mu g/m^3$ for annual
Contributions to ozone pollution from NO_x	Operations estimated to emit 2,300 tons[3] of NO_x (which contributes to formation of ozone) over 285 days (rate of about 3,000 tons/yr)	Operations estimated to emit 640 tons of NO_x over 285 days (rate of about 820 tons/yr)	Operations estimated to emit 2,000 tons of NO_x over 285 days (rate of about 2,600 tons/yr)	Operations estimated to emit 3,700 tons of NO_x over 15 months (rate of about 3,000 tons/yr)
Mercury emissions	Operations estimated to emit mercury at a rate of 116 lb/yr or 91 lb over 285 days[3]	Operations estimated to emit 21 lb mercury over 285 days (rate of about 28 lb/yr)	Operations estimated to emit 79 lb mercury over 285 days (rate of about 101 lb/yr)	Operations estimated to emit mercury at a rate of 116 lb/yr or 146 lb over 15 months
Carbon monoxide and lead	Because ambient concentrations of carbon monoxide and lead are far below NAAQS limits and because coal plants are not important sources of either pollutant, DOE did not model Plant contributions to ambient levels for either pollutant.			
Contributions to global climate change	Operations estimated to release CO_2 (a greenhouse gas that contributes to global warming) at a rate of 2,000,000 tons/yr from coal use	Operations estimated to release CO_2 at a rate of 488,800 tons/yr from coal use	Operations estimated to release CO_2 at a rate of 1,766,500 tons/yr from coal and trona use	Operations estimated to release CO_2 at a rate of 2,007,500 tons/yr from coal and trona use

Table S.1 (Continued)

Resources and Topics	Pre-shutdown (prior to August 24, 2005)	Pre-Order (Sept. - Dec. 20, 2005)	Order (Dec. 20, 2005 - Oct. 1, 2006)	Temporary extension of Order (until Dec. 1, 2006) and potential extension until Dec. 2007 [1]
HUMAN HEALTH				
Premature mortality due to air pollution exposure	Expected incidence of premature mortality among the 144,000 adults in 36-mi^2 area[3] around the Plant of 3.8 per year	Expected incidence of premature mortality among the 144,000 adults in 36-mi^2 area around the Plant of 0.77 per year	Expected incidence of premature mortality among the 144,000 adults in 36-mi^2 area around the Plant of 1.3 over 285-day duration of the Order (annual rate of 1.7)	Expected incidence of premature mortality among the 144,000 adults in 36-mi^2 area around the Plant of 2.9 over 15-month duration of the potential extension (annual rate of 2.3)
WATER QUALITY				
Nitrogen loading to Chesapeake Bay	Operations deliver nitrogen to the Bay at an estimated rate of 170,000 lb/yr	Operations deliver nitrogen to the Bay at an estimated rate of 47,000 lb/yr	Operations deliver nitrogen to the Bay at an estimated rate of 150,000 lb/yr	Operations deliver nitrogen to the Bay at an estimated rate of 170,000 lb/yr
Acid deposition	Plant emissions of SO_2 and NO_x contribute to regional acid deposition.	SO_2 and NO_x emissions are 28% of pre-shutdown levels	NO_x emissions are 87% of pre-shutdown levels; SO_2 emissions are less than 45% of pre-shutdown levels	NO_x emissions are similar to pre-shutdown levels, but SO_2 emissions are 50% of pre-shutdown levels
	Negligible impacts to water quality in nearby watersheds, because these watersheds are well buffered against acid rain.			
Effects of changes in Plant water use and releases	Effects of many years of Plant operations are among the natural and human factors reflected in the existing water quality conditions of the Potomac River	Reduced water and thermal discharge rates, compared with pre-shutdown operations, could contribute to improved water quality in the Potomac River	Impacts intermediate between pre-Order and pre-shutdown operations	Impacts similar to pre-shutdown operations

Table S.1 (Continued)

Resources and Topics	Pre-shutdown (prior to August 24, 2005)	Pre-Order (Sept. - Dec. 20, 2005)	Order (Dec. 20, 2005 - Oct. 1, 2006)	Temporary extension of Order (until Dec. 1, 2006) and potential extension until Dec. 2007 [1]
ECOLOGICAL RESOURCES				
Acid deposition	Acid deposition resulting from Plant operations has negligible impacts on terrestrial and aquatic biological resources because (1) the soils in the nearby river and stream watersheds where emissions from the Plant are likely to fall are well buffered and (2) vegetation has actively grown near and next to the Plant even at "pre-shutdown" levels.			
Changes in water quality	Ecological changes to the Potomac River and Chesapeake Bay due to changes in nutrient loading induced by the Order or a potential extension of the Order would be minimal.			
	No effects from trona (no use of trona).	No effects from trona (assessment assumes no use of trona).	Selenium and arsenic leached from solid wastes produced with trona use could adversely affect biota in Mataponi Creek. Monitoring of collected landfill leachate and stormwater for selenium should identify the potential for problems before discharges occur, but the current discharge permit does not require monitoring for arsenic.	
Changes in water use	Effects of Plant operations under the Order or a potential extension of the Order through December 2007 would not have a major impact on aquatic biota, although the impacts from entrainment and impingement would be greater than for the "pre-Order" mode.			
Special status species	No adverse impacts to any special status species would be expected to result from Plant operations.			

Table S.1 (Continued)

Resources and Topics	Pre-shutdown (prior to August 24, 2005)	Pre-Order (Sept. - Dec. 20, 2005)	Order (Dec. 20, 2005 - Oct. 1, 2006)	Temporary extension of Order (until Dec. 1, 2006) and potential extension until Dec. 2007 [1]
WASTE MANAGEMENT				
Solid waste	With indefinite continuation of Plant operations in pre-shutdown mode, the Mirant Brandywine ash landfill would be able to receive fly ash until mid-2012.	With indefinite continuation of Plant operations in pre-Order mode, the Mirant Brandywine landfill would be able to receive fly ash until mid-2015.	With indefinite continuation of Plant operations at operating levels under the Order, including use of trona, the Mirant Brandywine ash landfill would be able to receive fly ash until early 2010.	
	Waste characteristics would be unchanged.	Waste characteristics would be unchanged (assessment assumes no use of trona).	Trona in Plant solid wastes may increase the leaching of selenium and arsenic from the landfill. Current monitoring requirements at the landfill include monitoring for selenium in collected leachate and stormwater before water is discharged to surface water, but do not include monitoring for arsenic. Groundwater monitoring does not include selenium or arsenic.	
TRANSPORTATION				
Impacts from road and rail traffic	Neither rail nor truck traffic associated with Plant operations have an important effect on local traffic near the Plant.			
	Transport of Plant fly ash to the Mirant Brandywine ash landfill contributes to existing traffic problems on Maryland Route 381, and increased traffic associated with operations under the Order, including the temporary extension of the Order and any potential extension of the Order increases this effect. The State Highway Administration is requiring that Mirant address problems at certain intersections along Maryland Route 381 that have been rated as having “failing” levels of service, and Maryland-National Capital Park and Planning Commission staff have recommended ways to address traffic impacts on North Keys Road.			

Table S.1 (Continued)

Resources and Topics	Pre-shutdown (prior to August 24, 2005)	Pre-Order (Sept. - Dec. 20, 2005)	Order (Dec. 20, 2005 - Oct. 1, 2006)	Temporary extension of Order (until Dec. 1, 2006) and potential extension until Dec. 2007 [1]
ENVIRONMENTAL JUSTICE				
Impacts to minority and low-income populations	Because of their proximity to the Plant, residents of block groups 1 and 2 (which are neither low-income nor minority populations) experience higher air pollution from Plant emissions than residents of block groups 3 (which is identified as a low-income population) and 4 (which is identified as a minority population). DOE has not identified any different or unique ways that these or other minority and low-income populations in the area could be exposed to Plant air pollutants or otherwise affected by the Order or its potential extension. Consequently, the minority and low-income populations in block groups 3 and 4 do not suffer "disproportionately high and adverse human health or environmental effects" related to air pollutant emissions from the Plant.			

[1] For several resources and topics, emissions and impacts are greater under an extension of the Order than under the Order because during the initial months of the Order the Plant operated at lower levels than result from daily predictive modeling.

[2] EPA's October 17, 2006, rule making on NAAQS for particulate matter (EPA 2006j) revoked the annual PM_{10} standard, effective December 18, 2006.

[3] To convert tons to metric tons, multiply by 0.91. To convert lbs to kg, multiply by 0.45. To convert square miles to square km, multiply by 2.60.

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Special Environmental Analysis

For Actions Taken under U.S. Department of Energy Emergency Orders Regarding Operation of the Potomac River Generating Station in Alexandria, Virginia

DOE/SEA-04

U.S. Department of Energy
Washington, D.C.

November 2006

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ACRONYMS AND ABBREVIATIONS

µg	micrograms (i.e., millionths of a gram)
µm	micrometers (i.e., millionths of a meter)
ACO	Administrative Compliance Order
Btu	British thermal unit
C	Celsius
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
cm	centimeter
CO	carbon monoxide
CO_2	carbon dioxide
CT	census tract
D.C.	District of Columbia
DCPSC	District of Columbia Public Service Commission
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
F	Fahrenheit
FAA	Federal Aviation Administration
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
FR	*Federal Register*
ft	feet
ft^2	square feet
FWS	U.S. Fish and Wildlife Service
gal	gallons
ha	hectare
hr	hour
kg	kilogram
km	kilometer
km^2	square kilometer
kV	kilovolt
L	liter
lb	pound(s)
LLC	Limited Liability Company
LOS	level-of-service
m	meter
m^2	square meter
m^3	cubic meter
MBtu	million British thermal units
MES	Model Evaluation Study
mg	milligrams (i.e., thousandths of a gram)
mi	mile
mi^2	square mile
min	minute
MSL	mean sea level
MW	megawatts
MWh	megawatt-hour
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NO_x	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
O_3	ozone
Pb	lead
Pepco	Potomac Electric Power Company
PJM	PJM Interconnection, LLC
Plant	Mirant's Potomac River Generating Station (in Alexandria, Virginia)
PM	particulate matter
$PM_{2.5}$	particulate matter with an aerodynamic diameter less than or equal to 2.5 µm
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to 10 µm
ppb	parts per billion
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
ROD	*Record of Decision*
SEA	special environmental analysis
SIP	state implementation plan
SO_2	sulfur dioxide
TCLP	Toxicity Characteristic Leaching Procedure
U.S.	United States
U.S.C.	United States Code
VDEQ	Virginia Department of Environmental Quality
yd^3	cubic yard
yr	year

EXPONENTIAL NOTATION: Some values in the text and tables of this document are expressed in exponential notation. An exponent is the power to which the expression, or number, is raised. This form of notation is used to conserve space and to focus attention on comparisons of the order of magnitude of the numbers (see examples):

1×10^{4}	=	10,000
1×10^{2}	=	100
1×10^{0}	=	1
1×10^{-2}	=	0.01
1×10^{-3}	=	0.001

Metric Conversions Used in this Document:

Multiply	By	To Obtain
	Length	
inch (in.)	2.54	centimeters (cm)
feet (ft)	0.30	meters (m)
yards (yd)	0.91	meters (m)
miles (mi)	1.61	kilometers (km)
	Area	
acres (ac)	0.40	hectares (ha)
square feet (ft^2)	0.093	square meters (m^2)
square yards (yd^2)	0.84	square meters (m^2)
square miles (mi^2)	2.60	square kilometers (km^2)
	Volume	
gallons (gal)	3.79	liters (L)
cubic feet (ft^3)	0.028	cubic meters (m^3)
cubic yards (yd^3)	0.76	cubic meters (m^3)
	Weight	
ounces (oz)	28.4	grams (gm)
pounds (lb)	0.45	kilograms (kg)
short ton (ton)	0.91	metric ton (t)

1. PURPOSE AND NEED FOR THE DOE ACTION

1.1 Introduction

This special environmental analysis (SEA) focuses on the environmental impacts of operations at the coal-fired Potomac River Generating Station (the "Plant") in Alexandria, Virginia, as a result of a U.S. Department of Energy (DOE or "Department") emergency order (the "DOE Order" or "Order") (Appendix A) issued on December 20, 2005, pursuant to Section 202(c) of the Federal Power Act (FPA)[1]. The Plant is owned by Mirant Corporation and its wholly owned subsidiary, Mirant Potomac River, LLC (collectively referred to herein as Mirant). (See text box.)

On August 24, 2005, Mirant shut down operation of the Plant to respond to concerns about the Plant's impacts on air quality. (See Section 1.3.3.) On August 24, 2005, DOE received an Emergency Petition and Complaint from the District of Columbia (D.C. or District) Public Service Commission (DCPSC 2005). That petition requested DOE to direct Mirant to continue operation of the Plant. The basis for the petition was that shutdown of the Plant reduced the reliability of the electrical supply (Section 1.3.1) to much of the central business district of the District of Columbia, many Federal institutions, the Georgetown area in D.C., other portions of Northwest D.C., and the D.C. Water and Sewer Authority's Blue Plains Wastewater Water Treatment Plant (collectively referred to herein as the "Central D.C. area"), placing these electrical customers at risk of a blackout (DCPSC 2005).

After receiving the petition from the D.C. Public Service Commission, DOE undertook an exhaustive review of the facts. (See Section 1.3.3 for a detailed history.) Based on this

Entities involved in delivering power in the Central D.C. area

Mirant owns and operates electrical power generating plants, including the Potomac River Generating Station in Alexandria, Virginia.

Potomac Electric Power Company (Pepco) owns and operates transmission lines and is responsible for supplying electricity to retail customers in D.C. and parts of Maryland.

PJM Interconnection, LLC (PJM) is the transmission organization responsible for coordinating the regional electric power grid and wholesale electricity market in D.C., Maryland, Virginia, Delaware, New Jersey, West Virginia, and parts of Indiana, Illinois, Kentucky, Michigan, Ohio, Pennsylvania, and Tennessee. PJM keeps the electricity supply and demand in balance by telling power producers how much power to generate.

[1] Section 202(c) of the FPA vests in the Secretary of Energy the authority to issue an order when "an emergency exists by reason of a sudden increase in the demand for electric energy, or a shortage of electric energy or of facilities for the generation or transmission of electric energy, or of the fuel or water for generating facilities, or other causes..." [16 U.S.C. Section 824a(c)]

extensive evaluation, the Secretary of the Energy on December 20, 2005, issued Order 202-05-03 (the "DOE Order") directing Mirant to generate electricity at the coal-fired Plant under certain, limited circumstances.

DOE is issuing this SEA in compliance with the "alternative arrangements" plan agreed upon with the Council on Environmental Quality (CEQ) pursuant to 40 CFR 1506.11. This SEA covers a period of about 24 months beginning with the issuance of the Order. The time period for DOE's original Order ended at 12:01 am on October 1, 2006; on September 28, 2006, the Secretary of Energy extended the Order for two months, until 12:01 am on December 1, 2006. However, this SEA covers the full 24-month period at the end of which the Potomac Electric Power Company (Pepco) (text box) expects to have completed construction of new transmission lines that will provide additional electrical service to customers in the Central D.C. area.

1.2 Purpose and Need for Agency Action

The purpose and need for DOE's action was to respond to the emergency reliability situation that had been brought on by shutdown of operations at the Mirant Potomac River Generating Station.

1.3 Background

1.3.1 Electrical Reliability

The Plant has been operating since 1949. It is one of three sources that provide electricity to Central D.C. area customers. The other sources are two 230,000-volt (230-kV) transmission lines that deliver electricity from other regional generating sources. Two additional generating stations exist in close physical proximity to the Central D.C. area, but they are not connected by transmission lines that allow the electricity they produce to be delivered to that area. Thus, if the Plant is not available to generate electricity and one of the two transmission lines serving the Central D.C. area goes out of service, electricity would be supplied to that area by only the one remaining transmission line. Should the remaining line fail for any reason, a potentially extended blackout would occur in the Central D.C. area. If both lines are down and one of them could not be brought back into service immediately, it would take at least 28 hours to bring the Plant into full operation, during which time much of the Central D.C. area would be without electricity. Transmission line outages can be either planned in order to perform periodic maintenance or unexpected. The duration of an outage can be several days or weeks for maintenance or up to several weeks in the event of a major, unexpected equipment failure.

An important consideration in issuing the Order was the facilities and functions that would be adversely affected by an extended blackout. The Central D.C. area includes facilities of

all three branches of the U.S. government that are critically important to the Nation's national security, law enforcement, and regulatory functions. The Central D.C. area also includes hundreds of thousands of residents and workers and many public safety and protection facilities (e.g., hospitals, police and fire stations). Moreover, within 24 hours of a Central D.C. blackout the Blue Plains Wastewater Treatment Plant would begin to discharge untreated sewage into the Potomac River. Thus, an extended blackout would severely impact critical portions of the Nation's government with potentially adverse national effects. It would also result in hardship and potential physical risk to many people from loss of heat or cooling, elevator outages, medical equipment failure, and other causes.

In 2005 Pepco received permission from the D.C. Public Service Commission to construct two additional 230-kV lines that would supply electricity to the Central D.C. area and two new 69-kV lines that would supply electricity to the Blue Plains Wastewater Treatment Plant. The two 69-kV lines have since been constructed. Once the new 230-kV lines are completed, these lines will provide a high level of electricity reliability in the Central D.C. area, even in the absence of production from the Plant. However, it could be mid- to late-2007 before the new lines are installed and operating. Pepco's schedule for completing installation of the new transmission lines has the lines going into service in June 2007.

1.3.2 Environmental and Health Issues

Residents in the area of the Plant have been concerned about the environmental and health impacts of its air emissions for years (SPROL 2005). However, the D.C. Public Service Commission, Pepco, and PJM Interconnection, LLC (PJM) (text box) have contended that there were no actual monitored exceedances of the National Ambient Air Quality Standards (NAAQS) of the Clean Air Act (CAA) during the Plant's operation in the period before Mirant shut it down on August 24, 2005, and that operation of the Plant at full power at any time during that period did not exceed the emissions limits contained in the Plant's operating permit (DOE Order 202-05-03).

1.3.3 Detailed History

This section describes the actions taken by DOE in relation to the DOE Order and to the Plant. Table 1.3-1, at the end of the section, provides a more complete chronology of the major actions and events related to the DOE Order and the Plant.

Mirant and the Virginia Department of Environmental Quality (VDEQ) entered into an Order by Consent on September 23, 2004. Under that order Mirant performed a dispersion modeling analysis to assess the effect of downwash[2] of air emissions from the Plant and to

[2] The September 23, 2004, judicial consent decree (EPA 2004) defined downwash as "the effect that occurs (continued...)

determine whether the Plant could cause or contribute to significant localized exceedances of the NAAQS (ENSR 2005). This study, known as the downwash study, used computer modeling to predict ambient concentrations of pollutants emitted by the Plant under certain weather and atmospheric conditions.

Mirant submitted the results of the downwash study to the VDEQ in August 2005. After reviewing the study, VDEQ sent Mirant a letter dated August 19, 2005, stating that the modeling results showed that under certain atmospheric conditions the Plant's operations could result in, cause, or substantially contribute to modeled violations of the NAAQS for sulfur dioxide (SO_2), oxides of nitrogen (NO_x), and particulate matter with an aerodynamic diameter less than or equal to 10 µm (PM_{10}).

In its August 19, 2005, letter the VDEQ requested "that Mirant *immediately* undertake such action as is necessary to ensure protection of human health and the environment, in the area surrounding the Potomac River Generating Station, including the potential reduction of levels of operation, or potential shutdown of the facility." (emphasis in original)

In response to the letter from the VDEQ, Mirant chose to shut down all five of the generating units at the Plant on August 24, 2005.

On August 24, 2005, the D.C. Public Service Commission filed an Emergency Petition and Complaint with DOE that requested DOE to issue an emergency order directing Mirant to continue operation of the Plant in order to prevent the risk of a blackout in the Central D.C. area (DCPSC 2005). The Commission also requested that the Federal Energy Regulatory Commission (FERC) issue a similar order under Sections 207 and 309 of the FPA.

Mirant then completed a refined computer modeling study using more realistic scenarios that indicated that the Plant could operate, in a limited fashion, within air quality standards. Thus, on September 21, 2005, Mirant restarted only Unit 1 at the Plant. From that date until the DOE Order was issued, Mirant operated that unit on an 8-8-8 basis – that is, in any given 24-hour period, the unit ran for up to eight hours at its maximum level, ran for eight hours at its minimum level, and did not run for eight hours. Mirant also experimented during this period with using trona (i.e., sodium sesquicarbonate, a naturally occurring substance similar to baking soda) or low-sulfur Colombian coal[3], alone or in combination, to control SO_2 emissions in order to determine if such changes would allow simultaneous operation of more than one unit without causing NAAQS exceedances.

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[2] (...continued)
when aerodynamic turbulence induced by nearby structures causes pollutants from an elevated source (such as a smokestack) to be mixed rapidly towards the ground resulting in higher ground-level concentrations of pollutants."

[3] During its experiments with low-sulfur coal from Colombia, Mirant determined that the higher moisture content in this type of coal created multiple operational problems. For example, the Plant was unable to dry the coal sufficiently for the coal pulverizers to maintain adequate throughput rates, and the moisture resulted in reduced efficiency of both the combustion and the heat transfer processes. For these reasons after its initial test of Colombian coal, Mirant decided not to use it any further.

After receiving the Commission's petition, DOE conducted an independent examination of the electricity reliability situation in the Central D.C. area and analyzed the Plant's role in ensuring a reliable supply of electricity to that area (Kirby and Kueck 2005). DOE also consulted with Federal and state officials responsible for environmental compliance (e.g., EPA shared information with DOE regarding NAAQS modeled results and other environmental issues at the Plant) and private entities responsible for electricity transmission. DOE's investigation found that the Plant must be available to run when one of the 230-kV lines is out of service in order to maintain a minimally reliable electric power system, because outage of the remaining line could result in a blackout of the Central D.C. area. DOE's investigation also found that the Plant should be operated in such a way as to minimize the amount of time needed to bring it into full operation to be better able to meet electric reliability needs quickly whenever one of the two 230-kV transmission lines was unexpectedly removed from service.

After DOE's investigation, on December 20, 2005, the Secretary issued the Order stating:

> I find that in the circumstances presented here, an emergency exists that justifies the issuance of a section 202(c) order. My determination is not based on any single factor, but on the combination of all relevant facts and circumstances. In particular, I find that an emergency exists because of the reasonable possibility an outage will occur that would cause a blackout, the number and importance of facilities and operations in our Nation's Capital that would be potentially affected by such a blackout, the extended number of hours of any blackout that might in fact occur, and the fact that the current situation violates applicable reliability standards.

DOE's Order directed Mirant to generate electricity at the Plant under certain, limited circumstances and to do so in such a way as to minimize adverse environmental impacts. The Order required Mirant to (1) operate the Plant to produce the amount of power (up to its full capabilities) needed to meet demand in the Central D.C. area during any period in which one or both of the 230-kV lines serving the Central D.C. area were out of service and (2) in situations when both lines are functioning, keep as many generating units in operation and take all other measures to reduce the start-up time of units not in operation, without regard to cost and without causing or significantly contributing to any exceedance of the NAAQS, in order to provide electrical reliability to the Central D.C. area. The Order also required Mirant to submit a plan to DOE within ten days indicating how it would comply with the Order. (See Appendix A for the full text of the Order.)

On December 30, 2005, as required by the DOE Order, Mirant submitted a plan describing how it would comply with the Order. The plan outlined a proposed temporary phase and two options for a proposed intermediate phase: Option A and Option B. All proposals included the use of trona and/or low-sulfur coal to manage air emissions. Mirant stated in its compliance plan that "Option A results in no modeled NAAQS exceedances." Mirant also stated

that "Option B offers dramatically better reliability than Option A, but results in a marginal computer-modeled exceedance of the 24-hour NAAQS for [SO_2], although the 3-hour and annual NAAQS for SO_2 are met. Moreover, that exceedance was modeled to occur infrequently in the course of a year and only on the top floor balconies and the roof of the Marina Towers condominium..." After reviewing Mirant's compliance plan, DOE instructed Mirant on January 4, 2006, to "immediately take the necessary steps to implement Option A." Between January and May, the Department continued to weigh other options that were available to Mirant to comply with the DOE Order.

On June 1, 2006, Mirant entered into an Administrative Compliance Order (ACO) with EPA regarding operation of the Plant. (See Appendix B.) On June 2, 2006, DOE concluded that operation of the Plant under Option A did not provide an adequate level of electric reliability to the Central D.C. area and that operation of the Plant pursuant to the ACO was necessary to assure an adequate level of electric reliability to the Central D.C. area. Mirant has since that time operated the Plant in accord with those instructions from DOE. Since June 2, 2006, the operation of the Plant under the Order thus followed the scheme summarized in the following paragraphs. (See Section 4.1 for details.) The ACO will expire one year after it was issued, on June 1, 2007.

During "non-line outage situations" the operation of the Plant must follow the ACO, under which Mirant is to "keep as many units in operation," and "take all other measures to reduce start-up time of units not in operation, for the purpose of providing electricity reliability so long as such operations are in accordance with paragraph B of Part IV of the ACO." Among other things, paragraph B authorizes operation in accordance with "daily predictive modeling." Under daily predictive modeling, the Plant operators acquire the appropriate weather forecast for the next day and use that forecast, along with their planned operating parameters, as inputs to conduct a computer modeling run for the following day's planned operation. If the modeling results indicate that operating the Plant under those conditions would not cause a modeled NAAQS exceedance for 3-hr and 24-hr average SO_2 and PM_{10}, the operators may run the Plant on that day using those parameters. If the modeling results indicate that operation of the Plant would cause an exceedance of these NAAQS, the operators adjust their planned operating parameters until the modeling results indicate compliance with the NAAQS. The operators may then operate the Plant using those parameters. Thus, under this scenario the Plant can operate on any one day up to the maximum level allowed by the preceding day's weather forecast.

The ACO requires Mirant to maintain alarms that alert the Plant operators if monitored average concentrations reach 80% of the standards for SO_2, including the annual SO_2 standard. In addition, the ACO requires Mirant to install and operate six new SO_2 ambient monitoring stations in the vicinity where elevated pollutant concentrations have been predicted and to conduct actual monitoring of ambient SO_2 concentrations.

During "line outage situations," the ACO places environmental requirements on Mirant in addition to the requirements of the DOE Order. It requires Mirant to "take all reasonable steps to limit the emissions of PM_{10}, NO_x and SO_2 from each boiler, including operating only the number of units required to meet PJM's directive and optimizing its use of trona injection to

minimize SO_2 emissions." Further, the ACO requires that Mirant achieve "80% reduction of SO_2 emissions unless: 1) Mirant demonstrates ... that 80% reduction is not necessary to achieve compliance with the NAAQS; or 2) Mirant demonstrates that 80% reduction is not logistically feasible because of such factors as the quantity of available trona and the predicted duration of the outage." If Mirant demonstrates that 80% removal is not logistically feasible, it is required to submit a plan to EPA for optimizing its use of trona.

On September 28, 2006, DOE issued an extension of the Order, including all of its terms and conditions, until 12:01 am on December 1, 2006.

Table 1.3-1. Chronology of major actions and events related to the Plant

Date	Agencies and other companies	Mirant; Potomac River Generating Station
2004		
September 23	Effective date of Order by Consent between VDEQ and Mirant	
2005		
until August 20		Historical operations; ***Pre-shutdown mode for this SEA***
August 19		Mirant submitted emissions modeling study to VDEQ
August 19	VDEQ requested Mirant to immediately undertake actions to protect human health and environment around the Plant	
August 21		Output at Plant reduced to lowest feasible level from all five units
August 24		Operations at the Plant ceased
August 24	D.C. Public Service Commission filed emergency petition and complaint with DOE and FERC	
September 21		Unit 1 (one of the two load-following or cycling units) restarted on an 8-8-8 basis[3]
September 21 - November 11		Unit 1 operated on an 8-8-8 basis

[3] That is, in any given 24-hour period, the unit ran for up to eight hours at power levels up to its maximum level of 88 MW, ran for eight hours at its minimum level of 35 MW, and did not run for eight hours.

Table 1.3-1. Chronology of major actions and events related to the Plant

Date	Agencies and other companies	Mirant; Potomac River Generating Station
November 11 - November 23		Unit 1 operated on an 8-8-8 basis with trona testing
November 24 - December 14		Unit 1 operated on an 8-8-8 basis with Colombian coal testing, but without trona
December 15 - December 20		Unit 1 operated on an 8-8-8 basis with Colombian coal and trona testing; ***Pre-Order mode for this SEA***
December 20	DOE consulted with CEQ	
December 20	The Secretary of Energy issued emergency order requiring Mirant to operate the Plant to assure a reliable supply of electricity to central Washington, D.C.	
December 21- December 23		Plant operated as during December 15 - December 20 period
December 22	DOE consulted with CEQ	
December 24		No data available on Plant operations
December 25 - December 31		Unit 1 operated without using low sulfur coal or trona
December 30		Mirant submitted its compliance plan (also known as the Operating Plan) to DOE identifying two options, A and B
2006		
January 1		No data available on Plant operations
January 2 -3		Unit 1 operated without using low sulfur coal or trona
January 4	DOE instructed Mirant to implement proposed Option A in compliance plan	Plant began to operate under conditions in Option A in compliance plan; Plant continued to operate under Option A until June 2 except during transmission line outages (indicated below).

Table 1.3-1. Chronology of major actions and events related to the Plant

Date	Agencies and other companies	Mirant; Potomac River Generating Station
January 6	PJM specified that it was necessary for Mirant to operate the Plant to meet entire Central D.C. load during transmission line outages Pepco proposed for January 7 - 19 and 22 - 27 for maintenance.	
January 7 - 19		Plant operated to meet entire Central D.C. load during line maintenance.
January 13	DOE consulted with CEQ	
January 17	DOE consulted with CEQ	
January 20	DOE issued *Federal Register* notice describing its emergency action and requesting comments on scope of the SEA.	
January 21		A second trona unit became operational
January 21 - 28		Plant operated to meet entire Central D.C. load during line maintenance.
February 21	End of comment period on *Federal Register* notice	
March 6	Pepco receives permission from the D.C. Public Service Commission to construct two new 230-kV lines into the D.C. area and two new 69-kV lines to serve the Blue Plains Wastewater Treatment Plant	
March 20		Third trona unit became operational
March	U.S. Department of Health's Agency for Toxic Substances and Disease Registry began a review of the existing air quality and other environmental data related to the Plant, as requested by the Director of the Alexandria Health Department.	
May 31		All five trona units operational
June 1	EPA issued an ACO to Mirant	
June 2	DOE instructed Mirant to comply with the ACO with EPA	

Table 1.3-1. Chronology of major actions and events related to the Plant

Date	Agencies and other companies	Mirant; Potomac River Generating Station
June 20		Operation began in accordance with daily predictive modeling
July 15	Pepco places two newly constructed 69-kV lines into service at the Blue Plains Wastewater Treatment Plant	
September 28	The Secretary of Energy extended emergency order for two months	
October 1	DOE Order was scheduled to expire at 12:01 am	
November 27 - December 11	Pepco plans transmission line outage for repairs	Full Plant generation will be required to meet central D.C. predicted load because of Pepco line repairs.
December 1	Extension to DOE Order expires at 12:01 am	
2007		
February 19 - March 5	Pepco plans transmission line outage for upgrades	Full Plant generation will be required to meet Central D.C. predicted load because of Pepco line upgrades.
May 2 - 15	Pepco plans transmission line outage for upgrades	Full Plant generation will be required to meet Central D.C. predicted load because of Pepco line upgrades.
May 21 - June 15	Pepco plans transmission line outage for upgrades	Full Plant generation will be required to meet Central D.C. predicted load because of Pepco line upgrades.
June 1	The ACO expires.	
late June	Pepco plans to have two new 230-kV transmission lines in service	.
Fall		Mirant plans to take units out of service to reconfigure the exhaust stacks.

1.4 National Environmental Policy Act (NEPA) Process

Major Federal actions significantly affecting the human environment generally call for DOE to prepare an environmental impact statement (EIS) before taking the action to analyze

impacts in compliance with NEPA. However, in emergency situations, pursuant to 40 CFR 1506.11, the CEQ's NEPA regulations provide that agencies consult with CEQ to determine what alternative arrangements the agency will take in lieu of preparing an EIS. DOE consulted with CEQ on December 20, 2005, December 22, 2005, January 13, 2006, and January 17, 2006, on a plan for alternative NEPA arrangements. Under this plan (71 FR 3279, January 20, 2006) DOE agreed to:

- Prepare a SEA to examine the potential impacts resulting from issuance of the Order and describe further DOE decision-making regarding reasonable future alternatives;
- Provide opportunities for public involvement;
- Continue to consult with EPA and the VDEQ concerning information on emissions, modeling results, potential mitigation measures, and any changes in the operation of the Plant; and
- Identify in the SEA steps that could be taken to mitigate any impacts from the DOE Order.

Consistent with the consultations with CEQ, DOE has prepared this SEA.

1.5 Public Involvement

As described above, on January 20, 2006, DOE published a *Federal Register* notice (71 FR 3279) (Appendix C) in which DOE described the action it had taken under the Order and reported its discussions with CEQ and its agreement to issue an SEA as part of its alternative arrangements for NEPA compliance.

DOE also used that *Federal Register* notice to request public comments on the information in the notice, as well as on issues to be addressed in the SEA. The comment period closed on February 21, 2006. DOE received comments from the following organizations: the Mount Vernon group and the Virginia Chapter of the Sierra Club; the Southern Environmental Law Center on behalf of itself and the American Lung Association of Virginia ; the City of Alexandria; and the Institute for Public Representation on behalf of the Potomac Riverkeeper, Inc., the Patuxent Riverkeeper, and the Anacostia Riverkeeper at Earth Conservation Corps. These comments are posted on the DOE website described below. Commentors identified many of the same issues that DOE had determined should be covered in the SEA. Section 1.6 describes where these issues are addressed in this document.

DOE maintains a website containing information (under DOE Docket EO-05-01) about the D.C. Public Service Commission Petition, its proceedings, and the DOE Order itself: http://www.oe.energy.gov/permitting/372.htm. This website also provides links to correspondence related to the petition and the Order, as well as the *Federal Register* notice and the comments received on that notice.

1.6 Scope of the Analysis

Based on its own evaluation of potential impacts and the concerns expressed by commentors, DOE has analyzed the below effects of Plant operations under the Order in the indicated sections of this SEA. Cumulative effects are discussed as appropriate in each section as described at the beginning of Section 4.3.

- Effects of any increased *air emissions* (Section 4.3.1);
- *Health* effects on Plant workers and the public of any increased air pollution; commentors on the DOE *Federal Register* notice expressed particular concern about impacts of increased particulate emissions, especially particulate matter smaller than 2.5 microns ($PM_{2.5}$), and of increased emissions of trace metals and hazardous air pollutants (especially arsenic, beryllium, lead, chromium, cadmium, nickel, and mercury) (Section 4.3.2);
- *Water quality* (Section 4.3.3) and *ecological* (Section 4.3.4) effects due to changes in Plant water use and releases or any increased deposition of air pollutants on soil and terrestrial communities, water bodies, and watersheds; commentors on the DOE *Federal Register* notice expressed concern about the potential for any increased emissions of SO_2 and NO_x to contribute to acid rain, nutrient loading to aquatic systems, and deposition of heavy metals, and the subsequent impacts on the aquatic resources of the Chesapeake Bay and several of its tributaries, specifically the Potomac, Anacostia, and Patuxent rivers;
- *Waste management* impacts (Section 4.3.5), particularly impacts of trona utilization, which commentors on the DOE *Federal Register* notice identified as a concern;
- *Transportation impacts* from increased shipping of coal and trona to the Plant and of wastes away from the Plant (Section 4.3.6); and
- *Environmental justice* impacts (Section 4.3.7).

This SEA also describes alternatives for potential future decision-making that include mitigation measures should the Order be further extended. Among these are several measures suggested by commentors on DOE's *Federal Register* notice on the proposal to prepare this SEA and parties commenting on the Order itself.

Because of the limited nature of the action, certain types of impacts that are usually analyzed in NEPA documents are not addressed.

- Because there would be no construction outside the footprint of the existing facility, no impacts to *land use, soil structure, floodplains,* or *aesthetics* are expected.
- Because only very small amounts of construction and employment are associated with the changed operations at the Plant, no appreciable effects on *social* or *economic resources* are anticipated.

A commentor expressed concern about possible adverse effects of trona utilization on Plant equipment. This concern is not addressed because it is not considered to be an environmental impact.

2. DESCRIPTION OF THE MIRANT POTOMAC RIVER GENERATING STATION

The Plant, which has been operating since 1949, was acquired by Mirant Potomac, Inc in 2000. It is located in Alexandria, Virginia, on the western bank of the Potomac River near the District of Columbia, about 5 miles (8 km) south-southwest of the U.S. Capitol building. (See Figure 2-1.) It is almost directly across the river from the Blue Plains Wastewater Treatment Plant and near Ronald Reagan Washington National Airport. Two National Park Service sites, the George Washington Memorial Parkway, developed both as a memorial to George Washington and to preserve the natural scenery along the Potomac River (NPS undated), and the Mount Vernon Trail (Figure 3.4-1), run past the Mirant Plant.

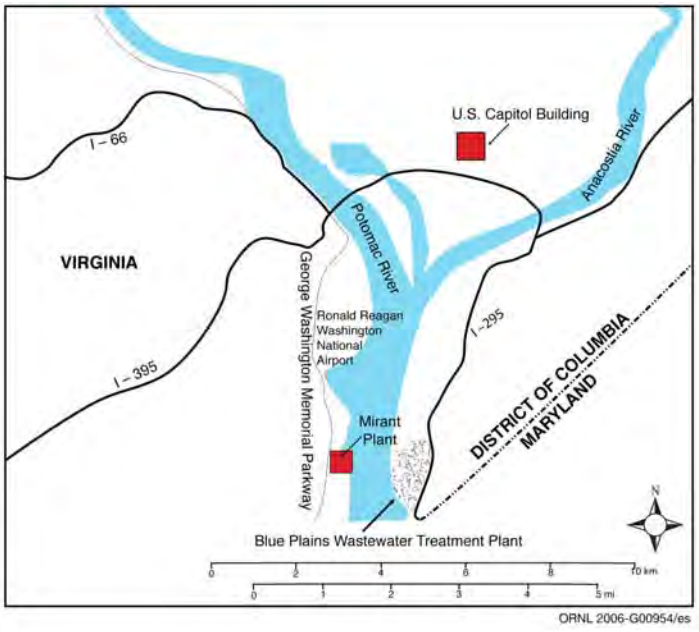


Figure 2-1. The location of the Plant in relation to the central Washington, D.C. area.

The site occupies approximately 28 acres (11 ha) and was relatively remote when the power plant was built. Alexandria has, however, grown up around it, and residential areas are now located immediately adjacent to the Plant. (See Figure 2-2.)

2.1 Site Layout

The footprint of the Mirant Plant is typical for a coal-fired electricity generation facility (see Figure 2.1-1), consisting of a large coal pile and a set of five steam generating boilers. The Plant has five stacks, each 161 ft (49 m) high (Mirant 2006a).

2.2 Plant Equipment and General Operation

The Plant consists of five steam boilers and associated generators with a net generating capacity of 482 megawatts (MW) of electricity for delivery to Central D.C. area customers. Units 1 and 2 are designed to be capable of load-following or cycling; that is, they are capable of changing power levels quickly as demand rises or falls. These units each have a generating capacity of 88 MW (with an operating range of 35 MW to 88 MW). Units 3, 4, and 5 are

designed for baseload operation; that is, they are intended to generate power at a steady rate for extended periods, typically 24 hours per day, and have historically been used more than Units 1 and 2 (Mirant 2006a). Units 3, 4, and 5 each have a generating capacity of 102 MW (with an operating range of 35 MW to 102 MW).

The facility uses oil to pre-heat units during startup and then burns coal. The Plant receives coal by rail car delivered by the CSX Railroad. (See Figure 2.1-1.) The rail cars are unloaded at a dedicated rail siding at the Plant. Typical plant operations involve unloading the rail cars and feeding some coal directly into the boiler building; additional coal is stored on-site in an outdoor coal pile with a capacity of 135,000 tons (122,000 metric tons). The coal storage yard occupies 4 acres (2 ha) and has an average coal-pile height of about 30 ft (9 m). Diesel-fueled bulldozers move the coal around the footprint of the coal pile, and a conveyor system transfers coal from the coal pile into the boiler building. The coal is pulverized in the boiler building and sized for injection into the five boilers. Steam is then piped from the boilers into the turbine building where the generators produce electricity.

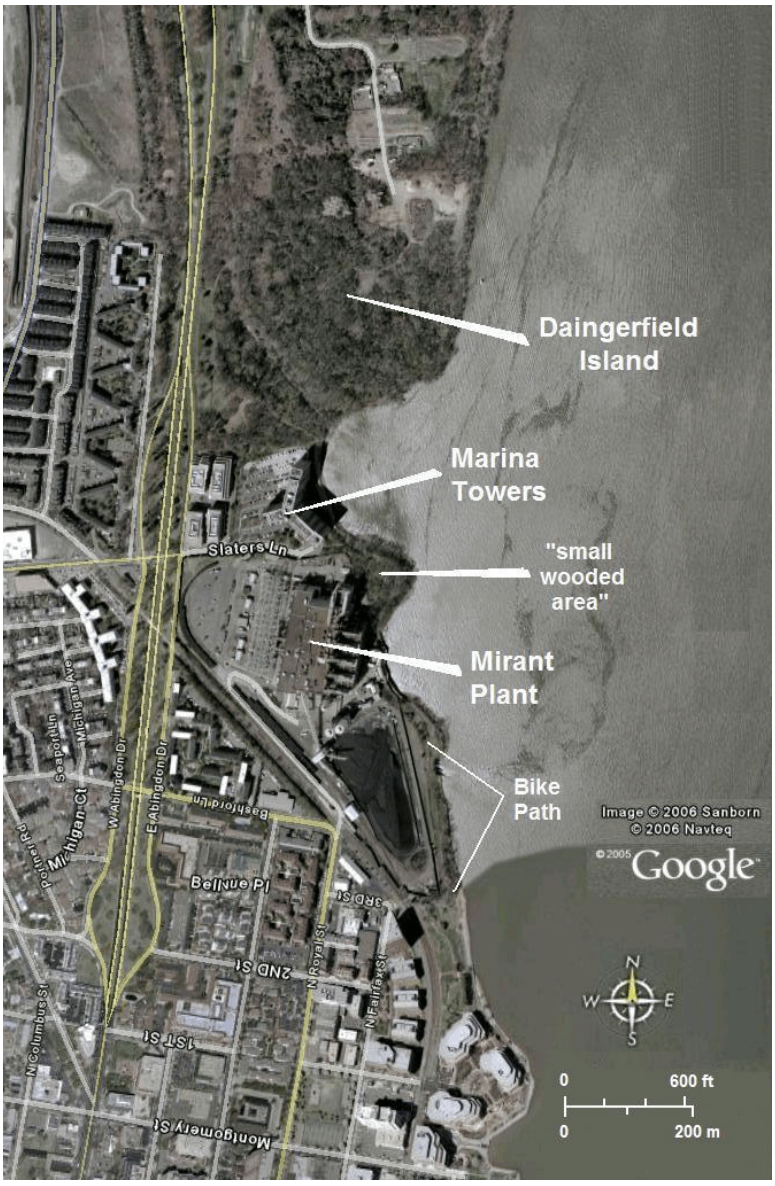


Figure 2-2. Aerial photo showing the Plant and surrounding residences.

Flue gases from each of the five boiler units exhaust to the atmosphere through separate, dedicated stacks. (See Figure 2.1-1.) Pollution abatement equipment at the Plant consists of hot- and cold-side electrostatic precipitators for each boiler unit. These precipitators remove solid particulate matter, called fly ash, from the exhaust gas streams. The fly ash collected by the precipitators is stored in a pair of on-site silos prior to being shipped by covered truck for off-site

disposal. Bottom ash from the boilers is collected and stored in a silo prior to being shipped off-site for beneficial use. (See Section 2.4.3)

The Plant also has trona injection units for each of the five boiler units. Each trona injection unit consists of 8 or 10 injection nozzles in the outlet duct from the boiler economizer to the hot-side precipitator inlet. Each injection unit is capable of injecting trona at a rate of up to 12,000 lb/hour (5,500 kg/hour), which Mirant's study determined to be sufficient to remove 80% of SO_2 from flue gas (Mirant 2006c). At maximum capacity the trona injection units on all five boilers can utilize a total of 25 tons (23 metric tons) of trona per hour to remove about 80% of SO_2 from flue gases. Trona is delivered to the site in 100-ton (91-metric ton) railcars shipped directly from the mine in Green River, Wyoming. Trona is fluidized and transferred pneumatically from the railcars to a 35-ton-capacity (32-metric ton-capacity) trona feed trailer adjacent to each boiler. Trona is transferred pneumatically to the boiler unit outlet duct where it is injected.

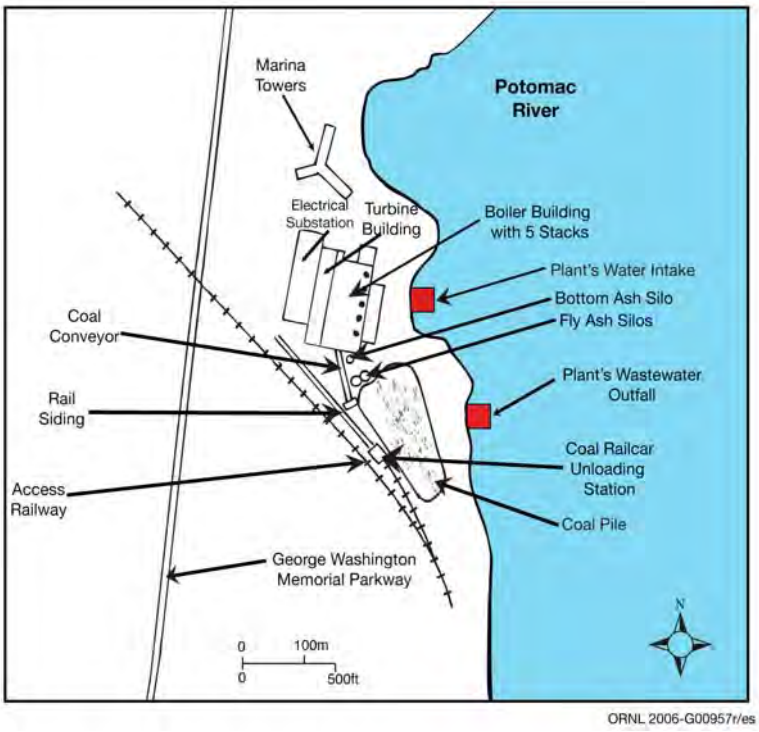


Figure 2.1-1. The site layout of Mirant's Potomac River Generating Station.

The Plant has a once-through cooling water system. Raw water is pumped from the Potomac River through a 1,250-ft^2 (116-m^2) rectangular intake area located on the river bottom along the shoreline, about 10 ft (3 m) below the water surface (Personal communications between D. Cramer, Mirant Corporation, and E.D. Smith, Oak Ridge National Laboratory, July 12, 2006, and between A. Wearmouth, Mirant Corporation, and E.D. Smith, Oak Ridge National Laboratory, July 21, 2006). The intake area is made up of 10 intake bays (two for each of the boiler units), each of which is 13.5 ft (4.1 m) long by 9 ft (3 m) wide and equipped with a 30,000-gal/min (about 100 m^3/min) pump (Personal communication between A. Wearmouth, Mirant Corporation, and E.D. Smith, Oak Ridge National Laboratory, July 21, 2006). Mirant installed new fine-mesh screens on the intakes in July and August 2005. One screen on an intake for Unit 1 is fitted with "fish buckets" for enhanced fish protection. All screens, with or without the enhanced system of fish recovery, facilitate the return of fish to the river south of the power plant intake. After removing debris and suspended solids, the Plant uses this water to cool condensers and auxiliary equipment associated with steam turbines (Mirant 2006b). Major water

treatment equipment includes a clarifier, settling pond, neutralization system, and an oil/water separator.

2.3 Resource Requirements

The Plant primarily uses three resources: coal, trona, and water. Each of these is discussed separately in this section.

In the period prior to August 24, 2005, the Plant typically used an average of about 2,280 tons (2,050 metric tons) of coal per day. Operation at full capacity could require up to 5,150 tons (4,670 metric tons) of coal daily. The Plant normally used central Appalachian coal with a heating value of about 12,000 Btu/lb, an ash content of about 14%, a sulfur content of 0.64% by weight, and a carbon content about 67% by weight.

Analyses of coal burned in 2003 indicates that the average mercury content was between 0.03 and 0.07 ppm (dry). DOE conservatively assumes that the coal consumed by Mirant contains 0.07 ppm mercury on average, or about 1.4 lb (0.6 kg) mercury per 1,000 tons (910 metric tons) of coal.

The coal data that Mirant provided to DOE did not include concentrations of toxic metals other than mercury. Table 2.3-1 presents some published data on concentrations of seven trace metals in other central Appalachian coals. These analyses provide an approximate indication of levels that may be present in the central Appalachian coal burned by the Plant.

Table 2.3-1. Ranges of values for trace metal concentrations in as-mined samples of Appalachian coals

Trace metal	Reported concentrations (mg/kg)
Arsenic	7 – 23
Cadmium	ND – 0.2
Lead	15 – 24
Selenium	ND – 2.9
Beryllium	1 – 2
Chromium	30 – 63
Nickel	18 – 34

ND = below quantitation limit
Source: Palmer et al. 1997.

Trona consumption is determined by the target for SO_2 removal. Theoretical calculations show that if trona reacted completely with SO_2 in the hot-side precipitator inlet gas, 2.354 parts by weight of trona would be required to react with each part by weight of SO_2 (e.g., 2.345 lb trona per lb of SO_2). However, testing by Mirant found that much larger quantities of trona must be used in order to achieve desired SO_2 removal rates. Addition of trona to the exhaust gas stream at five times the theoretically calculated rate was found to remove 80% of the SO_2 (Mirant 2006c). For typical coal burned at the Plant, removal of 80% of SO_2 would require 0.15 lb of trona per lb of coal burned (1 lb trona per 6.7 lb coal). Because Mirant does not operate the Plant to achieve 80% SO_2 removal most of the time, average trona consumption is about 1 lb for every 8.5 lb of coal consumed (Personal communication between D. Cramer, Mirant Corporation, and L.N. McCold, Oak Ridge National Laboratory, July 7, 2006).

Water withdrawals from the Potomac River for cooling water and other in-plant uses are estimated to be about 1% higher than discharges (Personal communication between A. Wearmouth and D. Cramer, Mirant Corporation, and E.D. Smith, Oak Ridge National Laboratory, July 14, 2006). Therefore, based on discharges (Section 2.4.2), withdrawals are estimated to have averaged somewhat less than 350 million gal/day (1.3 million m^3/day) under pre-shutdown operating conditions (prior to August 24, 2005).

2.4 Waste and Effluents

2.4.1 Air Emissions

The VDEQ approved a Stationary Source Permit to Operate on September 18, 2000, and a Phase II Acid Rain Permit on February 28, 2003. The Stationary Source Permit limits NO_x (as NO_2) emissions to 0.38 lb/MBtu. The EPA judicial consent decree, as amended (EPA 2004, 2006g), requires Mirant to limit Plant total NO_x emissions during the May 1 to September 30 period each year to 1,600 tons (1,500 metric tons) through 2009, among other things. The Acid Rain Permit allocates annual allowances for air emissions of SO_2 during its effective period of January 1, 2003, through December 31, 2007. SO_2 allowances for individual generating units range from 2308 to 3036 tons/year and total 13,344 tons/year for all units combined; in addition, the permit authorizes Mirant to acquire SO_2 allowances from other sources. The Acid Rain permit also limits emissions of NO_x, but the limitation on NO_x is less restrictive than the limit in the Stationary Source Permit.

The coal burned at the Plant averages about 67% by weight carbon. On a day when the Plant consumed 2,280 tons (2,050 metric tons) of coal, as it typically did in the period prior to August 24, 2005, it released about 11 million lb (5,600 tons) of CO_2.

2.4.2 Water Effluents

Plant effluents, including cooling water, boiler blowdown, runoff from the coal pile and fly ash handling areas, and other storm water runoff, are discharged to the Potomac River under National Pollutant Discharge Elimination System (NPDES) permit DC0022004. This permit was last issued for a 5-year duration in 2000 and expired in 2005. Mirant applied for renewal in 2004 (Wearmouth 2004), and the existing permit remains in force while EPA considers the application for renewal (Capacasa 2005). According to the renewal application (Wearmouth 2004), under historical operating conditions discharge under this permit averaged almost 345 million gal/day (1.3 million m^3/day), of which all but about 0.4 million gal/day (1,500 m^3/day) was once-through cooling water.

Boiler blowdown and effluent from treatment (i.e., demineralization) of intake water are treated by sedimentation and neutralization. Before being mixed with other wastewaters, they are monitored (in accordance with permit requirements) for flow rate, pH, total suspended solids, and oil and grease to verify that concentration limits in the permit are met. Ash clarifier system wastewater and runoff from the coal pile and fly ash handling areas are treated by rapid mixing, flocculation, and precipitation. They are monitored for the same set of parameters prior to mixing with other wastewaters. Once-through cooling water and storm water runoff from uncontaminated areas are blended with the treated effluents and discharged without additional treatment. No chlorine or other chemicals are added to the cooling water or used in the Plant's other water processes.

The NPDES permit requires monitoring of flow rate and other parameters at several internal monitoring points and at outfalls. Mirant submits monthly reports with the monitoring data to EPA and the Washington, D.C. Department of Health (Mirant 2006b). The Plant's primary wastewater outfall is subject to permit limits on pH, total residual chlorine, thermal output, and temperature rise in the river. Heat discharge in cooling water is limited to 4,286 MBtu/hr. Temperature rise in the river is limited to 2.8°C above ambient temperature and a maximum temperature of 32.2°C beyond a 1,000-ft (300-m) radius of the discharge point when the ambient river temperature is less than 27.8°C and beyond a 1,600-ft (490-m) radius when the river temperature is warmer than 27.8°C. Mirant conducted temperature surveys in the river in 2001 that confirmed that heat discharge from the Plant does not cause exceedance of these temperature limits, so temperature monitoring in the river is not required (Mirant 2002, NPDES permit document, and personal communication between A. Wearmouth, Mirant Corporation, and E.D. Smith, Oak Ridge National Laboratory, July 14, 2006).

Table 2.4-1 lists reported concentrations of selected contaminants in the Plant's cooling water intake and in effluent from the outfall that receives cooling water and treated wastewaters from demineralization, boiler blowdown, coal pile runoff, and fly ash handling. The table includes data for many parameters that are not listed in the Plant's NPDES permit. The near-neutral effluent has higher levels of biochemical oxygen demand, suspended solids, nitrate and nitrite, sulfate, aluminum, iron, manganese, copper, and fecal coliform bacteria than the intake

water, while loadings of chemical oxygen demand, total organic carbon, residual chlorine, phosphorus, and phenols are decreased in the effluent compared with the intake water.

Table 2.4-1. Water quality of Plant intake water and cooling water effluent

Contaminant	Intake Concentration (mg/L)	Effluent Concentration (mg/L, except as indicated)
Biochemical oxygen demand	9.6	14
Chemical oxygen demand	22	21
Total organic carbon	4.7	4.3
Total suspended solids	24	39
Fecal coliform bacteria	27	110
pH (pH units)	—	7.6
Chlorine, total residual	0.15	0.05
Fluoride	0.20	0.12
Nitrate-Nitrite as N	1.1	1.2
Nitrogen, total organic	ND	ND
Phosphorus	0.076	0.060
Sulfate	33	37
Aluminum	0.75	1.4
Iron	0.86	1.5
Manganese	0.11	0.13
Copper	ND	0.013
Zinc	0.023	0.023
Phenols, total	0.015	0.014

ND = Not detected
— = Not reported
Source: Wearmouth 2004; These values are from a single set of measurements and may not be representative.

2.4.3 Solid Wastes

The Plant's principal solid wastes are fly ash collected from exhaust gases and bottom ash from the boilers. (See Section 2.2.) Under pre-shutdown operating conditions prior to August 24, 2005, reported fly ash generation totaled about 14,200 tons/month (12,900 metric tons/month), equivalent to about 20% of coal consumption. Bottom ash generation equals about 25% of the fly ash generation (Personal communications between D. Cramer, Mirant Corporation, and L.N. McCold, Oak Ridge National Laboratory, July 7, 2006; and between D.

Cramer, Mirant Corporation, and E.D. Smith, Oak Ridge National Laboratory, July 12, 2006, and July 14, 2006).

Fly ash is sent by covered truck to the Brandywine Fly Ash Facility, a landfill located in southeastern Prince George's County, Maryland (Figure 2.4-1), that is owned and operated by Mirant Ash Management LLC and used solely for disposal of coal combustion ash. (See Section 3.5.) Plant fly ash is marketed for beneficial use, primarily for structural fill, but historically its utilization has been very limited (Personal communication between D. Cramer, Mirant Corporation, and L.N. McCold, Oak Ridge National Laboratory, July 7, 2006). The fly ash generated by the Plant under historical operating conditions is a pozzolanic material (that is, when mixed with water it "sets," like cement), but its unburned carbon content is too high to permit its use as a cement substitute (TFHRC undated). Bottom ash from the Plant is used or sold for purposes such as road fill.

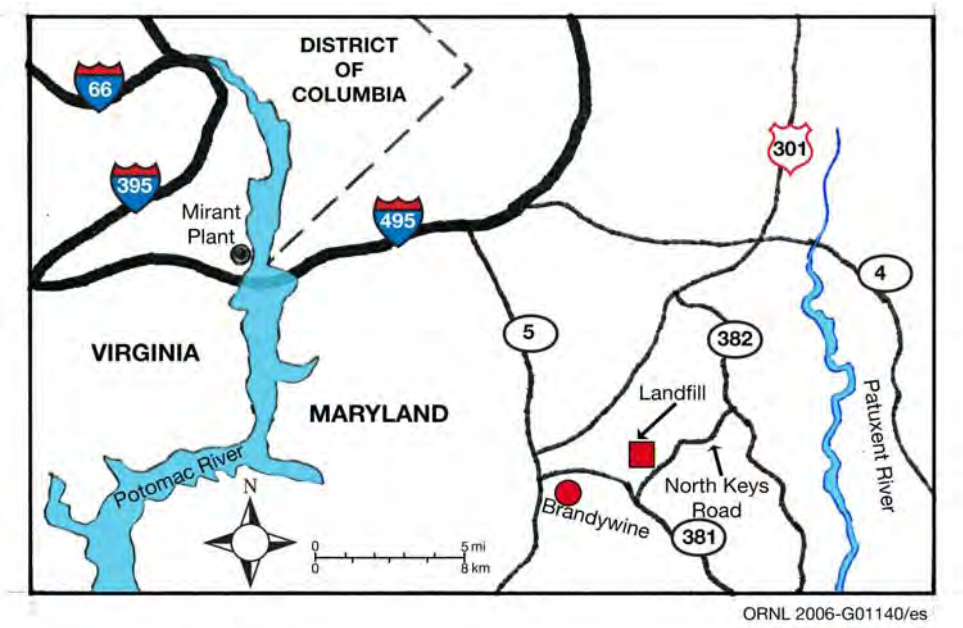


Figure 2.4-1. The location of and access routes to the Brandywine Fly Ash Facility used for disposal of solid wastes from the Plant.
Note: Mataponi Creek (not shown on the map) originates near Brandywine and flows east-northeast to the Patuxent River.

2.5 Changes to the Plant Since the DOE Order

Mirant has made several changes inside the existing Plant buildings since the DOE Order. The most important of these is the addition of trona injection units to all five boilers. Mirant has also made provision to withdraw trona from rail cars and transfer it to storage

containers inside the building. Several measures to control fugitive dust (for example, improved ash-loading systems for the two fly ash silos) were implemented during 2005 and 2006 in response to a 2004 EPA judicial consent decree (EPA 2004)that required Mirant to take actions to reduce fugitive particulate emissions. None of these changes included new construction or other disturbances at the Plant site.

Mirant is planning to merge the boiler exhaust gases from Units 1 and 2 and run the combined exhaust through the stack of Unit 1. Similarly Mirant is planning to merge the boiler exhaust gases from Units 3, 4, and 5 and run them through the stack of Unit 4. Mirant's modeling shows that combining the gas flows from the two units into one stack and from the three other units into another stack produces higher exit velocities and increases plume rise for all emissions into the atmosphere and, thus, lessens the potential for downwash impacts (Personal communication between D. Cramer, Mirant Corporation, and L.N. McCold, Oak Ridge National Laboratory, July 7, 2006).

Merging unit exhaust gases requires new common ductwork to be installed connecting the individual unit exhaust fan discharges, and installation of new higher capacity fans. This common ductwork will be connected to the existing stack at the existing location at the base of the stack. This common ductwork will be installed inside the existing plant structure and will not be visible from the ground since it will be located in-between the existing precipitator and stacks. There will be no foundations required for this ductwork.

Mirant plans to implement the exhaust system changes during the fall of 2007 (Personal communication between Richard Killian, EPA Region 3, and L.N. McCold, Oak Ridge National Laboratory, October 16, 2006). Each Plant generating unit is expected to have an outage of 7 to 9 weeks in order to remove the existing equipment and install the new equipment.

3. AFFECTED ENVIRONMENT

This section describes the resources and environmental conditions that could be affected by the DOE action. The areal extent of this "affected environment" is not the same for all potentially affected resource areas. Also, because the purpose of this descriptive information is to lay the foundation for evaluating potential environmental impacts of the action, not all resources and geographic areas are described at the same level of detail.

For air quality the extent of the affected environment is very large because air emissions from the Plant are transported within a large region. However, because the potential effects of greatest interest, including the potential for exceedances of ambient air quality standards, are concentrated in a local area very near the Plant, the description and assessment in this document focus primarily on a 36-mi^2 (93-km^2) area within about 3 mi (5 km) of the Plant. Similarly, the area of primary interest for human health and environmental justice is this same 36-mi^2 (93-km^2) area.

For water resources and ecosystems the affected environment consists primarily of the resources directly affected by Plant operations, including the Potomac River, the Plant site, and neighboring lands. However, because atmospheric deposition of contaminants emitted from the Plant to the air contributes to cumulative impacts to water quality and ecosystems in a larger region, the Anacostia River, Patuxent River, Chesapeake Bay, and other land and water areas (including Potomac River tributaries and their watersheds) within about 20 miles (32 km) of the Plant are treated as part of the affected environment for water resources and ecosystems.

For waste management and transportation the affected environment includes the Plant site; the landfill used for disposal of Plant fly ash; the local roads and rail facilities used for access to the Plant and landfill; and resources in the immediate vicinity of these facilities that may be affected by their air, water, or noise emissions.

3.1 Climate and Air Quality

3.1.1 Climate

The Plant is in Alexandria, Virginia, which lies at the western edge of the mid-Atlantic Coastal Plain, about 50 mi (80 km) east of the Blue Ridge Mountains and 35 mi (56 km) west of the Chesapeake Bay, adjacent to the Potomac River. Elevations range from a few feet (about a meter) above sea level to about 400 ft (122 m).

Weather observations in the vicinity have been kept continuously since November 1870. Since June 1941, the official observations have been taken at Ronald Reagan Washington National Airport (National Airport), just north of the Plant.

National Airport is located at the center of a large urban complex. As a result, low temperatures there are higher than those in surrounding areas. In winter low temperatures at the airport are often 10-15°F (6-8°C) higher than in suburban locations. There is less difference between airport and suburban high temperatures. The normal summertime high temperatures range from 85-90°F (30-32°C), and the average winter lows range from 26-32°F (-3 to 0°C). Normal precipitation is distributed rather uniformly throughout the year, ranging, approximately, from 2.7 to 3.9 inches (6.9 to 9.9 cm) per month.

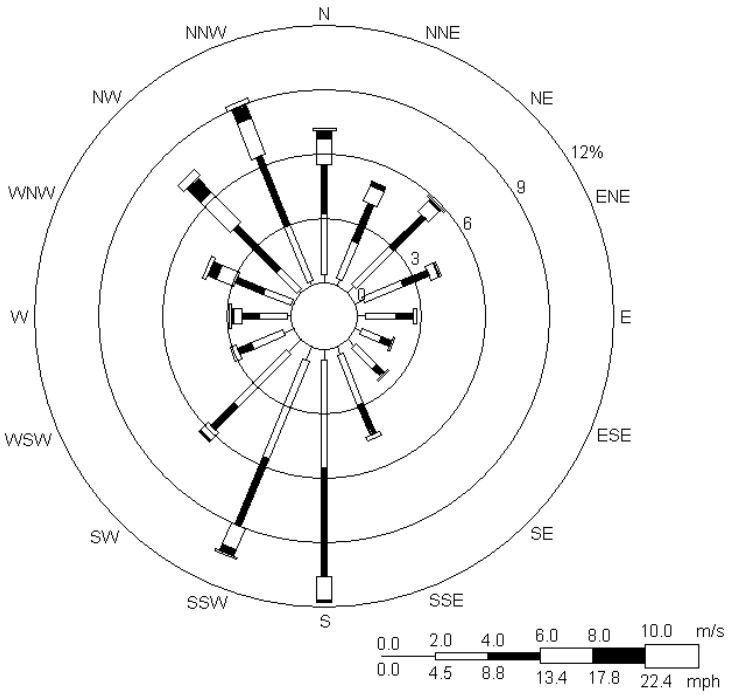


Figure 3.1-1. Wind rose for Ronald Reagan Washington National Airport, 2000-2004 weather data

Thunderstorms can occur at any time but are most frequent during the late spring and summer. The storms are often accompanied by downpours and gusty winds, but are not usually severe. Tornadoes, which occur infrequently, have resulted in significant damage. Severe hailstorms have occurred in the spring. Tropical storms can bring heavy rain, high winds, and flooding, but extensive damage from wind and tidal flooding is rare. Wind gusts of nearly 100 mi (160 km) per hour and rainfall over 7 inches (18 cm) have occurred during the passage of tropical storms.

Normal snowfall during the winter season is 15 inches (38 cm). The average date of the last freezing temperature in the spring is April 1, and the average date for the first freezing temperature in the fall is November 10.

Winds are most often from the south or south-southwest and from the north-northwest (Figure 3.1-1).

3.1.2 Air Quality

Criteria pollutants are defined as those for which National Ambient Air Quality Standards (NAAQS) exist (Table 3.1-1). These pollutants are carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter less than or equal to 10 µm in aerodynamic diameter (designated PM_{10}), particulate matter less than or equal to 2.5 µm in aerodynamic diameter (designated $PM_{2.5}$), and sulfur dioxide (SO_2).

Table 3.1-1. National Ambient Air Quality Standards for criteria pollutants

Pollutant	Averaging period	Concentration
CO	8-hour [a]	9 ppm (10 mg/m^3)
	1-hour [a]	35 ppm (40 mg/m^3)
Lead	Maximum quarterly average	1.5 µg/m^3
NO_2	Annual arithmetic mean	0.053 ppm (100 µg/m^3)
O_3	4th highest 8-hour daily maximum [b]	0.08 ppm (157 µg/m^3)
PM_{10}	Annual arithmetic mean [c]	50 µg/m^3
	24-hour [c]	150 µg/m^3
$PM_{2.5}$	Annual arithmetic mean [d]	15 µg/m^3
	98th percentile 24-hour [d]	65 µg/m^3
SO_2	Annual arithmetic mean	80 µg/m^3 (0.03 ppm)
	24-hour [a]	365 µg/m^3 (0.14 ppm)
	3-hour [a]	1,300 µg/m^3 (0.50 ppm)

[a] Not to be exceeded more than once per year.

[b] The 8-hour standard is met when the 3-year average of the annual 4th highest daily maximum 8-hour O_3 concentration is less than or equal to 0.08 ppm.

[c] The annual PM_{10} standard is attained when the expected annual arithmetic mean concentration is less than or equal to 50 µ/m^3 (3-year average); the 24-hour standard is attained when the expected number of days above 150 µ/m^3 is less than or equal to 1 per year. EPA's October 17, 2006, rule making on NAAQS for particulate matter (EPA 2006j) revoked the annual PM_{10} standard, effective December 18, 2006.

[d] The annual $PM_{2.5}$ standard is met when the annual average of the quarterly mean $PM_{2.5}$ concentrations is less than or equal to 15 µg/m^3, when averaged over 3 years. If spatial averaging is used, the annual averages from all monitors within the area may be averaged in the calculation of the 3-year mean. The 24-hour standard is met when the 98th percentile value, averaged over 3 years, is less than or equal to 65 µg/m^3. Under new standards published on October 17, 2006, and effective December 18, 2006 (EPA 2006j), the 24-hour standard will be 35 µg/m^3. The state of Virginia has until April 2008 to develop and submit to EPA for approval SIP provisions to implement, maintain, and enforce the new NAAQS for $PM_{2.5}$.

[e] Same as primary standard.

Source: 40 CFR Part 50.

The NAAQS are expressed as concentrations of pollutants in the ambient air; that is, in the outdoor air to which the general public has access [40 CFR 50.1(e)]. Primary NAAQS define levels of air quality that EPA deems necessary, with an adequate margin of safety, to protect human health. Secondary NAAQS are similarly designated to protect human welfare by safeguarding environmental resources (e.g., soils, water, plants, animals) and manufactured materials. States may modify NAAQS to make them more stringent or set standards for additional pollutants. Virginia has adopted the NAAQS as the state standards without modifications.

Attainment status for NAAQS is determined primarily by evaluating data from ambient air quality monitoring stations. The monitoring station nearest to the Plant (AIRS 51-510-0009) is located at the Alexandria Health Department, 517 North Saint Asaph Street, 0.6 mile (0.9 km) south. The station monitors CO, SO_2, NO_2, and O_3. The nearest $PM_{2.5}$ monitoring station (AIRS 51-013-0020) is located at Aurora Hills Visitors Center, 18th and Hays Streets, Arlington County, due west of Ronald Reagan Washington National Airport and 2.7 miles (4.4 km) north-northwest of the Plant. The nearest PM_{10} monitoring station (AIRS 51-059-0018) is located at Mount Vernon Fire Station, 2675 Sherwood Hall Lane, Mount Vernon, 5.7 miles (9.2 km)

south-southwest of the Plant. Because no lead monitoring stations are employed in Virginia, this section does not discuss lead.

Table 3.1-2 summarizes recent air quality data in the vicinity of the Mirant Plant.[4] The city of Alexandria and surrounding Arlington, Fairfax, Loudoun, and Prince William Counties are designated as NAAQS nonattainment areas for $PM_{2.5}$ and the 8-hour O_3 standard (VDEQ 2006a, 2006b).

Table 3.1-2. Ambient air quality in the vicinity of the Plant, 2004

Pollutant	Regulated parameter	Monitored concentration [a]	NAAQS limit
CO [b]	Second highest hour	2.9 ppm	35 ppm (40 mg/m^3)
	Second highest 8-hour average	2.0 ppm	9 ppm (10 mg/m^3)
NO_2 [b]	Annual average	0.024 ppm	0.053 ppm (100 µg/m^3)
O_3 [b]	4th highest 8-hour average	0.080 ppm	0.080 ppm (235 µg/m^3)
PM_{10} [c]	Annual arithmetic average	21 µg/m^3	50 µg/m^3
	Second highest 24-hour average [e]	44 µg/m^3	150 µg/m^3
$PM_{2.5}$ [d]	Annual average	14.4 µg/m^3	15 µg/m^3
	98th percentile 24-hour average	35.7 µg/m^3	65 µg/m^3
SO_2 [b]	Annual average	0.006 ppm	0.03 ppm (80 µg/m^3)
	2nd highest 24-hour average	0.021 ppm	0.14 ppm (365 µg/m^3)
	2nd highest 3-hour average	0.054 ppm	0.50 ppm (1,300 µg/m^3)

[a] *Source:* VDEQ 2005a (Just before publication of this document, Virginia released ambient air monitoring data for 2005 [VDEQ 2006c]. The updated background levels vary only slightly from the 2004 values reported and used here.)
[b] Measured at Alexandria Health Department (AIRS 51-510-0009).
[c] Measured at Mt. Vernon Fire Station (AIRS 51-059-0018).
[d] Measured at Aurora Hills Visitors Center (AIRS 51-013-0020).
[e] EPA's October 17, 2006, rule making on NAAQS for particulate matter (EPA 2006j) revoked the annual PM_{10} standard, effective December 18, 2006.

Contaminants other than the criteria pollutants are present in the atmosphere in varying amounts that depend on the magnitude and characteristics of the sources, the distance from each source, and the residence time of each pollutant in the atmosphere. In the ambient air many of these pollutants are present in extremely small concentrations, requiring expensive state-of the art equipment for detection and measurement. Hazardous air pollutants are regulated at emission sources based on the National Emissions Standards for Hazardous Air Pollutants (40 CFR Parts 61 and 63); measurements of existing ambient air concentrations for many such pollutants are, at best, sporadic.

[4] While additional air quality monitoring stations are located in Maryland and the District of Columbia, the monitoring station for each pollutant nearest the Plant is found in Virginia. (See Metropolitan Washington Council of Governments 2005 and VDEQ 2005a.)

3.2 Human Health

There is a well established association between exposure to outdoor air pollution and a broad variety of health effects, both acute and chronic. These health effects range from simple irritation such as burning eyes to premature death. The principal air pollutants generated by fossil fuel combustion that are associated with these health effects are PM, SO_2, and NO_x (WHO 2000). U.S. ambient air quality standards have been set at levels above background. For example, while the background concentration of SO_2 in the U.S. is about 1 $\mu g/m^3$, the NAAQS for annual-average SO_2 concentration is 80 $\mu g/m^3$. However, human health effects have been reported for concentrations below NAAQS levels for both PM and SO_2 (Dockery et al. 1993).

For the purposes of this SEA DOE has analyzed premature adult (age 30 and older) mortality as a useful indicator for health effects associated with air pollution because background mortality rates are readily obtainable, thereby strengthening the estimates, and the association between air pollution and mortality has well documented exposure response functions. The most recently available all-cause, all-age death rate for the area near the Plant is 7.5 deaths per year per 1000 population, as obtained from the Virginia Department of Health (2004). The most recent all-cause adult (age 30 and older) death rate in the region is 13 deaths per year per 1000 population.

3.3 Water Resources and Water Quality

Water resources potentially affected by Plant operations include the Potomac River and the Patuxent River, as well as the Chesapeake Bay, which is the destination for both of those rivers. The Potomac River supplies water to and receives effluent discharges from the Plant, and the watersheds of the Potomac and Patuxent Rivers include the land areas where air pollutants emitted from the Plant are most likely to be deposited. In addition, effluents from the landfill serving the Plant are discharged to Mataponi Creek, which is in the Patuxent River watershed. The Anacostia River and Rock Creek, which are tributaries to the Potomac located near the Plant, are also specifically discussed in this section.

3.3.1 Physical Setting and Hydrology

The Plant is situated in the Atlantic Coastal Plain physiographic province, in the watershed of Chesapeake Bay (Figures 3.3-1 and 3.3-2). Chesapeake Bay and its major tributaries, including the Potomac and Patuxent rivers, are “drowned river valleys.” That is, they are river valleys that were partially inundated by sea water when sea level rose following the end of the last Pleistocene glaciation. The Potomac, Patuxent, and other major streams in the region arise in upland areas and flow as fresh-water streams to the fall line near the edge of the

coastal plain. Below the fall line, the streams are considered to be estuaries, since their flow is modified by the influence of ocean tides. In the estuarine section of a stream, fresh water mixes with salt water in increasing proportions as the stream flows toward the sea. The effects of tides shelter the waters of these estuaries from the full effects of river currents, while river-valley geometry and stream flow shelter them from the full energy of ocean waves. Because they are sheltered from the flushing actions of both stream flow and ocean waves, water remains in these estuaries for a long time. Thus, pollutants discharged into an estuary remain there much longer than they would in an upland stream or in the open ocean. At the same time the sheltered waters of estuaries support exceptionally productive ecosystems. (See Section 3.4.)

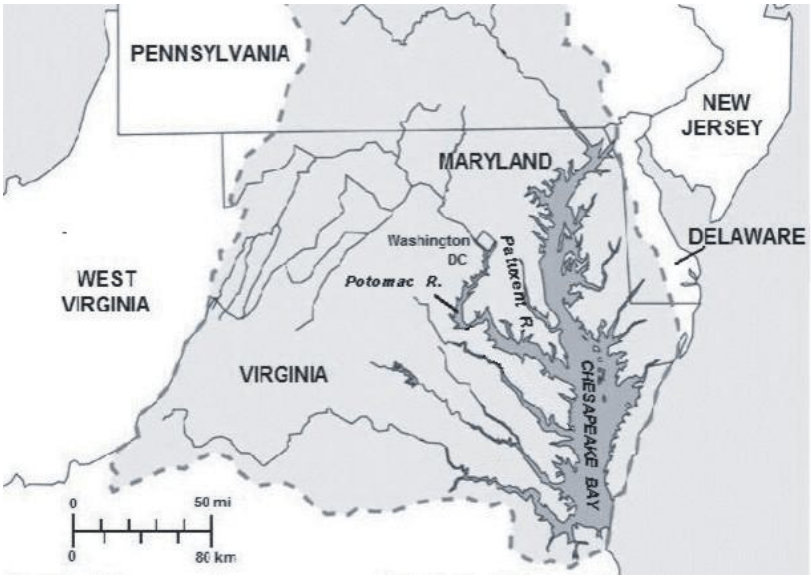


Figure 3.3-1. The Chesapeake Bay watershed includes the Patuxent and Potomac rivers.

3.3.1.1 Potomac River

The Plant is located next to the Potomac River, which flows from the Appalachian mountains to Chesapeake Bay, draining a 14,670-mi^2 (38,000-km^2) watershed in Maryland, Virginia, West Virginia, Pennsylvania, and the District of Columbia

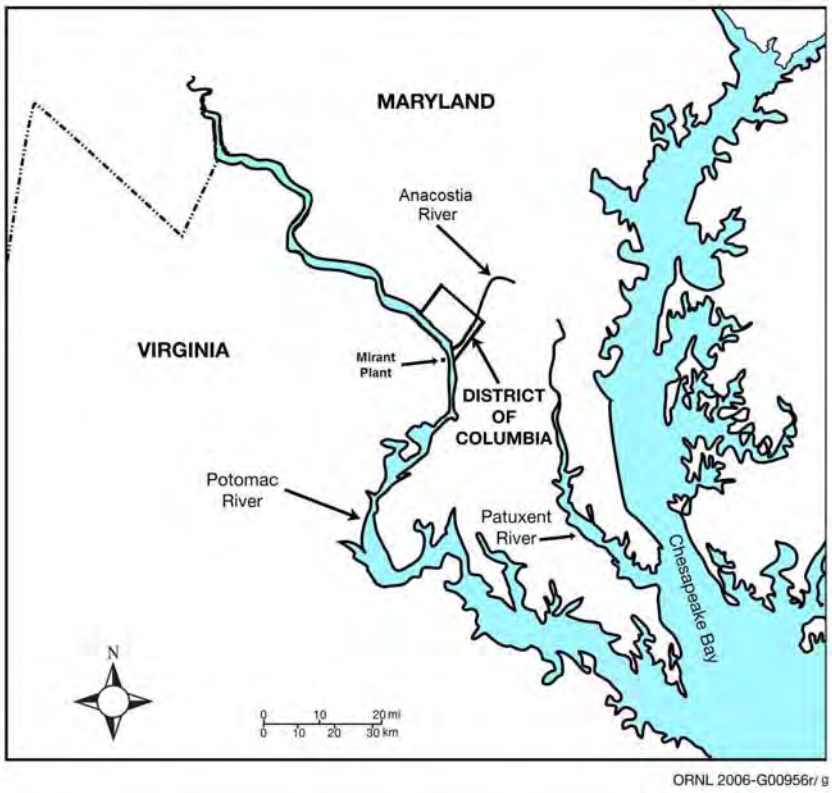


Figure 3.3-2. The Chesapeake Bay watershed near the Plant includes the Potomac, Patuxent, and Anacostia rivers.

(EPA 2000; Wilderness Society undated). The river is tidally influenced for about 110 miles (180 km) from the fall line at Little Falls, Maryland (located a short distance upstream from the District of Columbia border, about 11 miles [18 km] upstream from the Plant), to its mouth at Chesapeake Bay (EPA 2000).

While the entire tidally influenced reach of the river is an estuary, it is classified in three distinct hydrographic regimes: tidal river, transition zone, and mesohaline estuary. Adjacent to the Plant the Potomac is a tidal river with fresh water (salinity less than 500 mg/L) and a net seaward flow direction throughout the water column (EPA 2000). The transition zone begins approximately 38 miles (61 km) downstream from the fall line, about 27 miles (43 km) downstream from the Plant. The transition zone is about 22 miles (35 km) long and is characterized by variable salinity (from 500 to 10,000 mg/L) and significant mixing of fresh water with salt water from Chesapeake Bay. The lower 50 miles (80 km) of the river are classified as a mesohaline estuary with salinity varying from 5,000 to 18,000 mg/L (EPA 2000). Near the Plant the river channel has been extensively modified by past dredging and spoil disposal.

Average stream flow in the Potomac River at the fall line (above the zone of tidal influence) over the 50-year period 1931-1981 was 11,406 ft^3/sec (7.4 billion gal/day or 28 million m^3/day) (EPA 2000). Seasonally, flow is highest in the spring (February through May) and lowest in the late summer (July through September). September is the month with the lowest average flow, 4,126 ft^3/sec (2.7 billion gal/day or 10 million m^3/day). The long-term mean 7-day, 10-year low flow at the fall line is 628 ft^3/sec (406 million gal/day or 1.54 million m^3/day). The District of Columbia and some other area jurisdictions obtain public water supplies from the Potomac above the fall line.

3.3.1.2 Anacostia River

The Anacostia River is a tributary to the Potomac River that enters the Potomac approximately 4 miles (6 km) upstream from the Plant. The extensively urbanized Anacostia watershed encompasses 176 mi^2 (456 km^2) in Montgomery and Prince George's County, Maryland, and the District of Columbia. The Anacostia is a tidal river for its lower 8.4 miles (13.5 km). Flow in the tidal reach is described as sluggish; this reach has an average water residence time of 30 to 35 days. Average flow into the tidal reach from free-flowing tributaries and reaches is approximately 138 ft^3/sec (89 million gal/day or 338,000 m^3/day) (Anacostia Watershed Network 2006).

3.3.1.3 Rock Creek

Rock Creek (Figure 3.3-3) is a tributary to the Potomac River that enters the river several miles upstream from the Plant. Approximately 80% of its watershed is in Montgomery County, Maryland, with the remainder in Washington, D.C. (MDOE 2006). The nontidal portions of the

creek occur mainly within Maryland and cover about 60 mi^2 (155 km^2); the tidal portion is mainly within D.C.

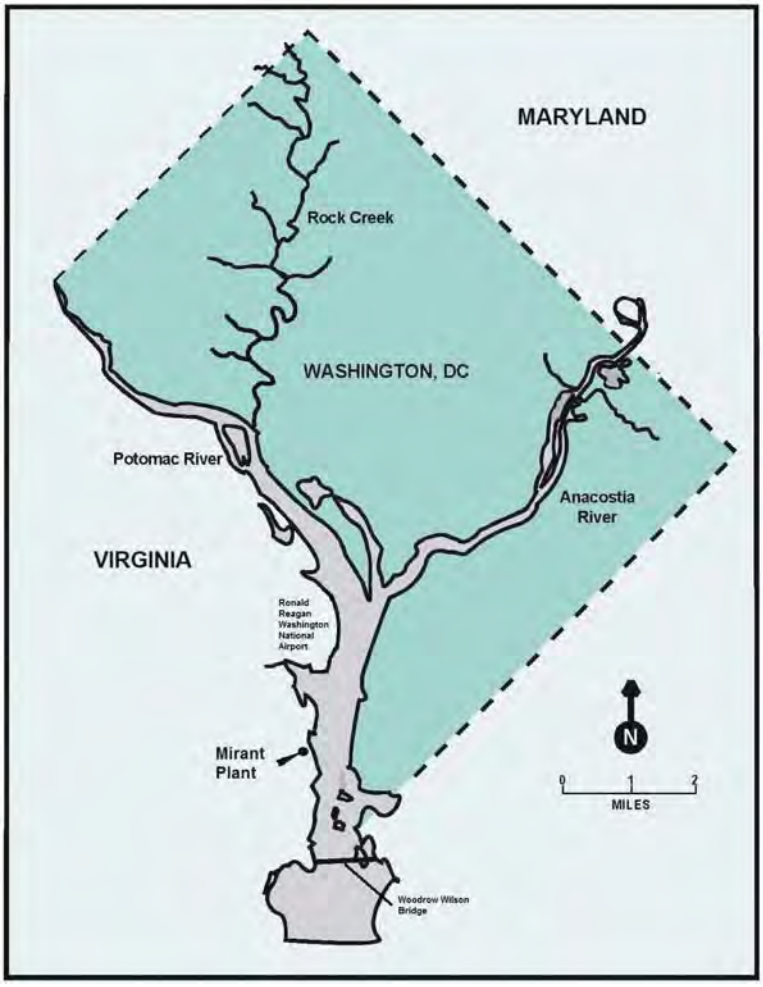


Figure 3.3-3. Location of features mentioned in the text.

3.3.1.4 Patuxent River

The Patuxent River watershed is immediately east of the Potomac River watershed in the Maryland counties of Anne Arundel, Calvert, Charles, Howard, Montgomery, Prince George's, and St. Mary's (Maryland DNR undated-a). The drainage divide between the Potomac and Patuxent watersheds is about 10 miles (16 km) east of the Plant. Only about 40% of the 849-mi^2 (220-km^2) Patuxent River watershed contributes to the river's flow above the fall line; the remainder of the watershed drains directly to the river's estuary, which has a water surface area of about 49 mi^2 (127 km^2) (Hagy and Kemp 2002). Total stream flow to the Patuxent estuary averages about 728 ft^3/sec (470 million gal/day or 1.78 million m^3/day) (Boynton and Swaney 1998). Fresh water residence time in the estuary typically varies between 50 and 80 days (Hagy and Kemp 2002).

Mataponi Creek, the Patuxent River tributary that receives discharges from the Mirant landfill (Section 3.5), originates in the upland near Brandywine, Maryland (Figure 2.4.1) and flows east-northeast toward the Patuxent River, entering the fresh water tidal reach of the river at a location about 9 miles (14 km) northeast of Brandywine. No stream flow or water quality data have been located for Mataponi Creek.

3.3.1.5 Chesapeake Bay

The Chesapeake Bay is the largest estuary in the United States, about 200 miles (320 km) in length, with a surface area of about 4,400 mi^2 (11,000 km^2) (including the estuarine reaches of its major tributaries) and a watershed of about 63,000 mi^2 (164,000 km^2), including the District

of Columbia and parts of the states of Delaware, Maryland, New York, Pennsylvania, Virginia, and West Virginia (Figure 3.3-1). The Chesapeake Bay is the destination of all waters in the region. The Potomac and Patuxent rivers contribute about 15% and 1% of the stream flow into the Bay, respectively (Boynton and Swaney 1998). Average water depth in the Bay is about 22 ft (7 m).

3.3.2 Water Quality

Important water quality concerns for all potentially affected surface waters include the potential for excessive sedimentation and depletion of dissolved oxygen. Dissolved-oxygen depletion is attributable to excessive loadings of organic materials and nutrients. The long water residence times and poor flushing that are typical of estuaries increase the susceptibility of estuaries to pollution problems. Effects on aquatic ecosystems are the principal focus of concern regarding water quality in these waters, as discussed further in Section 3.4. Public water supplies are obtained from rivers and reservoirs above the fall line; tidal waters generally do not supply water for human consumption. Information about water quality conditions in specific surface water bodies is presented below.

3.3.2.1 Potomac River

Water quality in the tidally influenced sections of the Potomac River is controlled primarily by the mixing of fresh water from upland streams and salt water from Chesapeake Bay, resulting in variable salinity. In the vicinity of the Plant fresh water predominates over salt water, and total dissolved solids are less than 500 mg/L. Table 2.4-1 includes additional data on the quality of river water at the Plant's water intake.

Due to their volume, effluent discharges from the Plant and the Blue Plains Wastewater Treatment Plant have the potential to be important influences on Potomac River water quality near the Plant. Data on the quality of effluents from the Plant are provided in Table 2.4-1.

The Blue Plains Wastewater Treatment Plant, owned and operated by the District of Columbia Water and Sewer Authority, is directly across the Potomac River from the Plant. (See Figure 2-1.) This facility provides wastewater treatment services for the District of Columbia and portions of Montgomery and Prince George's Counties, Maryland, and Fairfax and Loudoun Counties, Virginia, with a combined population near 2.2 million. The Blue Plains treatment plant has a rated treatment capacity of 370 million gal/day (1.4 million m^3/day) and a peak wet-weather capacity of 1.076 billion gal/day (4.1 million m^3/day). Operation at the rated capacity delivers a water volume to the river equivalent to 5% of the average flow and more than 90% of the 7-day, 10-year low flow at the fall line. The Blue Plains facility is considered an advanced wastewater treatment facility, providing primary and secondary treatment followed by nitrification-denitrification, effluent filtration, chlorination-dechlorination, and post-treatment aeration (DC WASA 2006). Historically, wastewater effluents discharged at this site caused

severe water quality degradation in the Potomac estuary, including high bacteria levels and low levels of dissolved oxygen. Downstream water quality improved dramatically, however, following implementation of secondary and advanced treatment in the Blue Plains treatment plant (EPA 2000). The NPDES permit for the Blue Plains facility specifies stringent water quality limits for discharges, as indicated in Table 3.3-1.

Table 3.3-1. NPDES-permitted discharge limits for the Blue Plains Wastewater Treatment Plant

Contaminant		Maximum Concentration (mg/L, except as indicated)
Carbonaceous Biochemical Oxygen Demand		5.0
Total Suspended Solids		7.0
Phosphorus, total		0.18
Ammonia Nitrogen (NH_3-N)	May-October	1.0
	November-April	6.5
Dissolved Oxygen		5.0
Chlorine, total residual		0.02
pH (range of values, pH units)		6.0 to 8.5

Source: DC WASA 2006.

Principal water quality concerns for Potomac River tributary streams draining northern Virginia watersheds near the Plant include the effects of urbanization on aquatic habitats, high fecal coliform bacteria counts in some streams, and the need to protect the watersheds of water-supply reservoirs (Northern Virginia Regional Commission undated; Fairfax County Stormwater Planning Division 2001).

3.3.2.2 Anacostia River

Water quality conditions in the free-flowing tributaries of the Anacostia range from excellent to poor, but the tidal reach of the Anacostia River has very poor water quality. Principal water quality issues for the Anacostia watershed include sediment, trash and debris, toxic chemicals, combined sewer and stormwater overflows that discharge directly into the river, and other nonpoint-source pollution (Anacostia Watershed Network 2006). According to EPA (1997), urbanization has altered the Anacostia River and its tributary streams to the point that floods are ten times more frequent, summer flows are much lower, and stream water temperatures are 5 to 10° C higher than under natural conditions. Due to the long water residence time in the tidal reach of the river, this reach has been described as “a very efficient pollutant trap” (Galli et al. 2001). The tidal reach has chronically low dissolved oxygen levels that

threaten aquatic life and high bacterial levels that make it unsafe for swimming and other water contact activities.

Through a series of agreements, beginning in 1984, local, state, and Federal government agencies have committed to cooperative efforts aimed at restoring the river (Metropolitan Washington Council of Governments 1999). The parties have made progress in implementing measures that should improve water quality, including improving stormwater management, reducing combined sewer overflows and trash, changing land use management to protect sensitive headwater tributaries, and increasing riparian forest buffers; the current agreement calls for continued efforts (Anacostia Watershed Restoration Committee 2001).

3.3.2.3 Rock Creek

Because Rock Creek Park surrounds the entire length of Rock Creek in D.C. and Maryland parks surround most of its length upstream from the District, Rock Creek experiences fewer adverse water quality impacts from urbanization than does the Anacostia River. However, creek water quality is affected by sedimentation and other contaminants associated with urban stormwater runoff (EPA 1997).

3.3.2.4 Patuxent River

Upland streams in the Patuxent River watershed are well oxygenated (only 1% are reported to have dissolved oxygen levels below 5 mg/L), but stream bank instability and erosion reduce biotic habitat quality and contribute contamination to downstream areas (Maryland DNR undated-a). In the tidally influenced area of the main channel, salinity increases in the downstream direction, ranging from fresh to moderately saline. Nutrient loading is a water quality concern throughout the watershed, contributing to eutrophication and oxygen depletion in the lower estuary (Maryland DNR undated-c).

3.3.2.5 Chesapeake Bay

A principal focus of concern for Chesapeake Bay water quality is ecosystem health, which is threatened by excessive loading of nutrients (Section 3.4.2). The historic *Chesapeake Bay Agreement of 1983* established the Chesapeake Bay Program with the goal of restoring the Bay (CBP undated). Through this Agreement, which has been updated and revised several times, Pennsylvania, Maryland, Virginia, the District of Columbia, EPA, and the Chesapeake Bay Commission have committed to a coordinated set of goals and targets for restoration of the Bay ecosystem, including its water quality.

Excessive loading of nitrogen, a nutrient, has been identified as one major contributor to various ecological problems in Chesapeake Bay. (See Section 3.4.2.) Nitrogen occurs naturally in soil, animal waste, plant material, and the atmosphere. In addition to these natural sources,

sewage treatment plants, industries, vehicle exhaust, acid rain, and runoff from agricultural, residential, and urban areas contribute nitrogen to the Chesapeake Bay and its rivers. One of the specific goals set by the Chesapeake Bay Program to achieve the overall objectives of the Chesapeake Bay Agreement is to reduce annual nitrogen input to the Bay to no more than 175 million lb (79 million kg) by 2010. This value is 162 million lb (74 million kg) less than the estimated 1985 input of 337 million lb (153 million kg). Between 1985 and 2004 estimated total nitrogen input to the Bay was reduced by 67 million lb/yr (30 million kg/yr) (41% of the goal), with the biggest improvement coming from reductions in point-source loadings, such as from sewage treatment plants (CBP 2005). The majority of the future reductions in nitrogen loading to the Bay are expected to come from land-based measures such as reducing farm runoff into streams.

Another important source of nitrogen in the Bay is atmospheric deposition (both on land in the watershed and directly on water). Atmospheric sources are estimated to contribute about 91 million lb (41 million kg) of nitrogen to the Bay annually. In 1985 this represented 27% of the nitrogen entering the Bay; by 2000 the estimated fractional contribution from atmospheric deposition had increased to 32% due to reductions in inputs from other sources. About three-quarters of the atmospheric nitrogen that reaches the Bay is estimated to have been emitted in the form of NO_x (Blankenship 1997). In the seven-state region (i.e., Maryland, Virginia, Pennsylvania, New York, West Virginia, New Jersey, and Ohio) estimated to produce most of the air emissions that contribute nitrogen to the Bay, utilities are estimated to be responsible for 38% of the NO_x emissions, cars and trucks 35%, industries 6%, and other sources 21% (CBP 2000).

Much of the atmospheric nitrogen that is deposited on land within the Bay watershed is utilized in biological processes and retained in the ecosystem, so that it is not delivered to the Bay (CBP STAC 1996). Thus, delivery of atmospheric nitrogen to the Bay is estimated based on landscape characteristics, data from acid-deposition monitoring, and other data. Maps of estimated per-hectare delivery of nitrogen to the Bay from all parts of the watershed (Brakebill and Preston 2004) indicate that the total delivery of atmospheric nitrogen to the Bay (in all chemical forms) is about one-tenth to one-third of the atmospheric nitrogen estimated to be deposited to the land surface as NO_x.

Plans for achieving the 2010 nitrogen goal assume that input from atmospheric deposition will be reduced by 8 million lb/yr (3.6 million kg/yr) between 1985 and 2010 as a result of the implementation of new or proposed regulations aimed at achieving Clean Air Act mandates to reduce acid rain and ozone and to limit NO_x emissions from automobiles (Blankenship 1997, 2004). The Chesapeake Bay Program has not established any location-specific targets for reducing atmospheric nitrogen input, which can originate from sources outside the watershed as well as sources within the watershed.

3.3.2.6 Acid deposition

Acid deposition (often called acid rain), due to the dry or wet deposition of oxides of nitrogen and sulfur in the air, is a concern for water quality and ecosystems in the Appalachian mountains and northeastern United States. Acids derived from air emissions have the potential to dissolve, and thus mobilize, aluminum and other metals in soils and sediments, introducing toxic metals into surface waters.

Streams and lakes most susceptible to the impacts of acid deposition are those in watersheds where soils lack carbonate minerals and other alkaline constituents that can neutralize acids deposited from the atmosphere. Such watersheds are considered to be "poorly buffered." In the state of Maryland approximately 96% of the 636 mi^2 (1,650 km^2) portion of the Potomac River watershed surrounding the District of Columbia (including Maryland portions of the Anacostia watershed) and 98% of the Patuxent River watershed are classified as "well buffered" against acid rain (Maryland DNR undated-a and undated-b). Thus, in the watersheds most likely to receive atmospheric deposition of Plant emissions, surface waters are not particularly susceptible to adverse effects from acid deposition.

3.4 Ecological Resources

The Plant is located on the western bank of the Potomac River, in the Chesapeake Bay watershed (Figures 3.3-1 and 3.3-2). The region around it is a highly urbanized ecosystem that includes the District of Columbia. Development has transformed the ecological resources of the region, and they are greatly changed from early historical conditions (EPA 1997). The ecological condition has, however, improved from the highly degraded situation that was prevalent in the late 1950s and early 1960s, and the region continues to support terrestrial, aquatic, and wetland resources.

3.4.1 Terrestrial Resources

3.4.1.1 Vegetation

Since the turn of the 20th century, approximately 75% of the forest cover in the District of Columbia has been eliminated by human activities (EPA 1997). Regionally, tree cover declined more than 30% from 1972 to 1997 (American Forests 2002). In many places intentional plantings or invasions of exotic trees and other plants have displaced and substantially altered the native vegetation (EPA 1997). Agricultural and forest land cover are, however, still predominant in some parts of the region.

Daingerfield Island, which is administered by the National Park Service as part of the George Washington Memorial Parkway, lies about a quarter mile (less than a half kilometer) north of the Plant (Figure 3.4-1). No longer geographically an island, this flat 107-acre (43-ha), mostly wooded peninsula includes a large patch of forest on the eastern portion of the island with common suburban trees and understory plants (NPS 2002).

The National Park Service administers the land between the Potomac River and the Plant. This expanse includes a bike path that runs south from Daingerfield Island past the Plant and a small wooded area near the Plant at the edge of the Potomac River. (See Figure 2-2.) The vegetation in the small wooded area is similar to that on Daingerfield Island, common suburban tree and understory plant species.

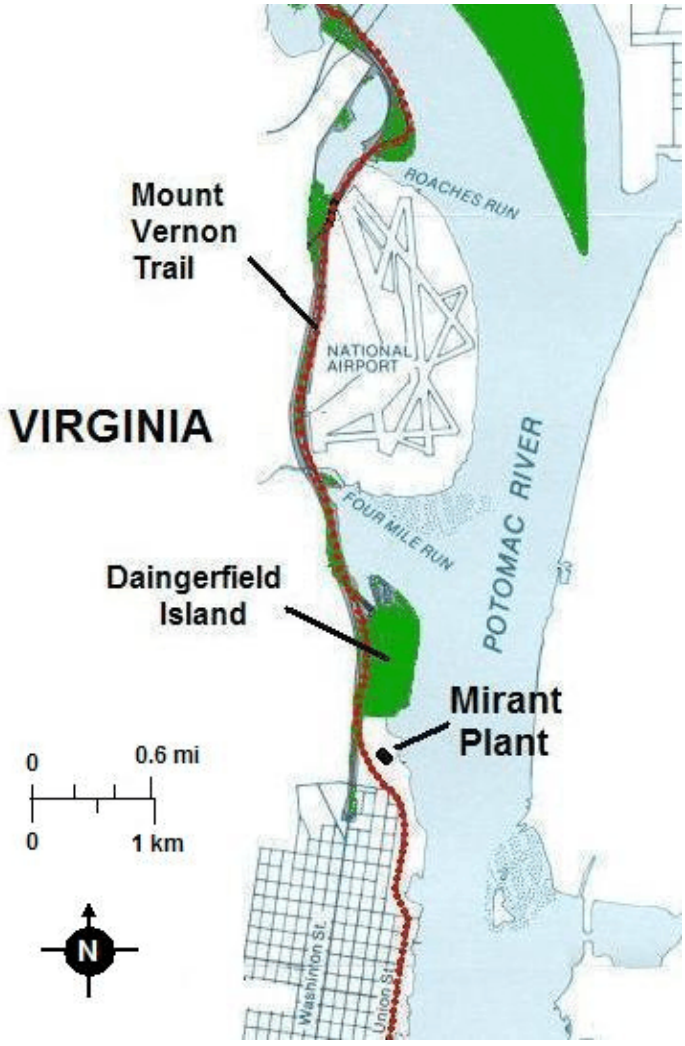


Figure 3.4-1. Location of National Park Service trail that passes the Plant.

3.4.1.2 Wildlife

Many of the animal species originally present in the D.C. region disappeared long ago (EPA 1997). Wildlife in the region is now dominated by opportunistic species characteristic of urbanized areas. Animals tolerant of human activities (e.g., opossums, raccoons, squirrels, black and Norway rats, house mice, stray cats and dogs) have increased in abundance due to the absence of larger predators and the abundant food offered by garbage. Bird species reflect a change from predominantly forest interior species to species representative of mixed land uses.

Wildlife on Daingerfield Island includes common urban species such as small mammals and birds (NPS 2002). Larger animals could possibly use the forest there for habitat. However, because the forest patch is separated from other forested areas by roadways, fields, and water bodies, the movement of large animals into the peninsular forest may be limited. The wooded

area near the Plant is also too small and too isolated by roadways, fields, and water bodies to provide habitat that could be easily used by larger animals.

3.4.1.3 The Mirant Plant site

The 28-acre (11-ha) Plant site is almost entirely covered by facilities related to coal storage and electric power generation. However, it also includes a 1,500 ft^2 (140 m^2) wildflower garden planted with woody and herbaceous vegetation for insects and pollinators.

Animals on the site include common urban wildlife species such as small mammals and birds. Artificial nesting structures for purple martins, eastern bluebirds, bats, and peregrine falcons are located within the small scattered areas of wildlife habitat.

3.4.2 Aquatic Resources

Aquatic ecosystems with the most potential to be affected by the Order include those in the Chesapeake Bay and some of its tributaries, particularly the Potomac, Anacostia, and Patuxent rivers and Rock Creek. (See Figures 3.3-2 and 3.3-3 and Section 3.3.) Coal-fired power plants can impact aquatic resources directly by the cooling water withdrawals and discharge of aqueous effluents and indirectly by the deposition of air pollutants (e.g., acid rain) into watersheds. The Plant withdraws cooling water from and discharges back to the Potomac River. The other rivers and the Chesapeake Bay are potentially affected indirectly by atmospheric deposition.

3.4.2.1 Potomac River

The estuarine portion of the Potomac River adjacent to the Plant supports aquatic communities that are recovering from past stresses. Historically the Potomac River supported dense stands of bay grasses along its entire length, but much of it was lost by the late 1930s (EPA 1997). A dense and wide patch of bay grasses has regrown and currently stretches from the Virginia Potomac shoreline at National Airport to the middle of the Potomac, extending past the southern tip and along the northern and eastern edges of Daingerfield Island that lies north of the Plant (NPS 2002). (See Figure 3.4-1.)

A large, tidally influenced river, the Potomac once possessed an exceptionally diverse and productive fish community, but species abundance and diversity are low compared to historic levels (EPA 1997). The Potomac River watershed supported large numbers of both resident, freshwater fish and anadromous fish (i.e., species that spend their adult lives in saltwater and spawn in freshwater), such as shad and river herring (*Alosa* sp.).

Even though the river has been degraded by the effects of human activities, a wide variety of fish species still occur in it. Many of these are exotic species (e.g., largemouth [*Micropterus salmoides*] and smallmouth bass [*Micropterus dolomieu*], walleye [*Sander*

vitreus]). Some native and exotic species present in the river (e.g., catfish [*Ictalurus punctatus*], crappie [*Pomoxis* sp.], sunfish [*Lepomis* sp.], largemouth and smallmouth bass, walleye) are important recreational species. The northern snakehead (*Channa argus*), a fish from Asia that has attracted public interest because it preys on other fish and can survive several days out of water, is believed to be established in the Potomac River and its tributaries (Fuller 2006). The estimated total fish abundance in the Potomac-Washington Metro Basin, which includes the Anacostia and Potomac rivers and a number of creeks, is 4.9 million fish (Maryland DNR undated-b).

An indication of the particular fish species that are affected by the Plant's cooling water withdrawals can be obtained from entrainment and impingement studies. Studies of aquatic organisms impinged (trapped) on the intake screens at the Plant during 2003-2004 provided information on the species that occur in that stretch of the Potomac (Personal communications between A. Wearmouth, Mirant Corporation, and M.S. Salk, Oak Ridge National Laboratory, July 24, and August 18, 2006). The main fish species found were white perch (*Morone americana*), gizzard shad (*Dorosoma cepedianum*), blueback herring (*Alosa aestivalis*), and channel catfish. Striped bass (*Morone saxatilis*) and American shad (*Alosa sapidissima*), commercially important fishes, were found in low numbers. Earlier impingement studies also observed gizzard shad and white perch, many of which were juveniles, stunted, or already diseased prior to impingement (Pepco 1982).

The benthic macroinvertebrate community in the tidally influenced river near the Plant includes a mix of freshwater organisms that are tolerant of exposure to low salinity and estuarine organisms that are tolerant of fresh water (http://www.dnr.state.md.us). Benthic organisms are affected by oxygen depletion that occurs in the bottom waters during summer months. The freshwater tidal Potomac does not support shellfish of commercial value, but it does include large populations of Asiatic clams (*Corbicua fluminea*), an undesirable invasive species (EPA 1997).

3.4.2.2 Anacostia River

The Anacostia River estuary has some of the poorest water quality in the Chesapeake Bay system and is, thus, in a degraded ecological condition (EPA 1995). Many miles of stream habitats have been severely degraded by urbanization, which has profoundly altered the flow, shape, water quality, and ecology of streams in the watershed. Stressors of concern in the river are described in Section 3.3.2.2.

Urbanization has caused the loss of nearly 50 percent of the forest cover in the basin, including much of the stream-side or riparian vegetation and other wetlands. (See Section 3.4.3.)

As a large, tidally influenced freshwater river like the Potomac, the Anacostia also has the capacity to support many diadromous as well as resident fish species. Even though the river has been degraded by the effects of human activities, a wide variety of fish species still occurs in it. Numerous man-made fish barriers, however, block migration of fish.

The tidal reach of the river has chronically low dissolved oxygen levels that threaten aquatic life. (See Section 3.3.2.2.) The periodic lack of dissolved oxygen is the likely reason that substantial clam populations are absent from the river (EPA 1997). The macroinvertebrate communities in the river are severely degraded compared to those in the Potomac.

Implementation of the Anacostia Watershed Restoration Agreement (Section 3.3.2.2) has resulted in some improvement in aquatic habitat conditions (EPA 1997, Anacostia Watershed Restoration Committee 2004).

3.4.2.3 Rock Creek

As the largest stream in D.C., Rock Creek has historically supported substantial populations of recreationally important fish species and, through its direct connection to the Potomac River, large numbers of anadromous species (EPA 1995). The present anadromous fish populations and resident fish communities reflect the harmful effects of polluted runoff, barriers to fish movement, and over fishing. Nonnative fish species (e.g., largemouth bass, bluegill [*Lepomis macrochirus*], carp [*Cyprinus carpio carpio*]) now constitute a significant part of the fish community. Some species that were historically present in Rock Creek have apparently been extirpated from the watershed (e.g., white perch, trout-perch [*Percopsis omiscomaycus*]). In contrast, populations of anadromous alewife (*Alosa pseudoharengus*) and blueback herring appear to be healthy. Even though instream impediments to fish movement probably affect these species and prevent them from passing far upstream, schools of hundreds of individuals occur at several locations.

In contrast to the mainstem, fish communities in tributaries of Rock Creek are small or absent (EPA 1995). Episodic water quality problems (e.g., low flows, flooding, scouring during storm events) and polluted runoff are likely contributing factors.

Overall, the condition of the benthic macroinvertebrate communities in Rock Creek is poor. However, the creek contains several spring-dependent species of isopods, ostracods, and amphipods (EPA 1995), including one amphipod that is listed as an endangered species (Section 3.4.4.1).

3.4.2.4 Patuxent River

Stream quality for fish communities in the Patuxent River is poor in over 50% of the stream miles; only 18% are considered to be in good condition for fish (Maryland DNR undated-a). The Patuxent River watershed includes an estimated 1.1 million fish of 44 species in its wadeable streams. Four species in the basin are at risk of local extinction: American brook lamprey (*Lampetra appendix*), glassy darter (*Etheostoma vitreum*), stripeback darter (*Percina notogramma*), and warmouth (*Lepomis gulosus*). The wadeable tributary streams of the watershed serve as a nursery for the five gamefish species that are found there (i.e., largemouth

bass, smallmouth bass, chain pickerel [*Esox niger*], brown trout [*Salmo trutta trutta*], and rainbow trout [*Oncorhynchus mykiss*]), as most individuals are not of harvestable size.

3.4.2.5 Chesapeake Bay organisms

The sheltered waters of Chesapeake Bay, the largest estuary in the U.S., are exceptionally productive. The Bay is a complex ecosystem that provides homes, protection, and food for many species, including fish, shellfish, and turtles (CBP undated, Alliance for the Chesapeake Bay undated).

Bay grasses, a form of naturally submerged aquatic vegetation, are important to the Chesapeake Bay ecosystem (CBP undated). Bay grasses produce oxygen, supply food for many species (especially waterfowl), offer shelter and nursery habitat for fish and shellfish, reduce wave action and shoreline erosion, absorb excess nutrients (e.g, nitrogen, phosphorus), and trap sediments.

More than 300 species of fish, including 32 year-round species, live in the Bay and its tributaries or use its waters as they migrate along the Atlantic Coast (Alliance for the Chesapeake Bay undated). Migrating fish can, however, no longer reach many stream habitats due to the presence of dams, inadequate culverts, and other barriers to their passage (EPA 1997).

The Bay acts as a nursery for crabs, oysters, and many other species of shellfish (Alliance for the Chesapeake Bay undated). While many of these species, particularly blue crabs (*Callinectes sapidus*), are still commercially important, oyster (*Crassostrea virginica*) populations have declined to about one percent of historical levels.

3.4.2.6 Chesapeake Bay stresses

Hydrological changes, sedimentation, and pollutant loading have degraded aquatic habitats throughout Chesapeake Bay. The cooperative efforts and guidance of the Chesapeake Bay Program have led to improvements, including reduced levels of nutrients and sediments in the Bay and increased availability of dissolved oxygen for the Bay's aquatic biota, but they have not fully restored the health of the Bay (CBP undated). The biggest problems currently facing the Bay's ecosystem and making restoration difficult are excess nutrients, chemical contaminants, air pollution, and landscape changes. (See Section 3.3.2.5.)

Nutrient loading contributes to excessive algal growth, which in turn depletes dissolved oxygen and reduces water clarity. Harmful blooms of *Microcystis* and other cyanobacteria (blue-green algae) that are toxic to humans and other mammals can occur in the fresh-water and low-salinity portions of the Bay and in tributary estuaries (e.g., the Potomac River). In addition, suspended sediment loading and the presence of toxic substances in Bay sediments stress Bay biota.

3.4.3. Wetlands and Riparian Habitats

Wetlands act as water-storage basins and provide vital habitats for a rich diversity of wildlife, including threatened and endangered species (EPA 2006d). They also reduce flooding and storm damage, minimize erosion of uplands, improve water quality by filtering pollutants, and support tourism and the hunting and fishing industries.

Many of the wetlands in the region have been degraded and are of poor quality, but some continue to provide habitat for waterfowl, wildlife, fish, and shellfish (EPA 1995).

Much of the area (e.g., the District of Columbia) was initially built by filling in extensive areas of marshes and swamps along the Potomac and Anacostia rivers (EPA 1997). Such wetlands originally comprised about half the area within the boundaries of the city, totaling more than 9,600 acres (3,900 ha) in 1790. In the early 1990's only 845 acres (342 ha) of wetlands remained in the District, a decrease in area of more than 90% in 200 years.

Riparian, or stream side, vegetation is especially important to the integrity of the District of Columbia ecosystem because it buffers aquatic resources from developed areas and provides habitat for terrestrial species near water (EPA 1997). Contiguous riparian habitats also provide migration corridors for wildlife, a critical factor in urbanized environments. Because Rock Creek Park surrounds the entire length of Rock Creek in the District and Maryland parks surround most of its length beyond the District, the area along Rock Creek is the most important terrestrial and riparian resource in the city.

Within the Anacostia River watershed nearly 75 percent of the freshwater wetlands have been destroyed. Of the original 2,600 acres (1,100 ha) of emergent tidal wetlands in the watershed, less than 100 acres (40 ha) remained in the early 1990s (EPA 1995); by 2003 ongoing restoration efforts had increased the area of tidal wetlands to 123 acres (50 ha) (Anacostia Watershed Restoration Committee 2004). Parklands along the Anacostia River do not provide benefits similar to those along Rock Creek because they are not protected natural areas, but rather are reclaimed wetlands in the form of sparsely wooded lawns. They have the potential, however, to provide such benefits, especially if riparian restoration is coordinated with ongoing restoration of wetlands.

The Federal government maintains 80% of the property bordering the Potomac River, Anacostia River, and Rock Creek drainage basins in the District of Columbia, thus providing some protection to their riparian areas (EPA 1997).

3.4.4. Special Status Species

3.4.4.1 Federally listed species

The Plant’s NPDES permit names three species listed as threatened or endangered under the Federal Endangered Species Act (ESA) that could occur at locations in or near the District of Columbia, including the Potomac River drainage. These are the endangered Hay's Spring

amphipod (*Stygobromus hayi*) and shortnose sturgeon (*Acipenser brevirostrum*) and the threatened bald eagle (*Haliaeetus leucocephalus*).

The Hay's Spring amphipod is restricted to a small area in Rock Creek in D.C., a very specialized habitat, and the species is not found elsewhere (Personal communication between A. Moser, U.S. Fish and Wildlife Service, and M.S. Salk, Oak Ridge National Laboratory, June 19, 2006).

The shortnose sturgeon exists as 19 distinct populations that occupy and spawn in rivers and bays from Canada to Florida (Keeney 2002). The Potomac River is one of several tributaries in the Chesapeake Bay drainage that appear to have suitable habitat for it. The Shortnose Sturgeon Recovery Plan (NMFS 1998) reports that one shortnose sturgeon was captured in 1996 at the mouth of a small creek off the Potomac River about 50 miles (80 km) downstream from the Plant. Between 1996 and 2002 six sturgeon were captured many miles downstream from the Plant in the lower and middle tidal Potomac River (Keeney 2002). Two mature, egg-bearing females were captured in the river in September 2005 and March 2006, suggesting that a spawning population continues to exist in the river system (Appendix D). The female caught in September 2005 overwintered in a creek approximately 24 miles (39 km) downstream of the Plant. Population dynamics in the Potomac River have not been documented, but it is likely that they migrate past the Plant in the spring (March - June) while moving to and from the presumed spawning grounds near Little Falls, Maryland (about 11 miles [18 km] upstream from the Plant). It is unknown if the sturgeon occur in this region of the river during other times of the year. However, if appropriate forage items are present, they could live in the area in the summer and fall. The shortnose sturgeon has not been reported among the species impinged by the Plant (Personal communication between D. Knight, Mirant, and M.S. Salk, Oak Ridge National Laboratory, July 24, 2006).

While a pair of bald eagles lived for several years about two miles (3 km) south of the Plant near the Woodrow Wilson Bridge (WWBP 2006a) until the recent death of the female (WWBP 2006b), bald eagles are only rarely seen near the Plant (Personal communication between D. Knight, Mirant, and M.S. Salk, Oak Ridge National Laboratory, July 24, 2006). (See Figure 3.3-3.)

The Virginia Natural Heritage Resources information database indicates that no Federally listed threatened or endangered species occur in the city of Alexandria, but it names two Federal species of concern[5] that could occur there: the Northern Virginia well amphipod (*Stygobromus phreaticus*) and Torrey's mountain-mint (*Pycnanthemum torrei*) (VNHR 2006). The amphipod is found only in caves (NatureServe 2006). In Virginia Torrey's mountain-mint occurs in dry, rocky, upland, deciduous woods; along roadsides; and in thickets near streams (NatureServe 2006). There is no suitable habitat for either species on the Plant site.

[5] "Species of concern" means a species that might be in need of conservation action (FWS 2006). Such species receive no legal protection, and use of the term does not necessarily imply that a species will eventually be proposed for listing.

3.4.4.2 State-listed species

The Virginia Natural Heritage Resources information database indicates that the only state protected species that occurs in the city of Alexandria is the threatened wood turtle (*Glyptemys insculpta*) (VNHR 2006). Wood turtles live along permanent streams during much of each year, but in summer they may roam widely overland and can be found in a variety of terrestrial habitats adjacent to streams, often associated with the margins of woods (NatureServe 2006). There is no suitable habitat for the species on the Plant site.

3.5 Waste Management

Except for small quantities of fly ash that are used beneficially (Section 2.4.3), fly ash from the Plant is disposed of in the Brandywine Fly Ash Facility, a landfill owned and operated by Mirant Ash Management LLC and used solely for disposal of coal combustion ash. The landfill, located in southeastern Prince George's County, Maryland (east of the community of Brandywine) (Figure 2.4.1), is also used for disposal of fly ash from Mirant's Chalk Point Generating Plant on the Patuxent River estuary in southeastern Prince George's County.

The 178-acre (72-ha) site currently used for waste disposal is part of a larger area that was formerly surface-mined for gravel and that has been used for coal combustion ash disposal since 1971. Surrounding land uses include an active sand and gravel mining operation, agricultural fields, forest, a high-voltage electric transmission line, and other landfills. The landfill site has a low-permeability base of compacted native soil (Personal communication between D. Cramer, Mirant Corporation, and L.N. McCold, Oak Ridge National Laboratory, July 7, 2006) and is equipped with a leachate collection system. Ash is delivered to the landfill by dual-axle dump trucks and is placed and compacted in the landfill in 2-ft (0.6-m) layers. On weekdays during peak power-generation periods the landfill receives approximately 60 truckloads of ash from the two generating stations; average daily ash receipts are approximately 70% of peak daily receipts.

Stormwater runoff and leachate from the landfill drain to collection ponds where a sprinkler pump provides aeration, water quality is monitored, pH is adjusted, and solids settle out before the water is discharged to the upper reaches of Mataponi Creek (a tributary to the fresh water tidal river reach of the Patuxent River) and an unnamed tributary to the creek (Baxter 2006). Dust is controlled by periodically watering haul roads and the active disposal area, using water recycled from the collection ponds (Personal communication between D. Cramer, Mirant Corporation, and L.N. McCold, Oak Ridge National Laboratory, July 7, 2006).

Landfill site plans limit the final height of the fill to a elevation of 260 ft (79 m) above mean sea level (MSL), or about 70 ft (21 m) above the original land surface grade (Personal communication between A. Wearmouth, Mirant Corporation, and E.D. Smith, Oak Ridge National Laboratory, July 21, 2006). Areas of the landfill that have reached their maximum

design height are capped with a 3-ft (1-meter) thickness of soil and seeded to establish a vegetative cover. In January 2005 the landfill was calculated to have a remaining capacity of 2.07 million yd^3 (1.58 million m^3), providing sufficient capacity for disposal of the two power plants' projected ash generation for about 7 years, or approximately through the middle of 2012 (GB&B Inc. 2005).

Disposal facilities for coal combustion ash are not subject to state solid waste regulation in Maryland (Personal communication between R. Daniel, Maryland Department of Environment Customer Service Center, and E.D. Smith, Oak Ridge National Laboratory, June 6, 2006), but local zoning requirements and state wastewater regulations apply. The Brandywine facility operates under a series of special exceptions from Prince George's County zoning restrictions. The most recent special exception for 12 years of continued operation was approved by Maryland-National Capital Park & Planning Commission, Prince George's County Planning Department in 1991 (Baxter 2006). In 2005 Mirant filed an application for a 15-year extension to this special exception (Baxter 2006); the application is currently pending.

Discharge of wastewater from the site, including storm water runoff, collected leachate, and truck wash water, is permitted under MDE Discharge Permit 02-DP-1389 (NPDES Permit MD0054836), issued by the Maryland Department of the Environment. The current 5-year discharge permit is effective September 1, 2005, to August 31, 2010. The permit limits discharge to a pH range of 6 to 9 pH units, total suspended solids of no more than 35 mg/L as a monthly average and 70 mg/L as a daily maximum, and total iron of no more than 3.5 mg/L as a monthly average and 7.0 mg/L as a daily maximum. Discharge monitoring requirements under the permit include monthly flow and monthly measurements for pH, total suspended solids, hardness, iron, copper, lead, selenium, and zinc. Six groundwater monitoring wells in the vicinity of the landfill are monitored quarterly for pH; total dissolved solids; chloride; sulfate; and dissolved aluminum, cadmium, manganese, copper, iron, lead, silver, and nickel. No surface or groundwater problems are currently identified at the site (Baxter 2006). There have been no regulatory violations since 1996 when a discharge from one of the wastewater ponds exceeded the permit limit for total suspended solids (Personal communication between D. Cramer, Mirant Corporation, and L.N. McCold, Oak Ridge National Laboratory, July 7, 2006).

3.6 Transportation Resources

The primary transportation activities associated with Plant operations are (1) trains traveling to and from the Plant to deliver coal and trona and (2) trucks traveling to and from the plant to remove ash. The following sections discuss the affected local environment for these rail and road operations.

3.6.1 Rail

Trains enter and exit the Plant to deliver coal and trona via a short rail spur from the CSX, Inc., main rail line located west of North Henry Street (Figure 3.6-1). The City of Alexandria allows the Plant to conduct rail operations during two daytime periods (11 a.m. to 12 p.m. and 1 p.m. to 3 p.m.) and one nighttime period (7 p.m. to 11 p.m.) from Monday through Saturday. (The Plant does not receive rail deliveries on Sundays.) Daytime rail operations involve removing empty rail cars from the Plant during each of the two daytime periods to avoid blocking vehicular traffic on the George Washington Parkway (Figure 3.6-1). Nighttime rail operations involve deliveries of coal and trona (Personal communication between D. Cramer, Mirant Corporation, and L.N. McCold, Oak Ridge National Laboratory, July 7, 2006).

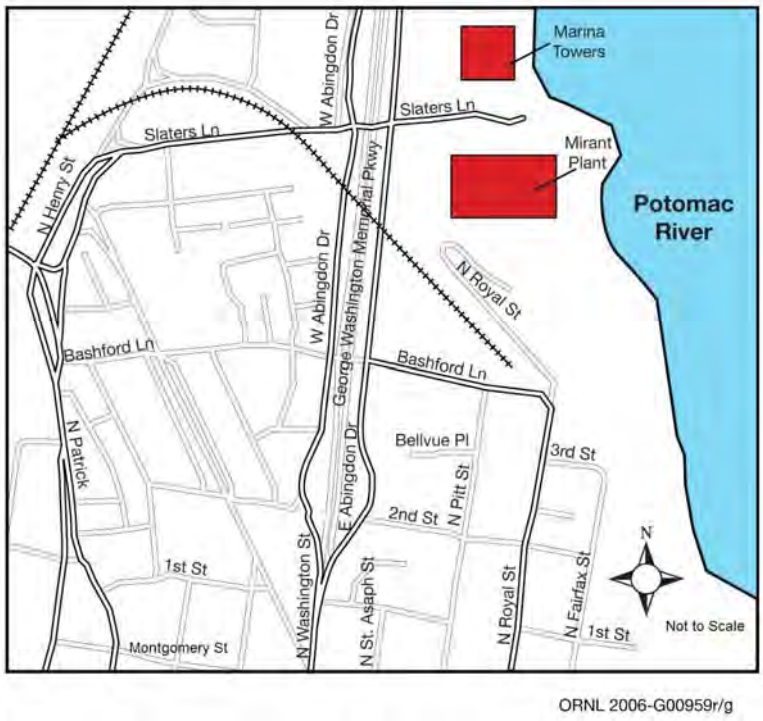


Figure 3.6-1. Access routes near the Mirant Plant.

3.6.2 Road

Trucks enter and exit the Plant to remove ash via a gated entrance located on North Royal Street (Figure 3.6-1). The trucks haul ash from the Plant to the Brandywine Fly Ash Facility in Prince George's County, Maryland (Figure 2.4-1).

From the Plant the trucks travel south on North Royal Street, then west on Montgomery Street (Figure 3.6-1). Neither the Virginia Department of Transportation nor the City of Alexandria maintains data on annual average daily traffic[6] or level-of-service (LOS)[7] for North Royal Street, but it is a local street with relatively little traffic and an existing level-of-service (LOS) at or near "A" (Personal communication between B. Garbacz, Transportation Engineer,

[6] The annual average daily traffic is "an estimate of typical daily traffic on a road segment for all days of the week, Sunday through Saturday, over the period of one year" (VDOT 2004).

[7] Level-of-service (LOS) is "a standard measurement used by transportation officials which reflects the relative ease of traffic flow on a scale of A to F, with free-flow being rated LOS-A and congested conditions rated as LOS-F" (FHWA 2006).

City of Alexandria, Virginia, and J.W. Saulsbury, Oak Ridge National Laboratory, May 26, 2006). On Montgomery Street annual average daily traffic is 3,800 vehicles (VDOT 2004).

Once the trucks reach the intersection of Montgomery Street and Henry Street (State Route 1) (Figure 3.6-1), they travel south on Henry Street to access Interstate 495 (I-495 or the Capital Beltway) (Figure 2.4-1). The trucks then travel east on I-495 North, crossing the Potomac River on the Woodrow Wilson Memorial Bridge, which serves as a major connector between Virginia and Maryland (Figure 3.3-3). On entering Maryland, trucks exit onto Maryland Route 5 and travel south. The trucks continue to travel south on Maryland Route 381 (Brandywine Road) to North Keys Road, on which the Brandywine facility is located. Table 3.6-1 lists the existing traffic volumes on each of these roads between Henry Street in Alexandria and the Brandywine facility in Maryland.

Table 3.6-1. Roads traveled by the ash removal trucks between Henry Street and the Brandywine Fly Ash Facility

Road	Segment	Annual Average Daily Traffic
Henry Street (Route 1)	Southbound to I-495 North (Capital Beltway)	22,000 to 25,000
I-495 North	Eastbound into Maryland via the Woodrow Wilson Memorial Bridge	154,000
I-495 North	Eastbound in Maryland to Maryland Route 5	142,925 to 174,800
Maryland Route 5	Southbound to Maryland Route 381	62,450 to 112,050
Maryland Route 381 (Brandywine Road)	Southbound to North Keys Road	4,850 to 12,150
North Keys Road	Southbound to the Brandywine Fly Ash Facility	No data available

Sources: VDOT 2004; MDOT 2005

The road network used to transport ash to the landfill is affected by ongoing construction activities associated with the Woodrow Wilson Bridge Project (WWBP 2006a). This project, which is scheduled for completion in December 2012, involves a series of roadway and interchange improvements along a 7.5-mile-long (12-km-long) segment of I-495 that extends from the Telegraph Road interchange in Virginia to the Route 210 interchange in Maryland. The project's centerpiece, widening and improving the Woodrow Wilson Memorial Bridge, is scheduled for completion in December 2008.

Access to the Brandywine Fly Ash Facility from North Keys Road is via a private road that is shared by an adjoining sand and gravel mining and wet processing facility. During peak winter and summer months total hauling operations at the Brandywine Fly Ash Facility consist of approximately 60 truckloads per day. This total includes trucks from the Plant and from Mirant’s Chalk Point Power Plant in Prince George’s County, Maryland. Typical weekday

haulage activity at the Brandywine facility is approximately 70 percent of the seasonal peaks (Baxter 2006).

There are some existing traffic problems on Maryland Route 381, which is used to access the Brandywine facility. Although the State of Maryland's accident records indicate that this road operates without any significant safety deficiencies, certain intersections along Maryland Route 381 function inadequately and have a low LOS based on existing traffic volumes (Baxter 2006).

In April 2005 Mirant filed with the Maryland-National Capital Park and Planning Commission an Application for Special Exception for a Sanitary Landfill (Fly Ash) (Baxter 2006). That application includes information about transporting ash to the Brandywine facility. Mirant's Application was reviewed by the Maryland Department of Transportation State Highway Administration and the Prince George's County Department of Public Works and Transportation. The Department of Public Works and Transportation conducted a traffic study for Mirant's Application in which it assumed that there would be "an increase in through traffic percent along key roadways in the study area." The traffic study examined impacts for seven intersections under three scenarios:

- existing traffic conditions,
- the addition of 13 background developments whose impact would affect some or all of the study intersections, and
- traffic volumes representing total background conditions combined with projected facility site trip generation (the 20-year build-out projection).

Analysis of this third scenario (which includes Mirant's Application, as well as 13 other "background" developments over a 20-year period) indicated impacts on the seven intersections as listed in Table 3.6-2. Ash hauling associated with pre-shutdown operations at the Plant was a minor contributor to these existing traffic problems.

The Department of Public Works and Transportation traffic study notes that the State Highway Administration has required Mirant to address the failing levels of service at these intersections along Maryland Route 381. In particular, the study notes that the intersection of Maryland Route 381 and U.S. Highway 301 "operates inadequately based on existing traffic volumes (LOS-E in the morning) and will worsen significantly with the inclusion of approved background developments." The study adds that pursuant to State Highway Administration's comments, Mirant "has offered no improvements that would ameliorate the inadequacies at that intersection" (Baxter 2006).

Table 3.6-2. Traffic impacts projected in Mirant's *Application for Special Exception* for the road intersections used to access the Brandywine Fly Ash Facility

Intersection	Level-of-Service during after-midnight and morning hours	Level-of-Service during afternoon and evening hours
North Keys Road/Gibbons Church Road (unsignalized)	B	A
Maryland 381/North Keys Road (unsignalized)	***F***	C
Maryland 381/U.S. 301 (signalized)	***F***	***F***
Maryland 381/Baden Westwood Road (unsignalized)	***F***	B
Maryland 381/Croom Road (unsignalized)	***F***	***F***
Link—Maryland 381 (U.S. 301–North Keys Road)	E	D
Link—Maryland 381 (Croom Road–North Keys Road)	C	C

Figures in ***boldface italics*** represent failing levels of service.
Source: Baxter 2006

3.7 Minority and Low-Income Populations

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs each Federal agency to identify and address the "disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations." The Council on Environmental Quality (CEQ) guidance on environmental justice (CEQ 1997) states that a "minority population" should be identified where either: "(a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage in the affected area is meaningfully greater than the minority population percentage in the general population or appropriate unit of geographical analysis." The CEQ guidance defines "low-income" using statistical poverty thresholds from the Bureau of Census Current Population Reports, Series P-60 on Income and Poverty.

For this analysis DOE examined the 2000 U.S. Census data to identify any minority or low-income populations in census tract[8] (CT) 2018.01, in which the Plant is located (Figure 3.7-1), and the four block groups[9] within CT 2018.01. DOE focused on CT 2018.01 because its boundaries encompass the geographical distribution of the greatest air quality impacts from the

[8] The U.S. Census Bureau defines census tracts as small, relatively permanent statistical subdivisions of a county. Census tracts average about 4,000 inhabitants and are designed to be relatively homogeneous units with respect to population characteristics, economic status, and living conditions. Census Tract 2018.01 has a total population of 4,727.

[9] The U.S. Census Bureau defines block groups as subdivisions of a census tract. Block groups are the smallest geographic unit for which the Census Bureau tabulates sample data.

Plant. To identify minority and low-income populations within CT 2018.01 and its block groups, DOE defined a "meaningfully greater" population as one that had a minority or low-income percentage at least 10 percentage points higher than the percentages for the city of Alexandria, the state of Virginia, or the United States (whichever is lower).[10] Thus, based on the data in Table 3.7-1, DOE identified minority populations as those that have a minority percentage of at least 39.8% (10 percentage points higher than the state of Virginia) and low-income populations as those that have a low-income percentage of at least 18.9% (10 percentage points higher than the city of Alexandria).

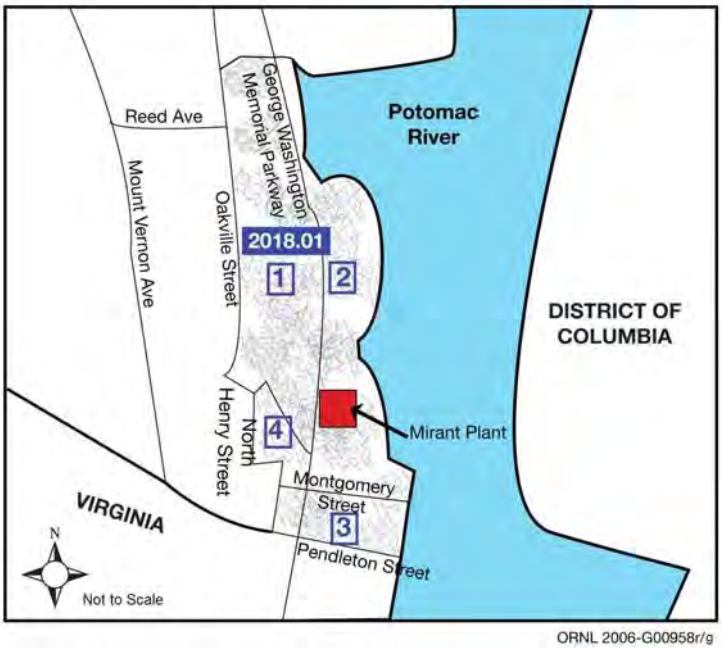


Figure 3.7-1. Block Groups 1-4 within Census Tract 2018.01.

As indicated in Table 3.7-1, the percentages of the total population in CT 2018.01 (population 4,727) that are classified as minority (27.2%) and low-income (11.1%) do not exceed DOE's threshold for identifying either minority or low-income populations. However, block group 3, which is located south of the Plant (Figure 3.7-1) and has a total population of 1,368, exceeds DOE's low-income threshold. Similarly, block group 4, which is located southwest of the Plant (Figure 3.7-1) and has a total population of 620, exceeds DOE's minority threshold. Therefore, block groups 3 and 4 of CT 2018.01 contain minority and low-income populations that meet the DOE thresholds, while block groups 1 and 2 (populations of 1,650 and 1,085, respectively) do not.

[10] The "10 percentage point" criterion is used here because it is large enough to indicate the presence of a minority or low-income population when compared to a large geographic area (i.e., the state or the nation), yet small enough to indicate minor differences in percentages among several census tracts or block groups in a small geographic area. Note that the use of a more conservative criterion, such as 5 percentage points, would not change which block groups are identified as minority or low-income populations.

Table 3.7-1. Minority and low-income data for census tract 2018.01 and its block groups (See Figure 3.7-1)

Location	Percent minority [a]	Percent low-income [b]
United States	30.9	12.4
State of Virginia	29.8	9.6
City of Alexandria	46.3 [‡]	8.9
Census tract 2018.01	27.2	11.1
Block group 1	18.9	5.0
Block group 2	6.3	9.5
Block group 3	37.8	23.3 [‡]
Block group 4	60.0 [‡]	3.4

[a] Includes all persons who identified themselves as not "white alone," plus those who identified themselves as both "white alone" and "Hispanic or Latino."
[b] Represents individuals below the poverty level as defined by the U.S. Census Bureau.
[‡] Minority or low-income population based on the DOE thresholds for percent minority or low-income.
Source: U.S. Census Bureau 2006.

4. PLANT OPERATIONS, ASSUMPTIONS, AND ENVIRONMENTAL CONSEQUENCES

This chapter begins by describing general Plant operations as authorized by the DOE Order. Next, this chapter describes the information and assumptions that DOE used to assess the impacts of the Plant under the DOE Order and a potential extension of the Order until the new 230-kV transmission lines are in service. Finally, this chapter assesses the impacts to air, human health, water, ecological resources, waste management, transportation resources, and minority and low-income populations as a result of the Order and a potential extension of the Order until the new 230-kV transmission lines are in service.

4.1 General Plant Operations as Authorized by the DOE Order

The DOE Order consists of 285 days, from December 20, 2005, to October 1, 2006. Just before the Secretary issued the Order, Mirant operated Unit 1 on an 8-8-8 basis (that is, in any given 24-hour period, it ran for eight hours at up to its maximum level of 88 MW, ran for up to eight hours at its minimum level of 35 MW, and did not run for at least eight hours), and began using trona and low sulfur Colombian coal, alone or in combination.

4.1.1 Operations as Authorized by the DOE Order until the Administrative Compliance Order (ACO)

At the time the Order was issued, Mirant had one operational trona injection unit that serviced only the Unit 1 boiler. A second trona unit became operational on January 22, 2006, and a third on March 20, 2006. Except during transmission line outages (Table 1.3-1), Mirant operated only boilers that had trona units. By April 28, 2006, Mirant had operational trona injection units installed on all five boiler units.

On January 4, 2006, DOE authorized Mirant to operate each of the two load-following or cycling units at the Plant (i.e., Units 1 and 2) up to 16 hours per day. Each unit was authorized to operate 8 hours at minimum load and up to an additional 8 hours at maximum load. In addition, DOE authorized Mirant to operate any one of the three baseload units continuously without constraint as to load or operating hours. According to Mirant's proposed operating plan, each baseload unit would operate for approximately two weeks before another baseload unit began a two-week operating period.

In January 2006, due to transmission line outages for maintenance, Mirant operated the Plant to meet the entire Central Washington, D.C., load for 21 days. No line outages have occurred since those in January. Between January and May, DOE continued to weigh other options that were available to Mirant to comply with the Order and consulted with EPA on options to increase electricity reliability while ensuring environmental protection.

4.1.2 Operation under the ACO

EPA issued its ACO to Mirant on June 1, 2006. On June 2, 2006, DOE directed Mirant to operate under the ACO during non-line outage situations, for the purpose of providing electricity reliability, and to continue operation in accordance with the DOE Order in line-outage situations.

4.1.2.1 Operations during non-line outage situations

Daily predictive modeling. Upon installation of three SO_2 monitors[11] the ACO directs Mirant, in non-line outage situations, to operate under daily predictive modeling. Under daily predictive modeling the Plant operators acquire the National Weather Service forecast for the next day for Ronald Reagan Washington National Airport and use that forecast along with their planned operating parameters as inputs to a computer modeling run for the following day using AERMOD Default[12]. If the modeling results indicate that operating the Plant under those conditions would not cause a modeled exceedance of the 3- and 24-hour average SO_2 and PM_{10} NAAQS limits, operators may run the Plant on that day using those parameters. If the results indicate that operation of the Plant would cause a modeled exceedance for these pollutants, the operators must adjust the planned operating parameters and rerun the model using the same weather forecast. The operators must continue to adjust their planned operating parameters and rerun the model until the results indicate no modeled exceedance of these pollutants. The operators then will operate the Plant the next day using those parameters. Thus, under this scenario the Plant can operate each day up to the maximum level allowed by the weather forecast for that day. The ACO only requires daily predictive modeling for PM_{10} when Mirant operates four or five units. Mirant is required to assume a PM_{10} emission rate of 0.055 lb/MBtu and to adjust operations to prevent a modeled exceedance for PM_{10}.

Other requirements of the ACO. In addition to daily predictive modeling, the ACO requires Mirant to install an audible alarm in the Plant's control room that will sound when the ambient concentration of SO_2 at any monitor reaches specified levels. When an alarm sounds, Mirant must make operational changes (e.g., increase use of trona, decrease operating level) and observe the effect of those changes on the level of SO_2 measured at the monitors. The ACO uses this alarm system to monitor the Plant's compliance with the annual SO_2 NAAQS limit. The

[11] Until June 20, 2006, when three newly installed SO_2 monitors were functioning, Mirant operated under the constraints detailed in Table 1 in the ACO. (See Appendix B.) These constraints included, for example, restrictions on number of hours of operation and SO_2 emission rate during each calendar day. For example, on days when Units 1 and 3 were operating, each unit was required to achieve a 24-hour average SO_2 emission rate no higher than 0.24 lb/MBtu and a 3-hour rolling rate no higher than 0.51 lb/MBtu, and Unit 1 was required to operate for no more than 8 hours per day above minimum power and spend at least 8 hours per day off.

[12] AERMOD Default means Version 04300 of the AERMOD computer model, currently approved for general use by EPA in accordance with 40 CFR Part 51, Appendix W, to predict NAAQS compliance. See the AERMOD text box in Section 4.3.1.

ACO also directs Mirant to undertake a "Model Evaluation Study" (MES) (text box) "to determine the best performing model for predicting the computer-modeled ambient air quality impacts" from Plant operations. To provide data for the MES and to support the alarms, Mirant installed six SO_2 monitors in locations identified in the ACO. (See Appendix B.) Lastly, the ACO puts a NO_x limitation on the Plant; at all times Mirant may not emit more than 3,700 tons (3,400 metric tons) of NO_x per year.

4.1.2.2 Operations during line outage situations

The ACO directs Mirant, in line-outage situations, to follow the DOE Order, but requires Mirant to "take all reasonable steps to limit the emissions of PM_{10}, NO_x and SO_2 from each boiler, including operating only the number of units required to meet PJM's directive and optimizing its use of trona injection to minimize SO_2 emissions." Further, the ACO requires that Mirant achieve "80% reduction of SO_2 emissions unless: 1) Mirant demonstrates ... that 80% reduction is not necessary to achieve compliance with the NAAQS; or 2) Mirant demonstrates that 80% reduction is not logistically feasible because of such factors as the quantity of available trona and the predicted duration of the outage." If Mirant demonstrates that 80% removal is not logistically feasible, it is required to submit a plan to EPA for optimizing its use of trona. However, as described in Section 4.3.1.1 and Section 5.3.1, DOE assumed 50% removal of SO_2 emissions in assessing impacts under the DOE Order and a potential extension of the Order.

Model Evaluation Study

The objective of the MES is to determine the best performing model for predicting the computer-modeled ambient air quality impacts from Plant operations. The MES proceeds by comparing the air quality impacts predicted by the AERMOD Default and those predicted by AERMOD EBD computer models to actual measured SO_2 concentrations in order to determine the better performing model. AERMOD Default is Version 04300 of AERMOD computer model, currently approved for general use by EPA. AERMOD EBD means the standard AERMOD computer model with modified direction-specific equivalent building dimensions derived from a wind tunnel study. Mirant submitted an MES protocol to EPA in July 2006 and submitted the results of the wind tunnel study to EPA in August 2006. If EPA and the VDEQ approve AERMOD EBD, Mirant must use it in its predictive modeling for the remainder of the MES period.

Mirant is to compare the actual data from the six monitors to the results of the two computer models. At the end of the study EPA and the VDEQ expect to determine which model is *best performing*. The best performing model will then be used to develop permanent emission limits for the Plant.

4.2 Assumptions and Data Used in SEA to Model Plant Operations

To the extent possible, DOE's assessment of the environmental impacts of Plant operations under the Order is based on actual operating data. However, the Plant has had several different modes of operation under the Order, and data are not available for all parameters.

Therefore, it was necessary to make some assumptions in order to assess the impacts of the Order and of the potential extension of the Order. This section describes operations under the Order and the assumptions that DOE used to estimate the environmental consequences.

4.2.1 Pre-Shutdown Operations

Before it shut down on August 25, 2005, the Plant operated its five units without SO_2 emissions controls. The Plant generated electricity at an annual average rate of 210 MW and burned about 837,000 tons (755,000 metric tons) of coal per year. Generation varied seasonally, with the highest generation occurring in the summer months when demand for air conditioning is high (Figure 4.2-1).

DOE used hourly, unit-by-unit electricity generation data, provided by Mirant, to model operations of the Plant. DOE used SO_2 emission factors it developed by analyzing detailed operation and emission data for the period December 20, 2005, through March 31, 2006. DOE assumed that the Plant emitted SO_2 at a rate of 1.05 lb/MBtu and that it emitted NO_2 at a rate of 0.35 lb/MBtu for Units 1 and 2 and 0.26 lb/MBtu for Units 3, 4, and 5.

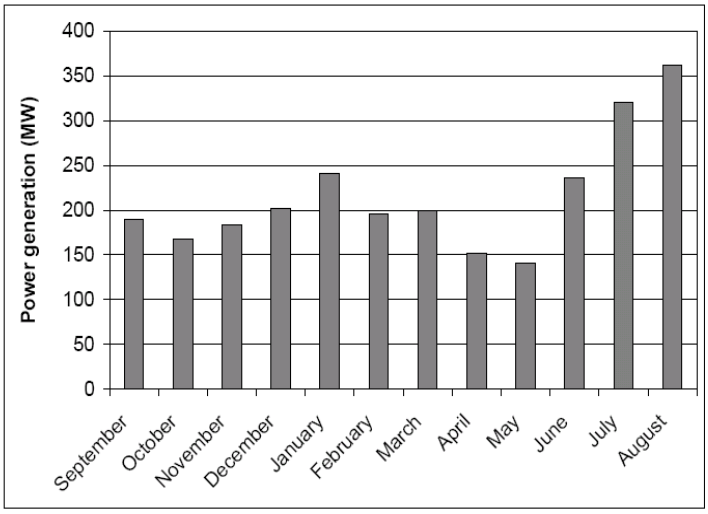


Figure 4.2-1. Monthly average power generation for September 2004 through August 2005.

4.2.2 Pre-Order Operations

Before the Secretary of Energy issued the Order, Mirant was operating Unit 1 in an 8-8-8 mode (in any given 24-hour period, the unit ran for up to eight hours at power levels up to its maximum level of 88 MW, ran for eight hours at its minimum level of 35 MW, and did not run for eight hours) and had begun using trona injection and low-sulfur coal in varying quantities. If the Order had not been issued, it is likely that Mirant would have continued to restart additional units at the Plant with the further installation of trona injection units. However, because it is impossible to know exactly what would have happened if the Order had not been issued, DOE is providing this "pre-Order" mode of operations as a basis for comparing impacts under the Order.[13]

[13] Because Mirant did not provide DOE with operations data for periods before December 20, 2005, and (continued...)

During the pre-Order mode, the Plant's Unit 1 operated for 16 hours per day with intermittent use of Colombian coal and/or trona injection. A typical day started at about 4 am with the unit being brought up to operating temperature by burning oil for about two hours. At about 6 am the unit was switched to coal and began generating electricity. The unit would reach a level close to its 88 MW capacity in about five hours, around 11 am. The unit would continue at that high power level through the afternoon and evening before making the transition to shut down status by about 10 pm. This is the 8-8-8 mode of operation.

During the pre-Order period Unit 1 consumed about 540 tons (490 metric tons) each day of coal with an average heat content of 12,000 Btu/lb and a heat rate of 12.9 million Btu per MWh (MBtu/MWh). On average, the unit emitted about 10,300 lb (4,700 kg) of SO_2 and about 4,300 lb (1,900 kg) of NO_x per day. SO_2 emission rates varied within the period due to trona injection and burning of coal with different sulfur contents. At this rate of coal consumption, one train containing 40 rail cars with 100 tons (91 metric tons) of coal per rail car could provide a week's worth of coal to the Plant. On a day when the Plant consumed 540 tons (490 metric tons) of coal that was on average 67% by weight carbon, it released about 1,300 tons (1,200 metric tons) of CO_2.

According to discharge monitoring reports that Mirant prepared for submission to EPA (Personal communication between A. Wearmouth, Mirant Corporation, and E.D. Smith, Oak Ridge National Laboratory, July 21, 2006), during December 2005 discharges to the Potomac River of cooling water and treated in-plant effluents averaged 94 million gal (356,000 m^3) per day. The reported maximum thermal discharge to the river was 969 MBtu per hour.

4.2.3 Operations under the Order and Potential Extension

Mirant provided DOE with hourly records of power plant operations for the period December 20, 2005, through March 31, 2006. These records include power production, stack gas parameters (e.g., flow rate, temperature, percent CO_2, opacity), pounds of NO_2 released per million Btu, pounds per hour of NO_2 released, pounds of SO_2 released per million Btu, and pounds per hour of SO_2 released. Table 4.2-1 is a summary of plant operations through March 31, 2006.

Mirant also supplied data on wastewater discharges for all months through June 2006 and data on total coal consumption and fly ash generation during the 3-month period March through May 2006.

The operating records described above allowed DOE to estimate plant operational parameters for each unit. DOE used those parameters to model plant operations during the Order and during a potential extension of the Order.

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[13] (...continued)
because Mirant continued its pre-Order (8-8-8 mode) operations through December 23, DOE used December 20 through 23 to represent pre-Order operations.

Table 4.2-1. Plant operation from December 21, 2005, through March 31, 2006

Dates	Operating mode
December 20- 23, 2005	Unit 1 operated with Colombian coal and trona testing
December 24, 2005	No data available
December 25 - 31, 2005	Unit 1 operated without using low sulfur coal or trona
January 1, 2006	No data available
January 2 - 6	Unit 1 operated without using low sulfur coal or trona
January 7 - 19	All five units operated as directed by PJM for a transmission line outage; only Unit 4 had trona injection
January 20	Only Unit 4 operated
January 21 - 28	All five units operated as directed by PJM for a transmission line outage; trona injection on Units 3 and 4
January 29 - February 15	Units 1 and 4 operated with trona injection
February 16 - 17	Only Unit 4 operated
February 18 - 21	Unit 3 and Unit 4 operated
February 22 - 25	Unit 1 and Unit 3 operated
February 26 - 27	Only Unit 3 operated
February 28 - March 8	Unit 2 and Unit 3 operated
March 9	Only Unit 4 operated
March 10 - 21	Unit 4 and Unit 5 operated
March 22	Only Unit 4 operated
March 23 - 31	Unit 3 and Unit 4 operated

Note: After January 28, only units employing trona injection were operated. Because Mirant found the Colombian coal unsuitable for use at the Plant, after the initial supply was consumed, Mirant used only trona injection to control SO_2 emissions.

For the purpose of evaluating impacts for which actual emissions data are not available, DOE assumed that impacts could be scaled to power production and coal use based on pre-August 2005 data (Section 4.2.1). During the year before shutting down in August 2005, the Plant generated power at an average rate of approximately 210 MW and consumed about 832,000 tons (755,000 metric tons) of coal.

Assumptions for operations from December 20, 2005, through June 30, 2006. For the period through March 31, DOE used hourly emissions data provided by Mirant to model air emissions. For the two days for which data were not provided, DOE assumed operations were identical to the preceding day. For this period DOE used historical weather data for the specific days of operation acquired from the National Weather Service.

Beginning with April, DOE made assumptions on operating modes based on information provided by Mirant. In operating plan supplements that Mirant supplied to DOE on January 13, 17, and 24 and February 6 and 16, 2006, Mirant described combinations of SO_2 emission rates and limits on hours of operation for all combinations of two units that its modeling determined would not cause any NAAQS exceedance. To model the air quality impacts of operations during the period April 1 through May 31, 2006, DOE assumed that Mirant operated the Plant to the maximum level described in those supplements.

Assumptions for operations from July 1 through September 30. On June 2, 2006, DOE directed Mirant to operate the Plant in compliance with the ACO. The ACO directed Mirant to operate the Plant within a set of constraints on operation hours and SO_2 emission rates enumerated in the ACO until Mirant met the requirements to operate in accordance with daily predictive modeling. For the purposes of this SEA DOE assumed that the Plant operated June 1 through June 30, 2006, in a manner that produced the maximum electrical power while being in compliance with the table of operational limits in the ACO.[14]

DOE assumed that after June 30 Mirant operated at the maximum level of power generation allowed under daily predictive modeling, as described in Section 4.1.2.1, and that, except during line-outage periods, this mode of operation continued through the duration of the Order and during a potential extension of the Order through 2007. The Plant generates electric power in response to demand, at levels requested by PJM. In order to estimate how much power might be generated during non-line outage situations when operating under daily predictive modeling, DOE used the record of the last year of historical operation (i.e., the year prior to August 24, 2005; Figure 4.2-1) to produce a scenario that represents levels of operations that might reasonably be expected if it were not for environmental constraints.

Assumptions for a potential extension of the Order.[15] DOE assumed that during non-line outage periods, the Plant would produce as much power as during the year before shutting down in August 2005, while complying with the ACO. Pepco has plans for several transmission line outages that would occur during a potential extension of DOE's Order before the two new 230-kV transmission lines are put into service. Outages are planned from November 27 through December 11, 2006; and February 19 through March 5, May 2 through 15, and May 21 through June 15, 2007. During outage periods DOE assumed that the Plant generated an amount

[14] Table 1 of the ACO specifies maximum operations levels and SO_2 emission rates for individual units and for combinations of two or three units. For operations under the ACO before daily predictive modeling commenced, DOE assumed that the Plant operated two units at all times.

[15] On September 28, 2006 Secretary Bodman issued a temporary extension of the Order until 12:01 a.m., December 1, 2006 to allow time to complete the SEA and consider public comments.

of power equal to the Central D.C. load during the corresponding dates in the year ending on August 31, 2005.[16]

Mirant is planning to take units out of service beginning in the fall of 2007 to reconfigure the exhaust stacks. DOE has not modeled these planned unit outages because they are not confirmed.

4.3 Environmental Consequences

Assessment of the environmental consequences of the Order is organized by environmental resource. Consideration of cumulative environmental impacts is incorporated into the individual resource-specific discussions, both implicitly (by considering impacts of the Order in the context of environmental conditions that exist because of past and ongoing actions) and explicitly (by considering the potential impacts of any additional ongoing and reasonably foreseeable future actions identified as having the potential to affect the resource).

4.3.1 Air Quality

Impacts to air quality would occur as the result of pollutants being emitted from the Plant's stacks during operations, as well as from activities at the Plant involving vehicle emissions and fugitive dust associated with the coal pile and the handling of ash. The pollutants of primary concern are SO_2 and particulate matter. Modeled concentrations of SO_2 and PM_{10} are discussed in Section 4.3.1.3. All other NAAQS pollutants, including $PM_{2.5}$, and hazardous air pollutants are discussed in Section 4.3.1.5. The emissions from the Plant were modeled for four periods: (1) Pre-shutdown operations, that is, the period before the Plant shutdown in August 2005; (2) Pre-Order operations (Section 4.2.2); (3) the period of the Order, including before

AERMOD

AERMOD is one of the approved models included in EPA's Guideline on Air Quality Models (40 CFR Part 51, Appendix W). It is composed of three parts: AERMAP, AERMET, and AERMOD. AERMOD is a steady-state plume air dispersion model that computes the air concentration of released pollutants at selected receptor points. During each hour modeled AERMOD considers the source characteristics (e.g., amount, temperature, stack exit velocity), atmospheric parameters (e.g., wind speed and direction, atmospheric stability), the relative locations of the source and receptor, and the effects of nearby buildings. The computed hourly concentrations are combined to produce the averaging periods (e.g., 24-hour averages) as requested by the user. AERMAP produces the required input data relative to the receptor grid, including elevation. AERMET processes surface and upper-air atmospheric data and produces the input files required by AERMOD.

[16] Because the Plant was not operating at normal historical levels in the period from August 21-31, 2005, DOE used operational levels for the first 11 days of August 2005 to represent the level that the Plant would likely have operated at if it had been generating power at historical levels during the last 11 days of the month.

the ACO allowed daily predictive modeling (December 20, 2005 through June 30, 2006) and after daily predictive modeling began (July 1 through September 30, 2006); and (4) the period beyond the Order (including the period of the temporary extension of the Order to December 1, 2006) until such time as the new transmission lines are placed into operation (October 1, 2006, through June 30, 2007, or, possibly, December 31, 2007).

4.3.1.1 Modeling methods and assumptions

DOE modeled hourly- and annual-average air concentrations of SO_2 and PM_{10} using the AERMOD system (EPA 2002). (See text box.) AERMOD was used to calculate concentrations for each of the more than 1,700 receptor locations provided by EPA, as shown in Figure 4.3.1-1. The modeled receptor locations include 50-meter intervals along the Plant's fence line. Beyond the fence line, the receptor grid forms a rectangular pattern with the innermost receptors spaced at 100-meter intervals out to a distance of 1,000 meters from the Plant (i.e., the innermost

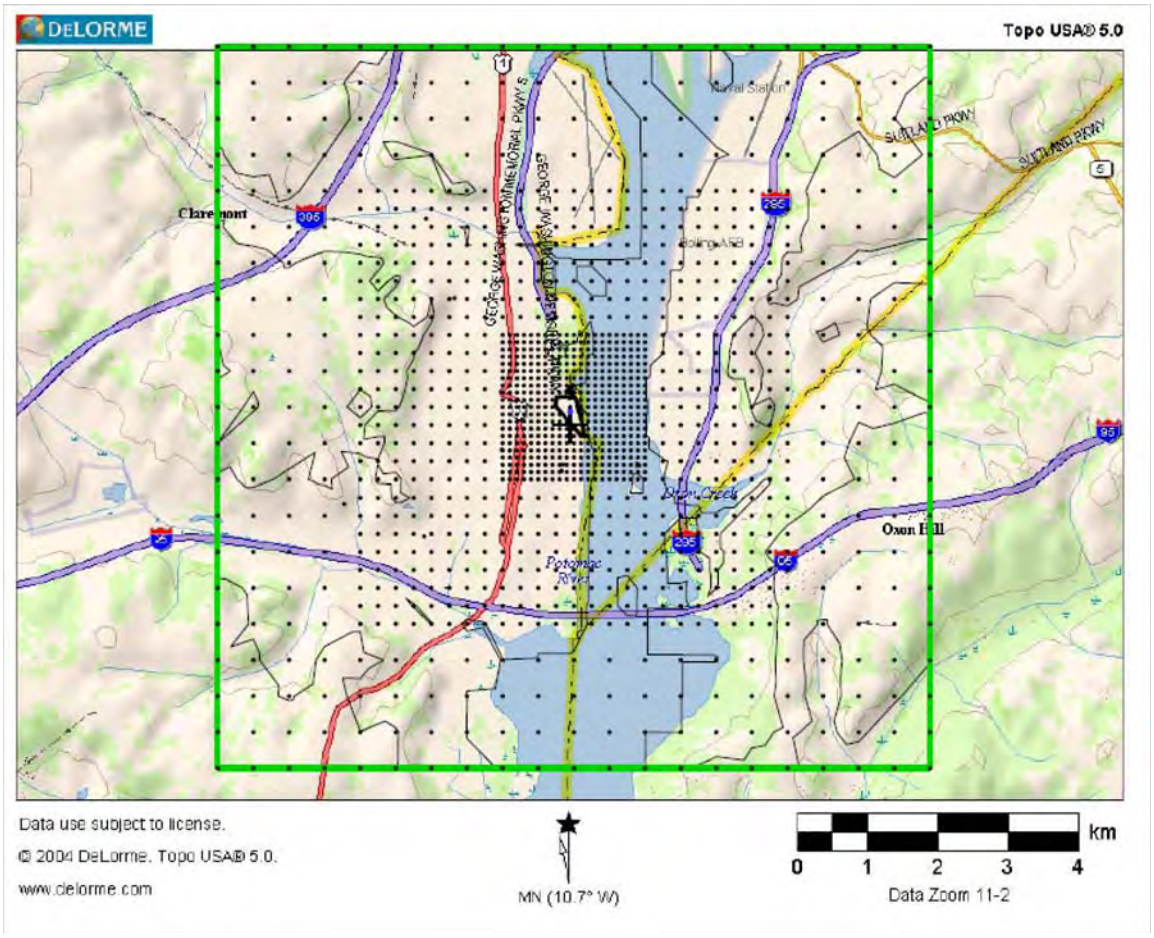


Figure 4.3.1-1. Map of receptor grid points for atmospheric dispersion modeling.

receptor grid forms a square 2,000 meters long on each side). A second set of receptors is located on the rectangular coordinates at 250-meter spacing for the distances between 1,000 and 3,000 meters of the Plant. Beyond 3,000 meters from the Plant, the receptor grid spacing is increased to 500-meter intervals. The receptor farthest from the Plant in an east-west direction (or in a north-south direction) is located 5,000 meters from the Plant. In addition to the grid of receptor locations, DOE modeled pollutant concentrations at several tall buildings in the vicinity of the Plant. DOE modeled 336 points around Marina Towers at the north end of the Plant, as well as points at multiple heights for six other nearby, tall buildings. The 336 points around Marina Towers are from 24 locations around the perimeter of the building and each of 24 floors of the building. Similarly, the multiple heights at the six other nearby buildings are the heights of each floor of the building.

AERMOD input data. For the period December 20, 2005, through March 31, 2006, DOE used actual unit-by-unit emissions (as provided by Mirant) and actual weather data obtained for Ronald Reagan Washington National Airport. These actual emissions and weather data were used in AERMOD to calculate local air pollution contributions of the Plant. For all other time periods DOE used estimated emissions and weather data from 2001 (as provided by EPA). Previous analyses by EPA had shown that 2001 resulted in predictions of more adverse air quality than the other years in the period 2000 through 2004.

For the period April 1 through May 31, 2006, DOE assumed that the Plant operated a different pair of units each week. Mirant reported to DOE that it had identified 10 two-unit operating modes (i.e., combinations of units that could operate for specified numbers of hours per day at specified SO_2 emission rates) that modeling by Mirant's contractor had demonstrated would not lead to exceedances of the 24-hour average SO_2 concentration at any location. For modeling purposes DOE assumed that the Plant practiced a ten-week rotation during which two of the five units were in operation during any given week. DOE assumed the following rotation of units: 1 and 2, 1 and 3, 1 and 4, 1 and 5, 2 and 3, 2 and 4, 2 and 5, 3 and 4, 3 and 5, and 4 and 5.

For the period April 1 through May 31, 2006, DOE assumed that the Plant operated a different pair of units each week. Mirant reported to DOE that it had identified 10 two-unit operating modes (i.e., combinations of units that could operate for specified numbers of hours per day at specified SO_2 emission rates) that modeling by Mirant's contractor had demonstrated would not lead to exceedances of the 24-hour average SO_2 concentration at any location. For modeling purposes DOE assumed that the Plant practiced a ten-week rotation during which two of the five units were in operation during any given week. DOE assumed the following rotation of units: 1 and 2, 1 and 3, 1 and 4, 1 and 5, 2 and 3, 2 and 4, 2 and 5, 3 and 4, 3 and 5, and 4 and 5.

For the month of June DOE assumed that two units at a time operated according to the schedule of allowed operations given in the ACO (Section 4.1.2). DOE assumed that the Plant used each of the 10 combinations of two units and operated each for three days.

DOE assumed that daily predictive modeling, as authorized by the ACO, was implemented beginning July 1, 2006. For operations under daily predictive modeling DOE assumed that, except during outages, each Plant unit generated power at the same level as it had during the year before Mirant terminated operations in August 2005[17] and that at all times Mirant injected enough trona to achieve 50% SO_2 removal (i.e., controlled to 0.525 lb/MBtu). DOE estimated 50% SO_2 removal to be an average or typical removal rate. At low power generation times and/or favorable wind conditions, very little SO_2 removal is needed to meet air quality standards. During high generation times and/or unfavorable wind conditions, higher rates of trona use (to remove up to 80% of SO_2) are necessary to meet air quality standards. DOE selected the assumption of 50% removal as a mid-range value.

During the transmission line outages planned by Pepco (Table 1.3-1), DOE assumed that all five units operated as necessary to meet the full load of Central D.C. as determined from past data.[18] DOE assumed that after a planned transmission outage the Plant resumed generating power at the level it had the year before operations were terminated on August 24, 2005.

The greatest modeled exceedances of the NAAQS SO_2 limits occur during line outage periods. Although removal of 80% of SO_2 from stack gases, which is technically feasible, would considerably reduce (but not eliminate) modeled exceedances, DOE's modeling of line outage periods assumes that the Plant removes 50% of SO_2 from stack gases. DOE has not modeled 80% removal because Mirant does not stockpile sufficient trona to maintain 80% SO_2 removal for an extended (typically, two-week) line outage.

Sulfur Dioxide. The SO_2 modeling proceeded by using AERMOD to calculate concentrations for each receptor grid point. To simulate the daily predictive modeling process of adjusting planned operations until modeled NAAQS compliance is achieved, DOE examined the 24-hour average concentration for each receptor grid point and for each day. For each day the predicted pollution concentration of each point in the receptor grid was reduced by the percentage that just brought the point with the highest concentration into compliance with the 24-hour SO_2 NAAQS limit.[19] DOE performed this procedure for every modeled day (except

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[17] Mirant provided unit-by-unit, hour-by-hour generation data for the period September 1, 2004, through August 31, 2005. DOE used this hourly power generation data to represent what the Plant would do if there were no environmental constraints. Plant operations were terminated on August 24, 2005. Because the data suggest that the Plant started reducing operations on August 21, generation data after August 20 were not considered representative of normal operation.

[18] During outages, DOE assumed that all five units operate at all times, each generating at least 30 MW (minimum capacity), for a total of at least 150 MW. When the load exceeded 150 MW but did not exceed 366 MW, DOE assumed that the two load-following or cycling units (Units 1 and 2) operated at minimum load (for a total of 60 MW) and the three baseload units (Units 3, 4, and 5) each operated at the same level to meet the remaining load. When the load exceeded 366 MW, DOE assumed that the baseload units each operated at capacity (102 MW), for a total of 306 MW, and the load-following or cycling units each operated at the same level to produce enough additional power to meet the demand until the load exceeded the capacity of the Plant (482 MW).

[19] Compliance with the 24-hour SO_2 limit was based on a concentration of 314 $\mu g/m^3$ (the NAAQS standard

(continued...)

during outages) before calculating 3-hour, 24-hour, and long-term average concentrations. Although the ACO also requires modifying planned operations if daily predictive modeling forecasts an exceedance of 3-hour average SO_2 limits, DOE did not simulate predictive modeling for the 3-hour standard because the computational effort required to calculate average concentrations for all possible 3-hour periods for each of the 1,747 modeled locations was judged to be excessively large for the information to be gained.

Particulate Matter. DOE's modeling considered both stack emissions and fugitive emissions from the Plant as sources of airborne particulate matter.

Based on particulate emissions testing by TRC Environmental Corporation (2006), DOE used a stack emission rate of 0.019 lb PM_{10} per MBtu when trona injection was employed and 0.035 lb/MBtu PM_{10} when it was not in use. For operations before the Order and during the January 2006 transmission line outage, DOE assumed the 0.035 lb/MBtu PM_{10} emission rate. For all other periods after the Order, DOE assumed the 0.019 lb/MBtu emission rate. DOE modeled stack emitted PM_{10} emissions using the same operational schedule as used for SO_2 modeling. However, DOE did not simulate the effects of daily predictive modeling on PM_{10} emissions because DOE found that with the 0.019 lb/MBtu emission rate, stack emissions never lead to exceedances of the NAAQS limit for PM_{10}.

DOE modeled fugitive PM_{10} emissions using fugitive dust parameters supplied to EPA by Mirant. Some fugitive emissions are related to wind; for example, wind blows dust off the coal pile. Most of the emissions are related to the handling of coal and ash, which are operations that increase as plant operations increase. Fugitive dust modeling parameters were not, however, increased or decreased as generating levels increased or decreased. The parameters are based on the assumption that four of the five units operate full time, but they do not account for the extra dust generated by disposal of trona waste.

4.3.1.2 Uncertainties in modeling

The modeling results need to be interpreted cautiously because of many uncertainties related to assumptions and modeling approaches. Overall, DOE's approach was conservative in that it tends to overestimate impacts. Specific sources of uncertainty include the following:

1. DOE chose to use 2001 weather data because, based on EPA experience using 2000 through 2004 weather data, the 2001 data were more likely than other years to yield modeled exceedances.

2. For periods after June 30, 2006, DOE assumed that Mirant used trona injection to reduce SO_2 emissions by 50%. The Plant may operate with less than 50% SO_2 removal when

[19] (...continued)
of 365 less the assumed background concentration of 51 µg/m^3).

modeling (based on predicted weather conditions) does not indicate an exceedance would result. Conversely, the Plant may remove more than 50% of SO_2 or reduce power generation rates when modeling indicates this is necessary to avoid exceedances of the NAAQS. The assumption of 50% SO_2 removal is likely to mean that DOE's modeling underestimates the period-average concentrations of SO_2. However, because of the way DOE has modeled daily predictive modeling, this should introduce little error in estimates of maximum short-term SO_2 concentrations.

3. DOE did not model all of the operational possibilities available to Mirant. When modeling indicates an exceedance, DOE's modeling assumes that Mirant reduces emissions to a level just below what would cause a modeled exceedance. (This is equivalent to assuming that the power generation from each boiler is reduced by the necessary percentage, or that additional trona is injected at each boiler to reduce SO_2 emissions by that percentage.) While it is mathematically possible to exactly meet the 314-µg/m^3 24-hour limit, DOE expects Mirant to keep SO_2 emissions somewhat below the levels that are computed to just meet the limit. Therefore, this DOE modeling approach tends to overestimate actual 24-hour averages.[20]

4. The ACO requires Mirant to achieve 80% SO_2 removal during line outage situations unless predictive modeling demonstrates that this level of SO_2 removal is not necessary or Mirant demonstrates that 80% removal is not "logistically feasible." Because Mirant does not have the capacity to stockpile sufficient trona for an extended line outage, DOE assumed 50% SO_2 removal during line outage situations.

5. DOE has used an estimate of fugitive PM_{10} emissions that is based on the assumption that four of the five boiler units are operating at all times. While some fugitive emissions are caused by wind-blown erosion (e.g., of the coal pile), most fugitive emissions result from coal and ash handling. Because the amount of coal and ash handling is related to the level of power generation, fugitive emissions are probably overestimated for periods when the Plant is producing relatively little power. On the other hand, because the fugitive emissions rates do not account for increased emissions due to trona waste generated by operations, the fugitive emissions may be underestimated during high power generation periods.

6. DOE's modeling of operations under daily predictive modeling does not account for the use of monitoring and alarms to prevent exceedances of SO_2 NAAQS. The ACO requires

[20] Although not required, Mirant is known to be targeting 200 µg/m^3 for a margin of predictive modeling to provide a margin of safety. (D. Lohman, EPA Region 3, personal communication with Seema Kakade, DOE, October 26, 2006.)

Mirant to monitor SO_2 at two locations on the top of Marina Towers and four other locations near the Plant. The ACO requires Mirant to maintain alarms that alert the Plant operators if monitored average concentrations reach 80% of the standards for SO_2. If one of the alarms sound, Mirant is required to modify operations to prevent an exceedance. (See Appendix B, Section IV, B, 5.) Because DOE's modeling does not account for use of monitoring to constrain operations, it overestimates the actual concentrations that will be observed during operations after this section of the ACO takes effect.

7. The highest modeled SO_2 concentrations occur at the rooftop at Marina Towers. Initial monitoring data collected by SO_2 monitors installed by Mirant for the MES do not show concentrations as high as calculated by Mirant's follow-up modeling, which is based on actual weather data. Because DOE believes it used the same AERMOD input parameters that Mirant used, these data suggest that the DOE application of AERMOD may overestimate maximum concentrations at Marina Towers. These data and the questions they raise are described in more detail in Section 4.3.1.4.

Despite the limitations, the results presented here are the best estimates available at this writing.

4.3.1.3 Modeling results for SO_2 and PM_{10} emissions

The EPA has established air quality standards for different averaging periods. An area is considered to be in attainment when the standards are not exceeded at any location in the area. For most pollutants compliance is determined by the second highest value or some other statistical characteristic per year.

The tables in this section present concentrations for three time averaging periods: 3-hour, 24-hour, and specific indicated time periods ranging from 21 to 387 days in length, which are presented as surrogates for the annual average. Although the standards typically determine compliance by the second highest value or another statistical characteristic, for simplicity DOE presents only the highest value for the specified averaging period. This maximum value is likely to be higher than the value used to determine compliance with the standard.

In all cases the value presented in the table is the modeled value for the receptor location that had the highest modeled value among the 1,747 modeled receptor locations. The 3-hour average refers to the highest average concentration for any three consecutive hours for any location. The 24-hour average is the highest average concentration for any calendar day (in the period) at any location. The maximum 3- and 24-hour averages represent relatively unusual occurrences. The annual or period average is more indicative of the usual air quality. Because most of the modeled periods are shorter than one year, the modeled period averages in the tables are not directly comparable to the annual air quality standards, but they do indicate how the period contributes to the annual average. For example, operations during a period with an average that exceeds the annual standard could contribute toward an exceedance of the annual

standard, while operations during a period with an average below the standard could contribute toward meeting the annual standard. Note that, because pollutants are not evenly distributed across the area, all values in the tables considerably overstate the expected concentration at all but a few of the 1,747 modeled locations.

Table 4.3.1-1 shows modeled SO_2 and PM_{10} concentrations for pre-shutdown operations, pre-Order operations, and operations under the Order through September 30, 2006. The first row of the table presents maximum background concentrations. These are the maximum values observed at nearby ambient air quality monitoring stations for the specified averaging periods (Table 3.1-2). The ACO specifies that these "background concentrations" must be added to modeled concentrations resulting from Plant operations in determining whether a "modeled exceedance" occurs. Other rows in the table present modeled concentrations resulting from Plant operations and summed values in which modeled concentrations are added to the maximum background concentrations. The summation approach specified in the ACO is conservative because it is very unlikely that maximum Plant-induced concentrations would occur at the same time as maximum background concentrations. The modeling results presented in the table are discussed in more detail in the following paragraphs.

Pre-shutdown operations. Until August 2005 the Plant operated in the historical manner; essentially, it produced power as economics would dictate. The Plant operated without controls on SO_2 emissions. Table 4.3.1-1 shows that modeling of pre-shutdown operations predicts significant exceedances of the NAAQS for SO_2 concentrations. The table also shows exceedance for the maximum 24-hour PM_{10} concentration. The maximum PM_{10} values reported here are dominated by fugitive dust emissions. Maximum modeled concentrations of PM_{10} from stack emissions are generally less than half of concentrations due to fugitive emissions.

Pre-Order operations. During the fall of 2005, the Plant operated in an 8-8-8 mode: 8 hours off, 8 hours at minimum power, and 8 hours at up to maximum power each day (Section 4.2.2). During this period the Plant was experimenting with trona injection and use of Colombian coal. However, Mirant had performed modeling that showed that no exceedance of the NAAQS SO_2 limit would occur under 8-8-8 operation even if no SO_2 control were employed. Consequently, during this period Mirant did not control SO_2 emissions to any set level. Table 4.3.1-1 shows the results of modeling pre-Order operations for an assumed full year. The table shows that pre-Order operations allow the Plant to meet SO_2 limits.

During 2005 and 2006, Mirant implemented several fugitive dust control measures (Section 2.5). Modeling of PM_{10} concentrations resulting from pre-Order operations used emissions factors that assume that some of these measures were in place. Table 4.3.1-1 shows that modeled PM_{10} concentrations for pre-Order operations are substantially lower than for pre-shutdown operations and meet the PM_{10} limits.

Table 4.3.1-1. Modeled maximum ambient SO_2 and PM_{10} concentrations ($\mu g/m^3$) for Plant operations among all receptor locations.

	SO_2			PM_{10}	
Operating Scenario and Period	**Maximum 3-hour average**	**Maximum 24-hour average**	**Maximum period average (for the specified period or 1 year)**	**Maximum 24-hour average**	**Maximum period average (for the specified period or 1 year)**
Maximum Background Concentration	238 [a]	51 [a]	16 [a]	45 [a]	21 [a]
Modeled Maximum Concentrations					
Pre-shutdown operations (Sep. 1, 2004 through Aug. 20, 2005)	5,156	2,967	299	150	25
Pre-Order operations (annual)	767	277	24	61	13
Dec. 20, 2005 through June 30, 2006					
Non-outage periods (172 days)	479	246	32	36	9
Outage periods (21 days)	3,484	1,888	389	43	13
July 1 through September 30, 2006	1,445	314	136	58	10
Modeled Maximum Concentrations with Maximum Background Concentrations Added					
Pre-shutdown operations (Sep. 1, 2004 through Aug. 20, 2005)	5,394	3,018	315	195	46
Pre-Order operations (annual)	1,005	328	40	106	34
Dec. 20, 2005 through June 30, 2006					
Non-outage periods (172 days)	717	295	48	81	30
Outage periods (21 days)	3,772	1,939	405	88	34
July 1 through September 30, 2006	1,683	365	152	103	31
NAAQS limit [b]	***1,300***	***365***	***80***	***150***	***50***

Note: Modeled values are the highest criteria pollutant concentration among all receptor locations. Pre-shutdown and pre-Order operations do not include higher levels of operations for line outages. Actual or planned line outage conditions are included in the operational periods of the Order. Annual values for modeled concentrations for periods less than one year are time-weighted averages. Whereas many NAAQS limits are specified as the second highest or other value, the modeled values presented in this table are the highest values.

[a] These are the highest values observed at nearby monitoring stations for the specified averaging periods. At most times ambient concentrations are lower than these values. Annual SO_2 concentration is the annual arithmetic mean for years 2001, 2002, and 2003 measured at 517 N. Saint Asaph Street, Alexandria City (ENSR Corporation 2005). Annual PM_{10} concentration is the 2004 arithmetic mean reported in VDEQ 2005, page 49, monitoring site L-46-B3. (Just before publication of this document, Virginia released ambient air monitoring data for 2005 [VDEQ 2006c]. The updated background levels vary only slightly from the 2004 values reported and used here.)

[b] NAAQS values from 40 CFR Part 50. See Section 3.1.2 and Table 3.1-1 for an explanation of NAAQS and the averaging periods that apply to each. EPA's October 17, 2006, rule making on NAAQS for particulate matter (EPA 2006j) revoked the annual PM_{10} standard, effective December 18, 2006.

Operations under the Order. Operations under the Order were addressed in two periods, December 20, 2005, through June 30, 2006, and July 1 through September 30, 2006. Operations under the Order were divided in this manner because DOE assumed that operations changed significantly when Mirant began operations under daily predictive modeling as permitted by the ACO. The following paragraphs discuss the effects of SO_2 and PM_{10} emissions for these two time periods.

December 20, 2005, through June 30, 2006. For the December through June period, maximum modeled SO_2 concentrations (Table 4.3.1-1) show exceedances of the SO_2 limits during the January line outages, when the highest modeled 3- and 24-hour SO_2 concentrations occurred. For most of the outage trona injection was available on only one unit; Mirant injected trona in two units simultaneously during the last week of the outage. For non-line outage periods through June 30, there were no modeled exceedances of the 3- or 24-hour limits, in part because the Plant operated at a relatively low average power. Table 4.3.1-1 shows no modeled exceedances of limits for PM_{10} during either line outage or non-line outage periods. The fugitive dust parameters used in modeling PM_{10} concentrations for this time period reflect the progressive implementation of fugitive dust control measures at the Plant.

July 1 through September 30, 2006. The commencement of *daily predictive modeling* on July 1, 2006, approximately coincided with the beginning of the season of highest power demand (Figure 4.2-1). Beginning July 1, 2006, modeled plant generation increased and modeled SO_2 exceedances occur for all averaging periods except the 24-hour average during non-outage periods. The ACO requires modifying planned operations if daily predictive modeling forecasts an exceedance of either 3- or 24-hour average SO_2 limits. DOE's modeling assumed that the Plant would scale back operations to meet the 24-hour SO_2 standard as required by the ACO (Section 4.1.2). However, as described in Section 4.3.1.1, DOE's model did not assume that the Plant would scale back operation to meet the 3-hour standard, even though it is required by the ACO, because it would have been excessively complex to model. In actuality, it is expected that the modeled maximum 3-hour average exceedances indicated by Table 4.3.1-1 for the July through September period would be prevented by daily predictive modeling. However, the model's prediction of exceedances when the 3-hour limit is not applied suggests that controlling operations for 24-hour averages is not enough to assure compliance with the 3-hour average SO_2 limit.

The modeled exceedance of the longer-period average SO_2 limit (Table 4.3.1-1) is a logical consequence of operations under daily predictive modeling, because daily predictive modeling allows the Plant to operate at the highest levels that do not cause exceedances of 24-hour SO_2 limit. Operating close to the 24-hour limit (314 g/m^3) day after day inevitably raises the long-term average to a higher level than for a plant that does not consistently operate close to the limit.

The exceedances indicated in the table are modeled exceedances, not actual exceedances. The ACO has provisions for preventing actual exceedances during non-outage periods. In particular, the ACO requires Mirant to monitor SO_2 concentrations near the top of Marina Towers (where the maximum modeled exceedances occur) for close approaches to NAAQS SO_2 limits. If a monitored concentration exceeds 80% of the limit for one of the averaging periods, an audible alarm will sound in the control room (Section 4.1.2.1) and the ACO requires Mirant to take corrective action, such as reducing power generation. Consequently, DOE anticipates that actual exceedances of the SO_2 limits will not occur during non-line outage periods.

As shown by Table 4.3.1-1, Plant operations under the ACO do not result in modeled exceedances of any of the NAAQS limits for PM_{10}.

Operations during a potential extension of the Order until new transmission lines are installed. Table 4.3.1-2 presents modeled maximum concentrations of SO_2 and PM_{10} due to Plant operations during a potential 9- or 15-month extension of the Order beyond September 30, 2006. This includes the period of the temporary 2-month extension of the Order from October 1 to December 1, 2006. Pepco's current schedule has the new transmission lines being installed and operational by the end of June 2007. Because there is a possibility that the transmission lines may not become operational on schedule, DOE has also examined a scenario for extension of the Order through December 2007.

As shown by Table 4.3.1-2, compliance with the ACO leads to meeting the NAAQS limits for 24-hour average SO_2 concentrations during non-line outage periods. As with operations under the initial term of the Order, DOE's model did not assume that the Plant would scale back operation to meet the 3-hour standard as required by the ACO. In actuality, it is expected that the modeled maximum 3-hour average exceedances indicated by Table 4.3.1-2 would be prevented by daily predictive modeling. The modeled exceedances of the NAAQS SO_2 limits for the annual average during non-line outage situations shown in Table 4.3.1-2 result from the assumption that the Plant operates close to the 24-hour limit on a continuing basis. Under the ACO Mirant would be required to modify Plant operations to avoid predicted exceedances of all SO_2 NAAQS averaging periods. Consequently, DOE anticipates that actual exceedances of the SO_2 limits would not occur during non-line outage periods.

As shown by Table 4.3.1-2, Plant operations under an extension of the Order would not result in modeled exceedances of any of the NAAQS limits for PM_{10}.

EPA has provided DOE with preliminary data on monitored air quality measurements taken by Mirant pursuant to the ACO. Mirant sent this information to EPA as part of its monthly reporting requirements under the ACO. EPA is currently reviewing and interpreting the data; however, as discussed in Section 4.3.1.4, the data suggest that actual air quality impacts from operation of the Plant under daily predictive modeling are lower than impacts predicted through DOE's modeling efforts.

4.3.1.4 Monitored SO_2 data

Pursuant to the requirements for performing the MES (Appendix B, Section VI), Mirant has installed six SO_2 monitoring stations near the Plant. Two are located on the roof of Marina Towers--one at the center of the building and one on the southeast wing. One station is located east of stack 5 on the west bank of the Potomac River. Another monitor is located southeast of the Plant along the fence line near the River. One monitor is located at Daingerfield Island about 800 m north of Marina Towers. One monitor is located on the roof of Harbor Terrace (Holiday Inn) southwest of the Plant. These monitoring sites were selected based on discussions among Mirant, DOE and EPA modeling and meteorological experts.

Initial results from the monitors show that actual monitored daily average (approximately the same as 24-hour average) values are much lower than shown by Mirant's follow-up modeling using actual hourly emissions and exhaust parameters and observed weather

Table 4.3.1-2. Modeled maximum ambient SO_2 and PM_{10} concentrations (µg/m^3) for Plant operations among all receptor locations for a potential extension of the Order.

	SO_2			PM_{10}	
Operating Scenario and Period	**Maximum 3-hour average**	**Maximum 24-hour average**	**Maximum period average (for the specified period or 1 year)**	**Maximum 24-hour average**	**Maximum period average (for the specified period or 1 year)**
Maximum Background Concentration	238 [a]	51 [a]	16 [a]	45 [a]	21 [a]
Modeled Maximum Concentrations					
Potential extension of the Order Oct. 1, 2006 – Jun. 30, 2007					
Non-outage periods (203 days)	1,236	314	101	61	12
Outage periods (70 days)	2,193	1,152	171	66	13
Potential extension of the Order Oct. 1, 2006 – Dec. 31, 2007					
Non-outage periods (387 days)	1,449	314	115	67	12
Outage periods (70 days)	2,193	1,152	171	66	13
Modeled Maximum Concentrations with Maximum Background Concentrations Added					
Potential extension of the Order Oct. 1, 2006 – Jun. 30, 2007					
Non-outage periods (203 days)	1,474	365	117	106	33
Outage periods (70 days)	2,431	1.203	187	111	34
Potential extension of the Order Oct. 1, 2006 – Dec. 31, 2007					
Non-outage periods (387 days)	1,687	365	131	112	33
Outage periods (70 days)	2,431	1,203	187	111	34
NAAQS limit [b]	***1,300***	***365***	***80***	***150***	***50***

Note: All periods include the period of the two-month temporary extension of the Order from October 1 to December 1, 2006. Modeled values are the highest criteria pollutant concentration among all receptor locations. Planned transmission line outages in preparation for the 230-kV lines are included in the periods. Annual values for modeled concentrations for periods other than one year are time-weighted averages. While, many NAAQS limits are specified as the second highest or other value, the values presented in this table are the highest values.

[a] These are the highest values observed at nearby monitoring stations for the specified averaging periods. At most times, ambient concentrations are lower than these values. Annual SO_2 concentration is the annual arithmetic mean for years 2001, 2002, and 2003 measured at 517 N. Saint Asaph Street, Alexandria City (ENSR Corporation 2005). Annual PM_{10} concentration is the 2004 arithmetic mean reported in VDEQ 2005, page 49, monitoring site L-46-B3. (Just before publication of this document, Virginia released ambient air monitoring data for 2005 [VDEQ 2006c]. The updated background levels vary only slightly from the 2004 values reported and used here.)

[b] NAAQS values from 40 CFR Part 50. See Section 3.1.2 and Table 3.1-1 for an explanation of NAAQS and the averaging periods that apply to each. EPA's October 17, 2006, rule making on NAAQS for particulate matter (EPA 2006j) revoked the annual PM_{10} standard, effective December 18, 2006.

conditions, matched hour for hour. Specifically, for the period June 17 through September 17, 2006, the maximum monitored daily-average concentration for the monitors ranged from 4 to 63 µg/m^3. For the same time period Mirant's follow-up modeling of actual operations using weather data recorded at Ronald Reagan Washington National Airport gave maximum daily-average concentrations that ranged from 25 to 570 µg/m^3. Aside from the specific operations and weather data, follow-up modeling used the same parameters to characterize the Plant as used for the analysis in the SEA and the 2005 downwash study (ENSR Corporation 2005).

The reasons for the discrepancy between monitored and maximum concentrations from follow-up modeling are not apparent. Mirant's technical consultant reports that when modeling uses effective building dimensions derived from a wind tunnel study, the resulting modeled maximum SO_2 concentrations are closer to the monitored concentrations (Personal communication between D. Shea, ENSR Corporation, Welsford, MA, and L.N. McCold, Oak Ridge National Laboratory, Oak Ridge, TN, October 3, 2006), but this modeling approach does not fully account for the discrepancy. An explanation suggested by Mirant's consultant is that AERMOD underestimates the buoyancy of multiple stack plumes when the wind is blowing parallel to the line of stacks. Another possible explanation is that the weather data from National Airport does not precisely match the weather at the Plant. Mirant's consultant reports that wind directions reported at National Airport are often slightly different from those detected at the Plant. Particularly near the Plant, small differences in wind direction can cause large differences in pollutant concentration at any specific point.

The discrepancy between monitoring data and modeled concentrations raises the possibility that the modeled maximum concentrations reported in Tables 4.3.1-1 and 4.3.1-2 of this SEA are unrealistically high for receptor points that are very close to the Plant. However, because DOE used forecasts rather than actual emissions and weather data, the results presented in this SEA are not directly comparable to either the monitoring data or to Mirant's follow-up modeling.

Because the MES may require as much as a year of monitoring data, EPA is not expected to reach a conclusion about the accuracy of the modeled concentrations before late 2007. In the meanwhile, the ACO requires that the Plant be operated to avoid predicted modeled exceedances.

4.3.1.5 Other air pollutants

Contributions to $PM_{2.5}$ pollution. For $PM_{2.5}$ the NAAQS specify a maximum annual average concentration of 15 µg/m^3 and a 98th-percentile 24-hour average concentration of 65 µg/m^3. Regulation of $PM_{2.5}$ is still developing. On October 17, 2006, EPA published new ambient air quality standards for $PM_{2.5}$ in the *Federal Register* (EPA 2006j). The new standards, which take effect December 18, 2006, retain the level of 15 µg/m^3 for the annual average and institute a 35 µg/m^3 24-hour average. State implementation plans (SIPs) for $PM_{2.5}$ are not due to EPA until 2008.

The $PM_{2.5}$ monitor nearest to the Plant is at Aurora Hills Visitor Center (Table 3.1-2), a short distance west of Ronald Reagan Washington National Airport. The 2004 annual average $PM_{2.5}$ concentration measured at Aurora Hills was 14.4 µg/m^3; the 98th-percentile 24-hour average concentration was 35.7 µg/m^3.[21] As noted in Section 3.1.2, the region in which the Plant exists is in nonattainment with the $PM_{2.5}$ standard.

[21] Just before publication of this document, Virginia released ambient air monitoring data for 2005 (VDEQ 2006c). The updated background levels vary only slightly from the 2004 values reported and used here.

There are two important sources of particulate matter associated with the Plant: stack emissions and fugitive dust. Because fugitive dust from the Plant is emitted near ground level, for locations near the Plant fugitive dust is the principal source of ground level $PM_{2.5}$ attributable to Plant operations. Because stack emissions are located far off the ground, they are the most important Plant-related source of particulate matter at nearby elevated receptor locations, specifically near the top of Marina Towers. Because both ground level and elevated concentrations are important, maximum values for each are presented here.[22]

DOE used estimates of PM_{10} concentrations (Section 4.3.1.3) as a basis for estimating $PM_{2.5}$ concentrations. EPA's AP-42 emission factor guidelines (Personal communication between D. Lohman, U.S. EPA, Region III, and L.N. McCold, Oak Ridge National Laboratory, August 28, 2006) applied to wind blown dust indicate that $PM_{2.5}$ is 15% of the PM_{10}. Based on this guidance, DOE assumed that 15% of fugitive PM_{10} was $PM_{2.5}$. The AP-42 factors for the $PM_{2.5}$ fraction of PM_{10} from electric generating units controlled by electrostatic precipitators range between 44% for dry bottom boilers and 76% for over-fire stokers (Personal communication between D. Lohman, U.S. EPA, Region III, and L.N. McCold, Oak Ridge National Laboratory, August 28, 2006). Based on this guidance, DOE conservatively assumed 76% of PM_{10} emitted from the Plant stacks was $PM_{2.5}$.

DOE's analysis considers only directly emitted particulate matter. In addition to $PM_{2.5}$ that is emitted directly as particulate matter, certain chemicals, especially SO_2 and NO_x, are emitted as gases, but form particulate matter after they are released. This source of $PM_{2.5}$ is not included in the air quality analysis because AERMOD does not incorporate a photochemical model that can account for nonlinear chemical reactions. In addition, such a model would require much more extensive atmospheric data than are readily available. However, because the background concentrations used in developing DOE's $PM_{2.5}$ estimates were measured while the Plant was operating at pre-shutdown levels, some, unknown but probably small, fraction of the background is due to Plant operations. Consequently, adding estimated Plant contributions to background concentrations involves some double counting of Plant effects. The discussion below presents estimates of $PM_{2.5}$ contributions first with and then without background concentrations.

Pre-shutdown operations. Pre-shutdown operations (one year) are estimated to have resulted in maximum 24-hour average concentrations of 74 $\mu g/m^3$ (38 $\mu g/m^3$ due to Plant operations alone; that is, without background) at ground level and 112 $\mu g/m^3$ (76 $\mu g/m^3$ due to Plant operations) at the top of Marina Towers. The annual average ground level $PM_{2.5}$ concentration was estimated to be 20 $\mu g/m^3$ (5.7 $\mu g/m^3$ due to Plant operations), and the average annual $PM_{2.5}$ concentration at the top of Marina Towers was estimated to be 22 $\mu g/m^3$ (7.8 $\mu g/m^3$ due to Plant operations).

Pre-Order operations. If pre-Order operations had continued for one year. the maximum estimated ground-level 24-hour-average $PM_{2.5}$ would have been 45 $\mu g/m^3$ (9.2 $\mu g/m^3$ due to

[22] Both stack and fugitive sources were included in estimating $PM_{2.5}$ concentrations for both ground-level and elevated receptors.

Plant operations), and the comparable concentration at the top of Marina Towers would have been 40 $\mu g/m^3$ (4.8 $\mu g/m^3$ due to Plant operations). The maximum estimated ground-level annual average $PM_{2.5}$ concentration would have been 16 $\mu g/m^3$ (2.0 $\mu g/m^3$ due to Plant operations), and the maximum annual average concentration at the top of Marina Towers would have been 15 $\mu g/m^3$ (1.0 $\mu g/m^3$ due to Plant operations).

Operations under the Order. For the duration of the Order, the estimated maximum 24-hour-average ground-level $PM_{2.5}$ concentration is 61 $\mu g/m^3$ (25 $\mu g/m^3$ due to Plant operations), and the maximum estimated ground-level 285-day-period-average $PM_{2.5}$ concentration is 38 $\mu g/m^3$ (2.4 $\mu g/m^3$ due to Plant operations). Because an important fugitive dust suppression measure was implemented in March 2006, the period before April contributed more to the 285-day-period average $PM_{2.5}$ concentration than operations after April, and the maximum estimated 24-hour-average $PM_{2.5}$ concentration occurred before April.

For the duration of the Order, the maximum 24-hour-average concentration at the top of Marina Towers is 76 $\mu g/m^3$ (41 $\mu g/m^3$ due to Plant operations), and the maximum 285-day-period-average concentration at the top of Marina Towers is 18 $\mu g/m^3$ (3.9 $\mu g/m^3$ due to Plant operations). Because of increased generation after the start of operations under daily predictive modeling, operations after June contributed more to the 285-day-period-average $PM_{2.5}$ concentrations than operations before July, and the maximum estimated 24-hour-average concentration occurred after June.

Potential extension of the Order. For a potential extension of the Order through December 2007 (including the period of the temporary extension until December 1, 2006), the estimated maximum 24-hour average ground-level concentration would be 58 $\mu g/m^3$ (23 $\mu g/m^3$ due to Plant operations), and the maximum estimated concentration on the top of Marina Towers would be 79 $\mu g/m^3$ (43 $\mu g/m^3$ due to Plant operations). The estimated maximum 24-hour average occurs during non-outage periods. The estimated maximum annual average ground-level $PM_{2.5}$ concentration would be 18 $\mu g/m^3$ (4.0 $\mu g/m^3$ due to Plant operations), and the estimated maximum concentration at the top of Marina Towers would be 20 $\mu g/m^3$ (5.7 $\mu g/m^3$ due to Plant operations).

Nitrogen oxide contributions to ozone (O_3) pollution. Alexandria and the surrounding area are in nonattainment for O_3. Ozone is formed in the atmosphere when sunlight interacts with NO_x and volatile hydrocarbons. In the eastern United States, natural volatile hydrocarbon molecules are abundant in the atmosphere. Consequently, the most effective method for limiting the formation of O_3 is limiting the abundance of NO_x in the atmosphere. NO_x is readily formed in high temperature combustion processes such as power plants and internal combustion engines.

The following data were used to estimate NO_x emissions. Hourly operations data for December 20, 2005, through March 31, 2006, indicate that average NO_x emission rate for Units 1 and 2 is about 0.35 lb/MBtu and the emission rate for Units 3, 4, and 5 averages 0.26 lb/MBtu. Assuming that each unit consumes the same average amount of coal, the average emission rate would be 0.296 lb per MBtu of coal consumed. At 12,000 Btu/lb of coal, Units 1 and 2 have NO_x

emission rates of 8.4 lb per ton of coal. When all units operate (using equal quantities of coal), the average NO_x emission rate is about 7.1 lb per ton of coal.

As a point of reference, the ACO requires that the Plant emit no more than 3,700 tons (3,400 metric tons) of NO_x per year.

Pre-shutdown operations consumed about 832,000 tons (755,000 metric tons) of coal per year and emitted 3,000 tons (2,700 metric tons) of NO_x per year. For comparison purposes, if pre-shutdown operations had continued for the 285-day duration of the Order, the Plant would have consumed about 650,000 tons (590,000 metric tons) of coal and emitted about 2,300 tons (2,100 metric tons) of NO_x. If pre-shutdown operations were to continue for a 15-month extension of the Order through December 2007 (including the period of the temporary extension until December 1, 2006), the Plant would consume about 1,040,000 tons (943,000 metric tons) of coal and emit about 3,700 tons (3,400 metric tons) of NO_x.

Pre-Order operations. For comparison purposes, if pre-Order operations (when only Unit 1 operated) had continued for the duration of the Order, the Plant would have consumed about 153,000 tons (140,000 metric tons) of coal and emitted about 640 tons (580 metric tons) of NO_x, a rate of about 820 tons (750 metric tons) per year. If pre-Order operations were to continue for an extension of the Order through December 2007 (including the period of the temporary extension until December 1, 2006), the Plant would emit about 1,030 tons (940 metric tons) of NO_x over the 15-month period.

For the 285-day term of *the Orde*r, the Plant is estimated to burn about 566,000 tons (504,000 metric tons) of coal and emit about 2,600 tons (2,300 metric tons) of NO_x, a rate of 2,600 tons (2,300 metric tons) per year.

For *potential extension of the Order* from October 1, 2006 through December 2007 (including the period of the two-month temporary extension until December 1, 2006), the Plant would consume about 1,040,000 tons (940,000 metric tons) of coal and emit about 3,700 tons (3,400 metric tons) of NO_x, a rate of about 3,000 tons (2,700 metric tons) per year.

Contributions to carbon monoxide (CO) and lead pollution. As shown by Table 3.1.2, monitored levels of CO are well below the standard. Because CO levels are so low and because coal-fired power plants are not significant sources of CO, DOE did not model contributions to ambient CO levels due to Plant operations. Because ambient lead concentrations have declined to such low levels since the elimination of leaded gasoline that lead concentrations are no longer monitored in Virginia, DOE did not model potential contributions due to Plant operations.

Contributions to hazardous air pollutants. *Mercury* emissions by coal fired power plants are believed to be a major contributor to atmospheric mercury contamination. In its elemental form mercury is easily vaporized. Mercury forms nonvolatile compounds with sulfur and chlorine that can be captured in precipitators and incorporated in fly ash, but DOE assumed that all mercury in the coal burned by the Plant is emitted to the atmosphere through the stacks. This assumption is not likely to lead to an overestimate of mercury emissions because chemical analyses of Plant fly ash did not detect mercury (Section 4.3.5).

Data provided by Mirant indicates that the mercury content of coal supplied to the Plant ranges from 0.03 to 0.07 ppm (0.06 to 0.14 lb mercury per thousand tons of coal). DOE's analysis conservatively uses the high end of this range, that is 0.14 lb per thousand tons of coal.

Pre-shutdown operations consumed about 832,000 tons (755,000 metric tons) of coal per year. At 0.14 lb of mercury per thousand tons of coal, pre-shutdown operations can be estimated to emit 116 lb/year (53 kg/year) of mercury. For the 285-day period of the Order, it would emit about 91 lb of mercury. For extension of pre-shutdown operations through a 15-month extension of the Order, operations would emit about 145 lb of mercury.

For *pre-Order operations*, the Plant would burn about 540 tons (490 metric tons) of coal per day. Pre-Order operations for the period of the Order would lead to consumption of about 153,000 tons (140,000 metric tons) of coal. At 0.14 lb mercury per thousand tons of coal, pre-Order operations would have caused emission of about 21 lb (10 kg) of mercury for the period of the Order. Pre-Order operations for a 15 month extension of the Order would involve consumption of about 245,000 tons (220,000 metric tons) of coal and emission of about 34 lb (16 kg) of mercury.

For the 285 days of *the Order*, DOE estimates Plant coal consumption at 566,000 tons (510,000 metric tons), resulting in emissions of about 79 lb (36 kg) of mercury. Thus, the Order is estimated to increase mercury emissions of the Plant by 58 lb (26 kg) over the 285-day term of the Order. By comparison, if *pre-shutdown operations* had continued for the same 285 days, the Plant would have consumed about 650,000 tons (590,000 metric tons) of coal and emitted about 91 lb (41 kg) of mercury.

For *potential extension of the Order* from October 2006 through December 2007 (including the period of the two-month temporary extension until December 1, 2006), the Plant would consume about 1,040,000 tons (943,000 metric tons) of coal and emit approximately 146 lb (66 kg) of mercury. By comparison, pre-Order operations of the Plant for the same period would involve burning about 245,000 tons (220,000 metric tons) of coal with emission of about 34 lb (16 kg) of mercury. Thus, extension of the Order for 15 months would result in an increase in mercury emissions, over pre-Order operations, of about 111 lb (50 kg) mercury.

Other metals typically present as trace constituents of coal are less volatile than mercury, so they are primarily incorporated into solid wastes (bottom ash and fly ash), with only small fractions emitted to the atmosphere. The coal data that Mirant provided to DOE did not include concentrations of toxic metals other than mercury. Table 2.3-1 summarizes some published data on concentrations of seven trace metals in Appalachian coals. These data provide an indication of levels that may be present in the central Appalachian coal burned by the Plant. DOE performed a mass balance analysis for five of these metals using data on fly ash from Table 4.3.5-2. The results suggest that much of the arsenic and cadmium in the original coal, and some of the lead, selenium, and chromium are captured in fly ash. Capture of selenium in fly ash increases greatly when trona is used in the Plant (Section 4.3.5). DOE does not have data on the composition of the Plant's bottom ash, which would be expected to contain the majority of some metals, particularly the least volatile, such as beryllium, chromium, and nickel. Metals not

captured in a solid phase are released to the atmosphere. DOE has not estimated the quantities of these metals released to the atmosphere.

4.3.1.6 General conformity requirement

Background. General conformity arises out of Section 176(c)(1) of the Clean Air Act (CAA) which provides that no Federal agency shall "engage in, support in any way or provide financial assistance for, license or permit, or approve, any activity which does not conform to [an approved State implementation plan (SIP)]." Under the CAA conformity to an implementation plan means that such activities will not (1) cause or contribute to any new violation of any standard in any area, (2) increase the frequency or severity of any existing violation of any standard in any area, or (3) delay timely attainment of any standard or any required interim emission reductions or other milestones in any area [CAA §176(c)(1)(B)].

Before DOE issued its Order, VDEQ raised several concerns related to general conformity in its filing to FERC (VDEQ 2005b).[23] VDEQ claimed that resumption of Plant operations at the previous levels would "not be in conformity with the Virginia SIP's purpose of eliminating or reducing the severity and number of exceedances of the NAAQS." VDEQ's filing to FERC also claimed that resumption of Plant operations "at the previous levels, or any other level that would not be protective of human health or the environment, would clearly conflict with Mirant's regulatory obligation to comply with the [VDEQ] Director's request under 9 VAC 5-20-180(I), and therefore would not be in conformity with the SIP."

The Federal general conformity regulations implementing Section 176(c)(1) of the CAA are codified at 40 CFR Part 51, Subpart W, and 40 CFR Part 93, Subpart B. Pursuant to 40 CFR 51.851, Virginia has an EPA approved general conformity rule that complies with the CAA. Therefore, Virginia's general conformity rule applies here.

Under the general conformity rules, if the conformity rule applies to a Federal action, then the agency must determine whether the action "conforms" to a SIP. The conformity rule applies for each pollutant where the total of direct and indirect emissions in a nonattainment or maintenance area caused by the action would equal or exceed de minimis thresholds and where the action does not fit an exception (9 VAC 5-160-30). If the conformity rule applies, a Federal action is deemed to "conform" to a SIP if it is in compliance with all relevant requirements and milestones in the SIP and meets one of several requirements enumerated in the regulations, such as the emissions are specifically identified and accounted for in the SIP (40 CFR 93.158, 9 VAC 5-160-160).

The city of Alexandria and surrounding Arlington, Fairfax, Loudoun, and Prince William counties are in nonattainment for $PM_{2.5}$ and 8-hour ozone (the precursors for ozone are NO_x and volatile hydrocarbons) (EPA 2006f). Because the general conformity regulations only apply to

[23] As stated in DOE's Order (footnote 2), DOE considered all legal arguments made in FERC filings in its decision-making process.

Federal actions that exceed de minimis thresholds in designated "nonattainment" or "maintenance" areas, these are the only pollutants that are relevant here.

The Order conforms to the Virginia SIP. Because the Order does not cause or contribute to new emissions not already accounted for in the SIP or interfere with limits in the SIP, the Order conforms to the Virginia SIP. The Order does not allow the Plant to resume operations at levels it had been operating at under the Virginia SIP before the August 24, 2005, shutdown. Instead, the Order only allows the Plant to operate at pre-shutdown levels in limited transmission line outage circumstances, or when permitted by daily predictive modeling. In addition, for $PM_{2.5}$ the Order cannot interfere with $PM_{2.5}$ emissions not already accounted for in the SIP because Virginia does not currently have a SIP for $PM_{2.5}$.[24] Similarly, because the original study regarding the Plant's NO_x emissions (prompting the shutdown of the Plant on August 24, 2005), related to downwash rather than to NO_x as a precursor to ozone, the Order would not appear to affect Virginia's SIP for ozone (EPA 2006g).[25]

Furthermore, the Order alleviates the concerns related to conformity to the SIP raised by VDEQ in its filing to FERC. To the extent that the SIP accounts for full operation of the Plant without the use of trona and low-sulfur coal, the Order actually decreases emissions already accounted for in the SIP. Therefore, the Order helps Virginia achieve its "purpose of eliminating or reducing the severity and number of exceedances of the NAAQS" (VDEQ 2005b). The Order also does not present a conflict between resumption of Plant operations under the Order and Mirant's regulatory obligation to comply with the VDEQ Director's August 19, 2005, request. Indeed, the VDEQ Director's August 19, 2005, letter to Mirant suggested the "potential reduction of levels of operation" as a potential method of complying with the Director's request under 9 VAC 5-20-180(I) to "immediately undertake such action as is necessary to ensure protection of human health and the environment" (Personal communication between R.G. Burnley, VDEQ, and L.D. Johnson, Mirant Potomac River, LLC., August 19, 2005). Moreover, the DOE Order does not impinge upon VDEQ's ability to enforce concerns over pollutants emitted from the Plant. For example, during the period of the Order, VDEQ continued to work with EPA and Mirant on a long-standing settlement over NO_x that began in 2003 and resulted in an amended settlement on May 8, 2006 (EPA 2006g).

The function of the general conformity requirement is to ensure that Federal actions do not interfere with SIPs for meeting CAA standards and requirements. The integration of Federal actions and state air quality planning is intended to "protect the integrity of the SIP by helping ensure that SIP growth projections are not exceeded, emissions reduction progress targets are achieved, and air quality attainment and maintenance efforts are not undermined" (58 FR 63214,

[24] Although EPA has had a $PM_{2.5}$ NAAQS since 1997 (revised on October 17, 2006), $PM_{2.5}$ SIP's are not due for states with designated nonattainment areas for $PM_{2.5}$ until April 2008 (EPA 2006h, 2006i).

[25] Concerns over alleged violations of the 2003 Ozone Season NO_x emission limitations specified in Mirant's Stationary Source Permit have been resolved through a judicial consent decree between EPA, VDEQ, the State of Maryland, and Mirant (EPA 2004, 2006g).

63215; Nov. 30, 1993). In this case the Order not only conforms to the Virginia SIP by definition, but also achieves the overarching purpose of the general conformity principle.

The Order is exempt under the General Conformity regulations. Even if the Order does not conform to the Virginia SIP, the emissions generated from the Order fall within the "emergency" exceptions enumerated in the Virginia conformity regulations (9 VAC 5-160-30). A conformity determination is not required for "actions in response to emergencies or natural disasters such as hurricanes, earthquakes, etc., which are commenced on the order of hours or days after the emergency or disaster . . ." (40 CFR 93.153(d)2). "Emergency" is further defined in the Federal conformity regulations as:

> A situation where extremely quick action on the part of the Federal agencies involved is needed and where the timing of such Federal activities makes it impractical to meet the requirements of this subpart, such as natural disasters like hurricanes or earthquakes, civil disturbances such as terrorist acts and military mobilizations. (40 CFR 93.152)

An emergency clearly existed on December 20, 2005. In fact, the very nature of DOE's ability to issue the Order in the first place comes from the Department's *emergency* authority under Section 202(c) of the Federal Power Act. It took DOE three months to understand the reliability situation at hand and determine the potential environment, health, and safety risks associated with the Plant's shutdown. However, as soon as a line outage occurred (December 16, 2005) and the very real threat of a blackout in the Central D.C. area became apparent, DOE took quick action by issuing its Order. Therefore, DOE's action qualifies as an emergency exception to the general conformity regulations.

4.3.1.7 Global climate change

A major worldwide environmental issue is the likelihood of major changes in the global climate (e.g., global warming) as a consequence of increasing atmospheric concentrations of "greenhouse" gases (IPCC 2001). The atmosphere allows a large percentage of incoming solar radiation to pass through to the earth's surface and be converted to heat energy (infrared radiation) that does not pass back through the atmosphere as easily as the solar radiation passes in. The result is that heat energy is "trapped" near the earth's surface.

Greenhouse gases include water vapor, CO_2, methane, nitrous oxide, O_3, and several chlorofluorocarbons. The greenhouse gases constitute a small percentage of the earth's atmosphere; however, their collective effect is to keep the temperature of the earth's surface about 60°F (33°C) warmer, on average, than it would be if no atmosphere existed. Water vapor, a natural component of the atmosphere, is the most abundant greenhouse gas. The second-most abundant greenhouse gas is CO_2, which has increased about 30% in concentration over the last century. Fossil fuel burning is the primary contributor to increasing concentrations of CO_2 (IPCC 2001). The increasing CO_2 concentrations likely have contributed to a corresponding increase in

globally averaged temperature in the lower atmosphere, which has increased by about 1–1.4°F (0.5-0.8°C) in the last hundred years (IPCC 2001).

Because CO_2 is relatively stable in the atmosphere and essentially uniformly mixed throughout the troposphere and stratosphere, the climatic impact of CO_2 emissions does not depend upon their source location on the earth. Instead, an increase in CO_2 emissions from a specific source is effective in contributing to global increases in CO_2 concentrations.

Carbon dioxide emissions from the Plant involve two components: CO_2 produced by the combustion of the carbon contained in the coal and CO_2 produced by chemical reactions as the trona removes SO_2 from the exhaust gases. These two components of Plant emissions are shown in Table 4.3.1-3 and are discussed in detail in the following paragraphs. Coal combustion is discussed first.

During four days in December 2005, when the Plant was running in pre-Order mode, the Plant burned 2,150 tons (1,950 metric tons) of coal. This coal produced 5,300 tons (4,800 metric tons) of CO_2. Operation of the Plant for a full year at the pre-Order level operations would be expected to produce about 480,000 tons (440,000 metric tons) of CO_2.

For the 285-day term of the Order (December 20, 2005, through September 30, 2006), the total amount of coal used by the Plant is estimated to be 566,000 tons (513,000 metric tons). This quantity of coal, when burned, would produce approximately 1.38 million tons (1.25 million metric tons) of CO_2. On an annualized basis operation of the Plant under the Order would be expected to produce at an annual rate of 1.76 million tons (1.60 million metric tons) of CO_2 per year.

During the one-year period immediately preceding the shutdown of the Plant in August 2005, the Plant generated power at an average rate of 210 MW, using an estimated 832,000 tons (755,000 metric tons) of coal. The combustion of this amount of coal produced approximately 2 million tons (1.8 million metric tons) of CO_2. These data can be used to represent the anticipated operation of the Plant during the two-month temporary extension until December 1, 2006, and through the duration of any additional extension of the Order (i.e., October 1, 2006, through December 31, 2007).

For all three cases above, the use of trona is assumed to result in 50% removal of SO_2 from the Plant's stack gases. To achieve this removal rate, trona needs to be fed at a 2.5 times higher than the rate theoretically calculated to be sufficient to react with all of the SO_2 in the stack gases. With the addition of heat CO_2 is released from trona in a calcining reaction. This results in approximately 0.009 lb of CO_2 being released from trona for each pound of coal burned. The resulting quantities of the CO_2 released from trona, as shown in Table 4.3.1-3, are a very small fraction of the CO_2 released by coal combustion.

To put the above numbers into perspective, global fossil combustion in the year 2003 resulted in emissions of approximately 28 billion tons (26 billion metric tons) of CO_2 (Marland et al. 2006).

Table 4.3.1-3. Annualized carbon dioxide emissions (tons/year) from the Mirant Plant during operational periods under analysis in this report

	Coal combustion	Trona utilization	Total from Plant
Pre-shutdown operations	2,000,000	0	2,000,000
Pre-Order operations	480,000	1,800	488,800
The Order (Dec. 20, 2005 – Sep. 30, 2006)	1,760,000	6,500	1,766,500
Potential extension of the Order (Oct. 1, 2006 – Dec. 19, 2007)[a]	2,000,000	7,500	2,007,500

Note: "Annualized" values were obtained by prorating the emissions during the actual period over a hypothetical 365-day period.
[a]Includes the period of the temporary extension of the Order until December 1, 2006.

4.3.2 Human Health

This section discusses the human health impacts of emissions from the Plant during two principal time periods: (1) the period of operations under the Order and (2) the duration of a potential extension of the Order. As a comparison, the health effects of the pre-Order mode of operation as well as the pre-shutdown operation of the Plant are also presented. The analysis in this section uses mathematical factors that relate a person's exposure to concentrations of airborne pollutants to premature mortality and other health effects.

Potential human health effects resulting from the Order are a serious concern to DOE. A wide range of human health effects are associated with ambient concentrations of particulate matter and SO_2 as well as other NAAQS primary and secondary pollutants. Numerous epidemiological studies have demonstrated that increases in pollution levels are associated with increases in illness rates, use of health services, and earlier death among exposed persons.[26]

Particle pollution, especially fine particle pollution (i.e., $PM_{2.5}$), contains microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems. Numerous scientific studies have linked particle pollution exposure to a variety of problems, including:

- increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing,
- decreased lung function,
- aggravated asthma,
- development of chronic bronchitis,
- irregular heartbeat,

[26] Some recent information about air pollution health effects may be found in the Criteria Documents prepared to support EPA periodic reviews of the NAAQS; http://www.epa.gov/ttn/naaqs/.

- nonfatal heart attacks, and
- premature death in people with heart or lung disease.

People with heart or lung diseases, children, and older adults are most likely to be affected by particle pollution exposure. However, even healthy people may experience temporary symptoms from exposure to elevated levels of particle pollution.

Peak levels of SO_2 in the air can cause temporary breathing difficulty for people with asthma who are active outdoors. Longer-term exposures to high levels of SO_2 gas and particles cause respiratory illness and aggravate existing heart disease. SO_2 reacts with other chemicals in the air to form tiny sulfate particles. When these are breathed, they gather in the lungs and are associated with increased respiratory symptoms and disease, difficulty in breathing, and premature death.

4.3.2.1 Analytical approach

For the purposes of this SEA, DOE has used two techniques to estimate premature mortality due to Plant operations and has used one technique to estimate the incidence of other health effects. DOE analyzed all-cause mortality as a useful indicator of health effects because background mortality rates are readily obtainable and the association between air pollution and premature mortality[27] has well-documented response functions. DOE used a concentration-response function for premature mortality from Pope et al. (2002) to estimate the expected fatalities and to estimate the risk of premature mortality to a hypothetical maximally exposed individual in the community near the Plant. DOE used an EPA scaling technique (EPA 2005) to estimate premature mortality and other health effects to a much broader population.

For the assessment of health effects to persons in the local area, DOE used estimated $PM_{2.5}$ and modeled SO_2 concentrations for a 36-mi^2 (93-km^2) receptor grid comprised of 1,747 receptor locations with the Plant near its center (Figure 4.3.1-1). This area contains approximately 240,581 people.[28]

In order to provide estimates of the adverse effects of various operating scenarios in this SEA, DOE has chosen all-cause mortality as the most useful single indicator of adverse health effects. Mortality is the most severe outcome in personal terms and also represents 90% or more of the associated cost in economic terms.

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[27] The studies on which this environmental analysis is based analyzed all-cause mortality for cohort studies, which capture both short-term and long-term effects. *All-cause mortality* means fatalities that occur for any reason. Scientists studying the effects of air pollution use all-cause mortality rather than fatalities that are clearly tied to air pollution because accurately determining the cause of death is often impossible in epidemiological studies.

[28] The population estimates are based on individual, rectangular cells with a dimension of 15 seconds of one degree on each side. The populations within all such cells within the grid are interpolated to the U.S. Census Bureau's 2005 estimates (Personal communication between P. Coleman, Oak Ridge National Laboratory, and A.L. Sjoreen, Oak Ridge National Laboratory, June 5, 2006).

DOE used the adult (age 30 and older) $PM_{2.5}$ concentration-response function (relative rate: 1.06 per 10 µg/m^3, 95% confidence interval: 1.02–1.11) from Pope et al. (2002).[29] The Pope et al. (2002) study finds one of the strongest associations between $PM_{2.5}$ exposure and premature mortality. Because SO_2 represents a significant proportion of the Plant's pollutant output, and SO_2 is known to convert to sulfate particles in ambient air, it is considered here as an addition to the estimated $PM_{2.5}$ concentrations.[30] DOE assumed that SO_2 converts to sulfate particles as an addition to the $PM_{2.5}$ loading at the rate of 7% per 24-hour period (Azad and Kitada 1998).

All cause premature mortality is calculated by multiplying the modeled pollutant concentration by the age specific population, the age specific all-cause death rate, and the concentration-response function to obtain the expected number of deaths. Sixty percent of the population in Virginia is aged 30 or older (Virginia Department of Health 2004). For the receptor grid DOE studied this yields an estimate of 144,000 persons 30 or older. For this age group, the annual, all-cause death rate is 13 per 1,000 (Virginia Department of Health 2004).

To estimate several other health effects from particulate matter resulting from plant operations, DOE used a scaling technique developed by EPA based on extensive air quality modeling (EPA 2005). The method involves interpolation among cases that were modeled in detail by EPA. DOE used parameters provided by EPA to estimate health effects incidence based on total emissions of SO_2, NO_x, and $PM_{2.5}$ from the Plant (Personal communication between B. Hubbell, EPA, and L.N. McCold, Oak Ridge National Laboratory, October 11, 2006). The potentially affected population on which these estimates are based is roughly the population of the eastern United States. While the risks to persons who live near the Plant are largest, the expected incidence includes the sum of very small risks to millions of people.

4.3.2.2 Results

DOE estimated the expected incidence of premature mortality among the 144,000 adult population (age 30 or older) in a 36-mi^2 (93-km^2) area centered on the Plant (Figure 4.3.1-1). The results of the analysis of health effects to the adult population are described by the following bullets:

- As a result of exposure to the combined effects of SO_2 and PM_{10}, the expected incidence of premature mortality among the 144,000 adults (30 and older) in a 36-mi^2 (93-km^2) area around the Plant from *pre-shutdown operations* is about 3.8 (confidence interval: 1.2 to 6.8) per year.

[29] EPA employs the Pope et al. $PM_{2.5}$-related mortality estimates as one component in cost/benefit analyses of various air pollution reduction strategies (EPA 2005). Information on EPA's studies and the methodology can be found in the Regulatory Impact Analysis for the Final Clean Air Interstate Rule (EPA-452/R-05-002, March 2005), which may be found at http://www.epa.gov/air/interstateairquality/pdfs/finaltech08.pdf.

[30] NO_x is also known to convert to $PM_{2.5}$ in the atmosphere. DOE did not include NO_x in the analysis of nearby health effects because NO_x is a relatively smaller part of Plant pollution emissions and converts to $PM_{2.5}$ less efficiently that SO_2.

- For *pre-Order operations,* the expected incidence of premature mortality among the exposed population of 144,000 adults (30 and older) would be 0.77 (confidence interval: 0.26 to 1.4) per year.
- For *operations under the Order* the expected incidence of premature mortality among the adult population of 144,000 is 1.3 (confidence interval: 0.44 to 2.4). The annual rate for operations under the Order is 1.7 (confidence interval: 0.58 to 3.1).
- For *potential extension of the Order* through June 2007 the expected incidence of premature mortality among the adult population of 144,000 would be 1.5 (confidence interval: 0.51 to 2.7) Extending it through December 2007 would raise the expected fatalities to 2.9 (confidence interval: 0.97 to 5.1). The annual rate for extension of the Order is 2.3 (confidence interval 0.78 to 4.1).

Statistical Terminology

The results of the health effects analysis are expressed in statistical terms.

Some results are expressed as the ***expected incidence*** of a specified health effect occurring in the exposed population. For instance, if pepper were thrown into the faces of 1,000 people in 100 groups of 10 people and 340 of the people sneezed, for the next randomly selected group of 10 people, the expected incidence of sneezing would be 3.4 people. In each group of 10, the number of people sneezing would be a whole number. Sometimes it would be three people, sometimes it would be four, and it could as small as zero or as a high as 10, but for this hypothetical example the long-term average would be 3.4. Expected incidence, in this case 3.4, is not a statement about what will occur, but a statement of what is likely to occur.

Other results are expressed as the ***probability*** that an individual who is exposed would experience the specified health effect. For the example above, the probability that any one random individual would sneeze would be 0.34 (=340/1000).

Another example shows how probability statements can be interpreted for groups and individuals. In 2003 approximately 25 per 100,000 (0.00025 or 0.025%) Americans 50 years of age or older, were diagnosed with stomach cancer. This can be reported as an expected incidence of 25 stomach cancers per 100,000 Americans age 50 or older. For an average American 50 or older, the probability per year of being diagnosed with stomach cancer is 0.00025.

The reader should understand that the estimates of expected fatalities above do not indicate the risk faced by any particular individual. Pollutants do not affect all sectors of the population to the same extent. The very young, the elderly, and those with preexisting health conditions tend to experience adverse health effects at pollutant levels that have little or no effect on the remainder of the population. Activity levels also affect the nature of the health effects; the more active the person, the more likely that PM or SO_2 will induce health effects. For instance, jogging while pollution levels are high is more likely to cause health effects in healthy people than would resting on a picnic bench or walking slowly. The reader should also bear in mind that among the modeled population of 144,000 adults, about 1,800 would die each year due to various causes.

Another useful indicator of the potential health effects of the Order is the risk to the "maximally exposed individual." The maximally exposed individual is a hypothetical person who spends all his time outdoors at the receptor point that has the highest average modeled concentration. Nobody stays at the same place all the time, so the maximally exposed individual establishes the upper limit on the health risk that anyone could experience. However, the response factor used to generate these estimates is for the average adult (30 or older). Persons who are more susceptible to air pollutants would have a higher risk and healthy people would have a smaller risk.

Confidence Intervals

A confidence interval is one expression of the uncertainty associated with a statistical estimate. To be clearly defined, the confidence interval needs to specify the confidence level associated with the interval. The confidence intervals reported in this SEA are for a 95% confidence level. For example, if the estimate of the probability of a health effect is 0.30, it means that the best estimate of the probability is 0.30. If the associated 95% confidence interval is 0.17 to 0.48, it means that while the estimate is not certain, we are 95% confident that the true probability of the health effect is no lower than 0.17 and no higher than 0.48.

A confidence interval is helpful in informing us of how much confidence we can have in a statistical estimate. For example, if the confidence interval above were 0.29 to 0.31, we would know that we could be very confident in the estimate of 0.30. Conversely, if the confidence interval were 0.01 to 0.99, we would know to have much less confidence that 0.30 was close to the true value.

- For *pre-shutdown operations* the hypothetical maximally exposed individual has a risk of premature mortality of 0.22% (confidence interval: 0.074 to 0.39%) for a year of operation.
- For *pre-Order operations* if they had continued for one year, the risk of premature fatality to the hypothetical maximally exposed individual would be 0.028% (confidence interval: 0.0094 to 0.050%)
- For *operations under the Order* the risk of premature mortality from SO_2 concentrations to the maximally exposed individual is 0.072% (confidence interval: 0.024 to 0.13%).
- For a *potential extension of the Order* through June 2007, the risk of premature mortality to a hypothetical maximally exposed individual would be 0.067% (confidence interval: 0.022% to 0.12%). If the Order were extended through December 2007, the hypothetical maximally exposed individual risk of premature mortality would be 0.13% (confidence interval: 0.045 to 0.24%).

There are important uncertainties that are relevant to both the maximally exposed individual and population analyses. First, there are uncertainties associated with the response factors as indicated by the 95% confidence intervals. (See text box.)

Another uncertainty is the health status of the affected persons. If the persons exposed to the highest concentrations are more healthy than average, the risks are lower. Conversely, if the people exposed to the highest concentrations are relatively unhealthy, the estimated premature fatality probability may be an underestimate. Further, there is uncertainty associated with the location of affected persons, e.g., people who may not be at home all day or workers who may be

outside much of the day, so their actual exposures may be lower or higher than assumed for this analysis. To reduce these uncertainties would require very detailed information about the health status and daily movements of a large number of people. Such detailed information is not available.

Another important uncertainty has to do with the air dispersion modeling. As discussed in Section 4.3.1, many assumptions and approximations were used in the air dispersion analysis. Where there was uncertainty, DOE selected assumptions that avoid underestimating the impacts of Plant operations. The net result of all these assumptions is most likely to overestimate maximum pollutant concentrations. In addition, Mirant has stated that the standard building dimensions used in AERMOD lead to overestimating the modeled downwash effect, with the result that modeled concentrations at Marina Towers are unrealistically high. EPA authorized Mirant to initiate the MES to help resolve this concern. Initial monitoring results for SO_2 monitors near the Plant tend to support Mirant's statement, but EPA has yet to reach a conclusion.

If the estimate of the downwash effect is too high, it would mean that the maximum exposures to stack emissions are overestimated and the risk to the hypothetical maximally exposed individual may be too high. However, overestimate of the risk to the hypothetical maximally exposed individual may not appreciably affect the risk to the population. The population health effect is the sum of the individual risks for the modeled population of 144,000 adults. Relatively few people live in the top floors of Marina Towers. Even if modeling with improved input parameters showed that pollutant concentrations at Marina Towers are lower than current estimates, the concentrations at points that are farther away and the exposures for most of the population would be little affected. Thus, the population risk is not expected to be much affected by more accurate modeled building dimensions.

EPA Scaling Technique. The EPA scaling technique is a simple method of making estimates of a variety of health effects. The health effects reported in Table 4.3.2-1 are those examined by EPA in its recent regulatory impact assessments for emission standards. The estimates of population health effects are higher than those that would result from the method above because the potentially affected population is much larger. The EPA scaling technique does not provide estimates of uncertainty or confidence intervals. However, the estimates of premature mortalities are based on Pope et al. (2002) cited above. Consequently, at least for the premature mortalities, it is reasonable to estimate that a 95% confidence interval would span at least 70% below to 80% above the expected incidences reported in Table 4.3.2-1 based on Pope's reported confidence intervals.

4.3.3 Water Quality

Two types of water quality impacts could result from Plant operations as a result of the Order. Plant operations could cause direct impacts to Potomac River water quality by changing the volume or characteristics of the effluent discharged from the Plant. Indirect impacts to regional water quality could result from changes in the emissions of air pollutants that are

Table 4.3.2-1. Expected incidence of short- and long-term health effects resulting from Mirant Plant operations for the population of the eastern United States

Health effect	Pre-shutdown (one year)	Pre-Order (285 days)	Order (285 days)	Order extension Oct. `06 – Jun. `07	Order extension Oct. `06 – Dec. `07
Premature mortality (adults, 30 and over)	37	5	14	12	23
Infant mortality (infants less than one year)	0.08	0.01	0.03	0.03	0.05
Chronic bronchitis (adults, 26 and over)	20	3	7	6	13
Non-fatal myocardial infarctions (adults, 18 and older)	50	7	18	16	31
Hospital admissions – Respiratory (adults, 20 and older)	13	2	5	4	8
Hospital admissions – Cardiovascular (adults, 20 and older)	11	2	4	3	7
Emergency room visits for asthma (18 and younger)	30	4	11	9	19
Acute bronchitis (children, 8-12)	46	7	17	14	29
Asthma exacerbations (asthmatic children, 6-18)	698	101	258	218	440
Lower respiratory symptoms (children, 7-14)	553	80	205	173	349
Upper respiratory symptoms (asthmatic children, 9-11)	423	61	157	132	267
Work loss days (adults, 18-65)	3,942	568	1,459	1,234	2,488
Minor restricted activity days (adults, age 18-65)	23,490	3,387	8,693	7,350	14,823

Source: DOE analysis of SO_2, NO_x, and $PM_{2.5}$ emissions from the Mirant Potomac River Generating Station, using EPA scaling technique (Personal communication between B. Hubbell, Health and Environmental Impacts Division, EPA, Research Triangle Park, North Carolina, and L.N. McCold, Oak Ridge National Laboratory, October 11, 2006).

subsequently deposited in surface waters or that are washed into surface waters after being deposited on the ground surface.

4.3.3.1 Direct impacts to the Potomac River

The operating changes associated with the pre-Order period or operations under the Order do not change the water quality characteristics of Plant intake water and effluents. Thus, the effect of the Plant on the pollutant load in the Potomac River (including suspended sediments, coliform bacteria, and metals) under different operating conditions can be assumed to be proportional to the volume of water used and discharged by the Plant. No chlorine was used in the Plant during pre-Order operations or under the Order; thus, Plant operations do not affect chlorine levels in the Potomac River.

Pre-shutdown operations. Under pre-shutdown operating conditions the Plant used Potomac River water and discharged effluents to the river as described in Section 2. The effects of many years of Plant operations are among the natural and human factors reflected in the existing water quality and ecological conditions in the river, as described in Sections 3.3.2.1 and

3.4.2.1. Table 2.4-1 presents data on the water quality of intake water and effluents associated with pre-shutdown operations.

Pre-Order operations. The Plant's water discharges to the Potomac River in December 2005 (assumed to be typical of pre-Order conditions) averaged 94 million gal/day (360,000 m^3/day), approximately 27% (on average) of the average pre-shutdown discharge volume (Section 2.4.2). Assuming that withdrawals from the river during any period are about 1% higher than monitored discharges (Section 2.3), withdrawals during this pre-Order period are estimated at less than 95 million gal/day (360,000 m^3/day). The reported maximum thermal discharge to the river in December 2005 was 969 Mbtu/hr. The much lower water and thermal discharge rates associated with pre-Order operations could contribute to improved river water quality relative to pre-shutdown operations, which could improve conditions for aquatic organisms (Section 4.3.4.2).

Operations under the Order and potential extensions of the Order. The Plant's water and thermal discharges to the river varied during the 285-day period of the Order. Operations during the line outage in January 2006 contributed to an average water discharge for the entire month of 266 million gal/day (1.0 million m^3/day), nearly three times the discharge recorded in the pre-Order period. Reported maximum thermal discharge to the river was 3,355 MBtu/hr, more than three times the December maximum. Operations in the period February through May 2006, a period of relatively low power demand (Figure 4.2-1) during which there were no line outages, resulted in an average discharge of 170 million gal/day (640,000 m^3/day), about 80% higher than pre-Order operations but only about half of the average for the pre-shutdown period. Maximum thermal discharges in this period ranged from 1,157 to 1,620 MBtu/hr. Average water discharge in June 2006 was 250 million gal/day (950,000 m^3/day). This value is 165% higher than discharge under pre-Order conditions, but is still 27% less than the average discharge under pre-shutdown operations before August 2005. Maximum thermal discharge in June 2006 was 2,406 MBtu/hr, which also is intermediate between pre-shutdown and pre-Order levels. The somewhat lower water and thermal discharge rates resulting from operations under the Order through June 2006 could contribute to improved river water quality relative to pre-shutdown operations, which could improve conditions for aquatic organisms (Section 4.3.4.2).

For operations under the Order following the commencement of daily predictive modeling in July 2006 (including the temporary extension of the Order to December 1, 2006, and any extension beyond that date), water and thermal discharges are assumed to be similar to those during pre-shutdown operations. Impacts are estimated to be the same as for pre-shutdown operations.

4.3.3.2 Indirect impacts to regional water quality

DOE identified and assessed two potential sources of indirect impact to regional water quality from deposition of Plant air pollutants: (1) nitrogen loading and (2) acid deposition.

Nitrogen loading. Deposition of nitrogen compounds emitted from the Plant contributes to nitrogen input to Chesapeake Bay and other waters in the region, thus contributing to the nutrient loading that degrades water quality (Section 3.3.2) and can impact aquatic organisms (Section 4.3.4).

Targets for reducing atmospheric nitrogen inputs have been set for the Chesapeake Bay as a whole (Section 3.3.2.5), but not for component watersheds. Therefore, DOE's assessment of the potential impacts of Plant operations on nitrogen loading to area surface waters focuses on Chesapeake Bay. Because nitrogen inputs due to pre-shutdown operations of the Plant are implicitly included in current Bay nutrient budgets, the reduced levels of operations associated with pre-Order conditions and the Order contribute toward the Chesapeake Bay Program's 8-million-lb (3.6-million-kg) target for reduction in atmospheric inputs of nitrogen (Section 3.3.2.5). In all cases the estimated reductions in nitrogen loading are small when compared with the total nitrogen input to the Bay.

Assumptions. DOE estimates (Section 4.3.1.5) that the Plant emitted 2,800 tons (2,500 metric tons) of NO_x per year under pre-shutdown operating conditions. In estimating the impacts of nitrogen emissions from the Plant on Chesapeake Bay water quality, DOE assumes that NO_x has the same nitrogen content as an equivalent mass of NO_2; the pre-shutdown NO_x emission is the equivalent of about 1.7 million lb/yr (770,000 kg/yr) of nitrogen.

To estimate the impact of the Plant on Chesapeake Bay nitrogen loading, DOE assumed that 10% of the nitrogen released from the Plant reaches the Bay, primarily due to being deposited directly on water or on impervious urban surfaces, while all other nitrogen emitted from the Plant is either consumed in terrestrial or aquatic ecosystems or deposited outside the Bay watershed (e.g., on the open Atlantic Ocean). (See Section 3.3.2.5.)

The above assumption is believed to be realistic, based on the following reasoning. Assuming that electric power plants such as the Plant are responsible for 38% of the atmospheric contribution of nitrogen to the Bay (consistent with their contribution to regional NO_x emissions, as discussed in Section 3.3.2.5), the total estimated electric-utility contribution to the Bay is about 35 million lb/yr (16 million kg/yr). The 170,000 lb/yr (77,000 kg/yr) of nitrogen estimated to reach the Bay as a result of Plant air emissions (10% of the total nitrogen emissions) are approximately 0.5% of this total electric-utility contribution. This 0.5% value is consistent with power-plant NO_x emissions inventories reported by EPA (2006b), which indicate that during several months in early 2005 the Plant accounted for about 0.5% of electric utility NO_x emissions in the seven-state region (i.e., Maryland, Virginia, Pennsylvania, New York, West Virginia, New Jersey, and Ohio) estimated to produce most of the air emissions that contribute nitrogen to the Bay.

Pre-shutdown operations. Based on the above assumptions and the Plant's estimated NO_x emissions under pre-shutdown operating conditions, pre-shutdown Plant operations contributed about 170,000 lb (77,000 kg) of nitrogen to the Bay annually, or about 0.2% of the total annual nitrogen input to the Bay that is attributed to atmospheric sources (Section 3.3.2.5).

Pre-Order operations. Based on the estimate of NO_x emissions presented in Section 4.3.1.5, pre-Order operations are estimated to emit nitrogen at an annual rate of about 470,000

lb/yr (220,000 kg/yr). For the 285-day duration of the Order (through October 1, 2006) operations at pre-Order levels would emit about 370,000 lb (170,000 kg) of nitrogen.

Assuming that 10% of the nitrogen from the Plant reaches the Bay, pre-Order operations, if extended for a full year, would contribute about 47,000 lb (22,000 kg) of nitrogen to the Bay annually. Compared with pre-shutdown operations, pre-Order operations would avoid an estimated 123,000 lb (55,000 kg) of annual nitrogen delivery to the Bay, thus potentially achieving about 1.5% of the Chesapeake Bay Program's targeted 8-million-lb (3.6-million-kg) reduction in atmospheric nitrogen input.

Operations under the Order. Based on the estimate of NO_x emissions presented in Section 4.3.1.5, operations under the Order emit nitrogen at a rate of about 1.5 million lb/yr (670,000 kg/yr). For the 285-day duration of the Order (through October 1, 2006) operations under the Order emit 1.2 million lb (530,000 kg) of nitrogen, delivering nitrogen to the Bay at an estimated rate of 150,000 lb (67,000 kg) per year. If sustained for a full year this level of operations would avoid about 20,000 lb (10,000 kg) of pre-shutdown nitrogen delivery to the Bay annually and would achieve about 0.2% of the Chesapeake Bay Program's goal for annual atmospheric nitrogen reductions.

Potential extension of the Order. DOE's analysis assumes that Plant operations after October 1, 2006, including operations during the temporary extension of the Order through December 1, 2006, and any subsequent extension of the Order, would utilize coal and emit NO_x at approximately the same rate as pre-shutdown operations, so there would be no reduction from pre-shutdown nitrogen delivery to the Bay and no contribution toward meeting the Chesapeake Bay Program's nitrogen-reduction goals.

Acid deposition. The Plant's air emissions of SO_2 and NO_x (Section 4.3.1) contribute to regional acid deposition. However, under all operating conditions acid-deposition impacts to water quality of streams in nearby watersheds, including the Anacostia, Patuxent, and nearby portions of the Potomac watershed, would be negligible because these watersheds are well buffered against acid rain (Section 3.3.2.6).

Pre-Order operations. Air emissions of SO_2 and NO_x under pre-Order conditions were about 28% of pre-shutdown emissions of these pollutants, proportionately reducing the Plant's contribution to regional acid deposition, relative to pre-shutdown operations.

Operations under the Order. Compared to pre-Order operations, operations under the Order increase the Plant's contribution to regional emissions of these air pollutants that produce acid deposition, but the Plant's contribution is smaller than under pre-shutdown operations. Over the 285-day duration of the Order, the Plant produced about 87% of the NO_x emissions that would have occurred for the same duration of pre-shutdown operations, but roughly three times the emissions estimated for pre-Order operations. SO_2 emissions also increased relative to pre-Order operations, but the use of trona caused emission of less than 45% of the SO_2 that would have been emitted from pre-shutdown operations.

Potential extension of the Order. Operations under the Order after October 1, 2006, including during the temporary extension of the Order to December 1, 2006, and any extension

beyond that date, are conservatively estimated to emit NO_x at the same annual rate as pre-shutdown operations, but use of trona is assumed to reduce SO_2 emissions by 50% compared with pre-shutdown operations. Thus, the Plant's overall contribution to regional acid deposition is smaller than under pre-shutdown operations.

4.3.4 Ecological Resources

Operation of coal-fired power plants can impact ecological resources through air, water, or solid waste releases that can result in acid deposition, nutrient enrichment (see section 4.3.3.2), or changes in water quality or quantity of the receiving bodies (Dvorak et al. 1978, EPA 2006c).

4.3.4.1 Acid deposition

Acid deposition can affect plant and animal species, both directly and indirectly (Schreiber 1995, Roth et al. 2005, EPA 2006a), but Plant emissions (discussed in Sections 3.3.2.6 and 4.3.3.2) are expected to have minimal impacts as described below.

Aquatic impacts. The ecological effects of acid rain are most clearly seen in aquatic environments (e.g., streams, lakes, marshes) located in watersheds where the soils have a limited buffering capacity (EPA 2006a). (See Section 3.3.2.6.) In areas where buffering capacity is low, acid rain can release aluminum, which is highly toxic to many species of aquatic organisms, from soil into lakes and streams. In general, lowering the pH of a water body can impair the ability of certain fish and other aquatic organisms to grow, reproduce, and survive.

Soils in the river and stream basins in the region where air emissions from the Plant are most likely to fall (e.g., Potomac, Anacostia, and Patuxent rivers; Rock Creek) are generally well buffered (CBWP-MANTA 2001, Roth et al. 2005, Shanks 2005; also see Sections 3.3.2.6 and 4.3.3.2). Mobilization of aluminum is, thus, unlikely to occur, and acid deposition will not greatly change the pH level of the streams. Therefore, acid deposition resulting from the DOE Order, including the temporary extension of the Order to December 1, 2006, and any extension beyond that date, would have minimal impacts on biological resources in regional waterways.

Terrestrial impacts. Increases in soil acidity can impair the ability of some species of trees to grow and resist disease, while dry deposition of acidic gases and particles can directly impact some terrestrial vegetation.

The effects of over 50 years of Plant operations are among the natural and human factors reflected in the existing ecological conditions near the Plant, as described in Section 3.4.1. Vegetation still actively grows nearby on Daingerfield Island and in the small wooded area next to the Plant (Figure 2-2). While the Order results in higher emissions of the air pollutants responsible for acid deposition than occurred during the pre-Order period (Sections 4.3.1 and 4.3.3.2), combined total estimates of emissions of these pollutants under the Order and any

extension of the Order, including the temporary extension, are still lower than during pre-shutdown operations, when vegetation was growing well near the Plant. Thus, the Order is unlikely to have negative impacts from acid deposition on vegetation or the wildlife that depends on it.

4.3.4.2 Impact of water quality changes

Nutrients. One of the main causes of aquatic habitat loss in the Chesapeake Bay watershed as a whole (CBP undated) is elevated loading of two nutrients: nitrogen and phosphorus. (See Section 3.3.) To the extent that the DOE Order changes loading of these two nutrients to surface waters compared to the pre-Order or pre-shutdown operating periods, there could be effects on habitats in the river for fish and submerged aquatic vegetation (Section 3.4.2.6), but the Plant's impact on nutrient loading would be small relative to the total.

As discussed in Section 4.3.3.2, nitrogen compounds are emitted from the Plant and augment the nitrogen input to Chesapeake Bay and other waters in the region, thus, contributing to the nutrient loading that impacts aquatic organisms and their habitat. During the first six months of operations under the DOE Order, the Plant's contribution to the nitrogen in the Bay increased over the pre-Order value, but was still lower than under pre-shutdown operating conditions. Operations under daily predictive modeling are estimated to contribute a similar amount of nitrogen as pre-shutdown operations. In all cases changes in the Plant's contribution of atmospheric nitrogen to the Bay are small (as discussed in Section 4.3.3.2), when compared with the total nitrogen input to the Bay.

Reported phosphorus levels in Plant water effluent (Table 2.4-1) were lower than those in the intake water, suggesting that Plant water use may reduce the phosphorus load and, thus, benefit aquatic systems. If the Plant reduces phosphorus concentration in effluent by 0.016 mg/L (Table 2.4-1), effluent discharge at the pre-shutdown rate of almost 345 million gal/day (1.3 million m^3/day) would remove about 48 kg/day of phosphorus. Reduced operating levels during pre-Order operations and the first six months of the DOE Order would have diminished the Plant's beneficial impact by removing proportionately less phosphorus than pre-shutdown operations or operations under daily predictive modeling. At any level of operations, however, any beneficial impact on phosphorus load resulting from Plant operations is small relative to the total daily input (from all sources) of phosphorus to the Potomac River, which has been estimated to be about 8,000 kg/day (Boynton and Swaney 1998), or the contribution of the nearby Blue Plains Wastewater Treatment Plant, which delivers 720 kg/day of phosphorus to the river when operating at its rated capacity of 370 million gal/day (1.4 million m^3/day) and discharging effluent with the phosphorus concentration of 0.18 mg/L allowed by its NPDES permit (Table 3.3-1).

Other contaminants. As discussed in Section 4.3.3.1, changes under the Order in the amount of water used and discharged by the Plant could cause proportional, but small, changes

in concentrations of other pollutants removed from or returned to the Potomac River that are unlikely to result in impacts to organisms or their habitats in the Potomac River.

Trona use. Use of trona may change the landfill effluent discharged to Mataponi Creek by increasing pH and concentrations of sodium sulfate, sodium chloride, selenium, arsenic, and dissolved metals. (See Section 4.3.5.) Modest increases in pH that result from carbonate leaching could be beneficial to aquatic life in the creek due to buffering of acidity. Sulfate compounds are neither toxins nor nutrients; thus, increased concentrations of sodium sulfate would not be expected to impact the creek's aquatic life. Any increase in sodium chloride would likely be indistinguishable from background.

Release of arsenic and selenium could, however, have adverse impacts on aquatic biota and other wildlife that consume these organisms, depending upon the levels at which they occur in the effluent. As noted in Section 4.3.5, monitoring of collected landfill leachate and stormwater, as required under the existing discharge permit, should identify the potential for any problems from selenium before discharges occur. Arsenic levels are not, however, currently monitored prior to water discharge, so there is a potential for arsenic to be released to the creek at concentrations that could be harmful to aquatic life.

Selenium can enter the food web from both sediments and surface water (EPA 2006e). In the food web it undergoes bioconcentration, bioaccumulation, and biomagnification as organisms that first take it in are eaten by others. Elevated levels cause growth reduction in green algae. In other aquatic organisms a number of adverse effects have been observed including loss of equilibrium and other neurological disorders, liver damage, reproductive failure, reduced growth, reduced movement rate, chromosomal aberrations, reduced hemoglobin and increased white blood cell count, and necrosis of the ovaries.

Arsenic can cause cancer and genetic mutations in aquatic organisms, with those effects including behavioral impairments, growth reduction, appetite loss, and metabolic failure (EPA 2006e). Aquatic bottom feeders are more susceptible to arsenic than other organisms.

4.3.4.3 Impacts of changes in water use

Once-through cooling water systems such as used by the Plant can impact aquatic species by impingement (when aquatic organisms become trapped on the intake screens), entrainment (when aquatic organisms are taken in and pass through the cooling water intake system), or thermal changes (Jensen 1981). Impingement and entrainment are often roughly proportional to the volume of water withdrawn, as well as the numbers and species of aquatic organisms in the water body. At the Plant the numbers and species of fish, crabs, and other aquatic organisms that are susceptible to impingement or entrainment at any one time depends on the season of the year, annual fluctuations in relative abundance, and the impact of restoration activities in the Chesapeake Bay watershed. Overall, the effect on species or their habitats of water use and changes in water use by the Plant in different operation modes is expected to be small. The

Plant's thermal discharge is permitted and has been shown to not form a barrier to movement or cause lethality of aquatic organisms.

Impingement. Mirant studied impingement at the Plant during 1981-1982 and 2003-2004 (Pepco 1982; Personal communications between A. Wearmouth, Mirant Corporation, and M.S. Salk, Oak Ridge National Laboratory, July 24, and August 18, 2006). Rates of cooling water withdrawal at the Plant were similar for both study periods (i.e., pre-shutdown conditions). For 1981-1982 the estimated impingement was 206,379 finfish[31] and 56,600 blue crabs; for 2003-2004 the annual estimates were 19,392 finfish and no blue crabs. In the 1981-1982 study over 90% of the fish were impinged in the winter and spring. The main fish species impinged in both studies were species that were either not used commercially (e.g, gizzard shad) or were too small to be of commercial value (e.g, white perch). Some fish exhibited disease conditions or appeared stunted, indicating that they were in poor health.

Although the 2003-2004 study is likely more representative of the fish community that is currently susceptible to impingement by the Plant, the large differences in the results of the two studies illustrate the potential magnitude of annual variation in potential impacts, so results of both studies were used as a basis for assessing impacts of the Order.

Impingement is assumed to be proportional to water intake for the Plant. At pre-Order operating levels the Plant withdraws about 27% of the amount of water it used during the pre-shutdown period. (See Section 4.3.3.1.) Thus, impingement under pre-Order conditions is estimated to amount to about 5,200–55,000 fish per year, based on the levels observed during the two studies at the Plant.

Under the Order before the commencement of daily predictive modeling (i.e., between January and June 2006), monthly Plant water use ranged from 42 to 77% of monthly use in the pre-shutdown period, averaging about twice the use during the pre-Order period. Assuming that 90% of annual impingement occurs during the winter and spring months of January through June, impingement during this time period is estimated at approximately 9,400–99,000 fish. At the high end of the range the number of fish impinged under the Order on an annual basis is equivalent to about 3% of the estimated 4.9 million fish in the Potomac-Washington Metro Basin (Maryland DNR undated-b).

Following the commencement of daily predictive modeling in July 2006, the Plant is assumed to withdraw water at pre-shutdown levels, resulting in annual impingement rates within the range indicated by the two studies (i.e., about 19,000–206,000 fish per year). However, because the 1981-1982 study indicated that less than 10% of annual impingement occurs during the summer months, operations under the Order during the period July through September 2006 are estimated to have impinged fewer than 1,900–21,000 fish. The temporary extension of the Order to December 1, 2006, and any extension beyond that date would result in cooling water

[31] The number of fish impinged is for the 56-week duration of the study. Thus, the annual rates would be slightly less.

withdrawal rates and annual impingement rates similar to pre-shutdown conditions (i.e., about 19,000–206,000 fish per year).

Not all impinged fish are killed; new intake screens, particularly the one with the fish buckets (Section 2.2), should lower impingement mortality. Fish or other organisms impinged on the water intake screens are washed off the screens and returned to the river on the south side of the cove area next to the Plant, south of the water intake area. (See Figure 2.1-1.)

Little impact is expected to the blue crab population as studies have indicated that initial and latent mortality from impingement is less than 10% (Pepco 1982). Also, blue crabs are found near the Plant only in years when the river is particularly salty (Personal communication between A. Wearmouth, Mirant Corporation, and M.S. Salk, Oak Ridge National Laboratory, August 17, 2006). A difference in the salt level in the river between the two impingement studies is the likely explanation for the difference in the observed number of impinged crabs.

Entrainment. Mirant studied entrainment of fish eggs and larvae at the Plant in 1981 and 2005. Preliminary results from the 2005 study are similar to those from the 1981 study reported below (Pepco 1983; Personal communication between A. Wearmouth, Mirant Corporation, and M.S. Salk, Oak Ridge National Laboratory, August 25, 2006).

Only organisms small enough to pass through the screens on the water intakes are drawn into the Plant where they are subjected to heat, fluid, and mechanical stresses (Cada et al. 1981). Entrainment of fish eggs and larvae is mainly an issue in the period during and soon after fish spawning, from early spring through mid-summer.

During the 1981 study, eggs and larvae of anadromous species (i.e., white perch and herring) were 99% of the total number entrained. Freshwater species (e.g., minnows [fish in the Cyprinidae family], tessellated darter [*Etheostoma olmstedi*]) were entrained in very low numbers, less than 1% of the total.

The major spawning area for both white perch and herring is about 9 miles (14 km) above the Plant at Little Falls. As they mature, the larvae float downriver, past the Plant, mostly in a dredged channel well offshore. The Plant draws cooling water primarily from shallow water near shore, which results in relatively low entrainment rates. Significant spawning of white perch and herrings also occurs in other portions of the Potomac River and its tributaries. Thus, while some fish spawn in the Washington, D.C. portion of the Potomac River, spawning there represents a small portion of the spawning of the Potomac River population. The best estimate of the percent entrainment varied from 1.6% for white perch yolk-sac larvae (an early larval stage) to 8.7% for herring larvae after yolk absorption (Pepco 1983).

Pre-Order operations. There would have been no entrainment of fish eggs and larvae during pre-Order conditions in December 2005 because of the absence of these organisms from the Potomac River at that time. On an annual basis, assuming that entrainment is proportional to water intake, pre-Order conditions would result in entrainment at about 27% of pre-shutdown rates.

Operations under the Order. Under the Order before the commencement of daily predictive modeling (i.e., during January through June 2006) entrainment is estimated to have

occurred at approximately twice the calculated pre-Order rates, but substantially less than pre-shutdown levels (about 55% of pre-shutdown rates). Following commencement of daily predictive modeling in July 2006, entrainment is estimated to have been similar to pre-shutdown conditions for the summer season (owing to similar cooling water withdrawal rates). The temporary extension of the Order to December 1, 2006, and any extension beyond that date would be expected to result in entrainment rates similar to those that occurred during the pre-shutdown time period.

Since entrainment was not a major issue when the Plant was operating at the pre-shutdown level before August 2005, entrainment resulting from operations under the Order or any extension of the Order would not have a major impact on fish populations.

Temperature changes. The Plant's NPDES permit (Section 2.4.2) limits temperature rise in the Potomac River from water discharge to 2.8°C above ambient temperature beyond a 1,000-ft (300-m) radius in order to prevent formation of a barrier to movement of aquatic life or lethality to passing organisms. Based on a 2001 study (Mirant 2002), the thermal plume from the Plant does not form a barrier to movements of aquatic life or cause lethality to passing organisms. The main path for movement of aquatic organisms is the river channel, which is unaffected by the warm water plume from the Plant (Mirant 2002). Thus, no blockage to aquatic life movement is expected from the thermal plume under any assessed operating conditions.

If pre-Order operating conditions continued throughout the year, slightly lower summer water temperatures would result. This could slightly reduce the potential for nuisance algal blooms (Section 3.4.2). Similar, but smaller, benefits could be expected in 2006 because Plant operations under the Order before the commencement of daily predictive modeling resulted in thermal input levels intermediate between pre-Order and pre-shutdown operations (Section 4.3.3.1). Following commencement of daily predictive modeling in July 2006 and throughout any extensions of the Order, however, thermal input to the river is assumed to be similar to pre-shutdown conditions.

If there were a sudden shutdown of the Plant during the winter under any operating conditions, fish that were acclimated to the warm discharge might suffer cold shock when they lose the warm water habitat.

4.3.4.4 Special status species

The NPDES permit stated that the Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS), the agencies responsible for implementing the Federal Endangered Species Act (ESA), had indicated that the Plant's wastewater discharges were not adversely affecting the three Federally listed species mentioned in the permit. (See Section 3.4.2.)

During consultation with Mirant before the start of sampling for an entrainment study, FWS concluded that taking of eggs of the shortnose sturgeon, an endangered species, in the sampling process was not an issue as there was no possibility of finding them (Personal

communication between A. Wearmouth, Mirant Corporation, and E.D. Smith, Oak Ridge National Laboratory, July 14, 2006).

While bald eagles are occasionally seen near the Plant, the site provides no suitable nesting habitat for them (Personal communications between A. Wearmouth and D. Knight, Mirant Corporation, and M.S. Salk, Oak Ridge National Laboratory, July 24, and 25, 2006, respectively).

The Plant site does not provide any suitable habitat for any of the other special status species (i.e., the Hay's Spring amphipod, the Federal species of concern, and the Virginia state-listed species) discussed in Section 3.4.2. There have been no reported adverse impacts to any of these species due to the Plant while operating at the pre-shutdown level before August 24, 2005. Since Plant operating levels under the DOE Order are no higher than they were under pre-shutdown conditions, adverse impacts to any of the special status species would not be expected.

In order to comply with Section 7 of the ESA, DOE sent letters to FWS and NMFS as part of informal consultation. (See Chapter 6 and Appendix D.) The NMFS by letter dated October 3, 2006, concurred with DOE's determination that continued operation of the Plant under the Orders is not likely to adversely affect any listed species. The FWS by letter dated November 20, 2006, stated that only occasional transient individuals of Federally listed endangered or threatened species are known to exist within the project impact area. Both agencies concluded that no further consultation under Section 7 of the ESA is required.

4.3.5 Waste Management

Potential waste management impacts from the Order include (1) impacts to landfill capacity resulting from changes in the quantity of waste generated and (2) changes in environmental impacts of waste management resulting from changes in solid waste characteristics. Impacts related to solid waste transportation are discussed in Section 4.3.6.

4.3.5.1 Impacts on landfill capacity

Assumptions. In estimating the impacts of operations under the Order on remaining waste capacity in the Mirant Brandywine ash landfill used for disposal of fly ash from the Plant (Section 3.5), DOE made the following assumptions, derived from GB&B Inc. (2005):

- remaining disposal capacity at the beginning of 2005 was 2.07 million yd^3 (1.58 million m^3);
- ash placed in the landfill has an in-place density of 1.1 ton per yd^3 (760 kg per m^3); and
- throughout the period of analysis the Chalk Point Generating Plant would generate 206,000 tons (187,000 metric tons) of ash per year, of which 15% would be recycled and 85% would be placed in the Brandywine landfill.

Data and assumptions for pre-shutdown operations. Mirant's records indicate that the Plant sent 113,865 tons (103,297 metric tons) of ash to the landfill during the period January

through August 2005, prior to the events and actions addressed in this SEA (Personal communication between D. Cramer, Mirant Corporation, and L.N. McCold, Oak Ridge National Laboratory, July 7, 2006). This corresponds to an annual ash generation rate of 170,000 tons (150,000 metric tons) per year, which is somewhat higher than the rate (136,000 tons [124,000 metric tons] per year) used in the GB&B Inc. (2005) analysis.

Assumptions for pre-Order operations. Making the conservative assumption that, on average, pre-Order operations of the Plant during the last three months of 2005 generated fly ash at 20% of the rate recorded for the first eight months of the year, DOE estimated that under pre-Order operating conditions the plant would generate fly ash at a rate of 34,000 tons (31,000 metric tons) per year. (To simplify the assessment of waste management impacts, DOE assumed that under pre-Order operating conditions trona use did not affect the rate of ash generation. This assumption is conservative, in that it minimizes the estimated impacts of pre-Order operations, thus increasing the contrast between the impacts of pre-Order operations and operations under the Order.)

Data and assumptions for operations under the Order. Mirant's records indicate that the Plant sent 28,399 tons (25,763 metric tons) of ash to the Brandywine landfill during the 3-month period March through May 2006 (Personal communication between D. Cramer, Mirant Corporation, and L.N. McCold, Oak Ridge National Laboratory, July 7, 2006). In estimating the impacts of operations under the Order on landfill capacity, DOE assumed that fly ash was generated at the same average rate from February 2006 until the beginning of June, when the Plant began operating under the ACO. From that time forward the analysis conservatively assumes that under the Order the Plant operates, on average, at pre-shutdown levels, including the temporary extension of the Order to December 1, 2006, and any extension beyond that date.

Impacts. Using the data and assumptions summarized above, DOE estimated total Brandywine landfill waste disposal (from both power plants) during 2005 (prior to the Order) at 269,000 yd^3 (206,000 m^3), which is somewhat less than the historical annual disposal rate of 278,000 yd^3 (213,000 m^3) used in the GB&B Inc. (2005) analysis. This value then became the starting point for analysis of the effect of several different Plant operating modes on the remaining capacity and operating life of the landfill, summarized in Table 4.3.5-1.

Pre-shutdown operations. The 2005 analysis by GB&B Inc. projected that with continued operations at then-current (i.e., pre-shutdown) operating levels, the Brandywine ash landfill would be able to continue receiving ash from the Plant and Mirant's Chalk Point Generating Plant until the middle of 2012.

Pre-Order operations. Table 4.3.5-1 indicates that under pre-Order operating conditions, beginning with the date of the Order and continuing indefinitely, the landfill would be able to receive waste from both power plants for approximately the next 9 years, through the middle of 2015.

Operations under the Order and any extension. To indicate the potential range of impacts from operations under the Order and any extension (including the temporary extension through December 1, 2006), Table 4.3.5-1 presents estimates of disposed waste volume and remaining

Table 4.3.5-1. Impact of Plant operations on remaining operating life of the Brandywine ash landfill

Plant operating mode [a]	Disposal rate for Plant fly ash (yd^3/year) [b]	Estimated full-capacity date for landfill
Pre-shutdown operations [c]	119,000	mid-2012
Plant operates at pre-Order level [d]	31,000	mid-2015
Plant operates in accordance with the Order, without trona injection [e]	varies [e]	late 2011
Plant operates in accordance with the Order (as above), with trona injection [f]	310,000 [f]	early 2010

[a] Mirant's Chalk Point Generating Plant is assumed to operate under all scenarios, generating 159,000 yd^3 of in-place waste annually. If Chalk Point Generating Plant operated and the Mirant Potomac Plant did not, the estimated full-capacity date for the landfill would be the end of 2017 (GB&B 2005).
[b] To obtain the approximate equivalent numerical value in tons/year, multiply by 1.1.
[c] These values are from GB&B Inc. (2005).
[d] Pre-Order level of operations is conservatively estimated to be equivalent to approximately 20% of pre-shutdown operations.
[e] Due to line outage conditions in January 2006, operations in accordance with the Order during that month are assumed to have resulted in waste disposal at the pre-shutdown rate. Operations during February through May are assumed to have resulted in waste disposal at the annual rate of 103,000 yd^3/year recorded during March through May (Personal communication between D. Cramer, Mirant Corporation, and L.N. McCold, Oak Ridge National Laboratory, July 7, 2006). Beginning in June 2006, the Plant is assumed to operate at the pre-August 2005 level, without trona injection, resulting in waste disposal at annual rate of 155,000 yd^3/year.
[f] Beginning in June 2006, trona injection is assumed to double the quantity of waste requiring disposal.

landfill life for two different assumptions: (1) the Plant operates at pre-shutdown levels, but with no use of trona, after the beginning of June 2006 (since trona is used in operations under the Order, this assumption results in a lower-bound estimate of potential impacts from the Order) and (2) the Plant operates at pre-shutdown levels beginning in June 2006 and trona is injected at a rate which doubles the pre-shutdown rate of solids generation. Trona injection in the Plant can substantially increase ash production; at injection rates necessary to achieve maximum SO_2 removal, trona injection could double or triple the quantity of fly ash waste generated by the Plant (Mirant 2006c). Because trona injection is done only part of the time that the Plant operates and Mirant records of fly ash generation during the period March through May 2006 (Personal communication between D. Cramer, Mirant Corporation, and L.N. McCold, Oak Ridge National Laboratory, July 7, 2006) indicate that trona use during that period increased fly ash production by approximately 50% over the quantity expected based on coal utilization during the same period, the assumption that trona use doubles the rate of fly ash generation is expected to provide an upper bound on the potential impacts of trona use on landfill capacity. DOE's estimates of the potential impact of the Order on landfill operating life (Table 4.3.5-1) assume that operations

continue indefinitely at pre-shutdown levels, instead of ending when the Order or any extension to the Order expires.

The table indicates that with the level of Plant operations estimated under the Order, but without trona use after June 2006, the landfill's operating life would be about one-half year shorter than projected by GB&B (2005) for pre-shutdown conditions, but about 3.5 years shorter than under pre-Order operations. (Note that this analysis assumes that the ash-generation rate reported in the first 8 months of 2005 would continue, rather than the lower rate assumed by GB&B.) Use of trona would cut almost two additional years off the Brandywine landfill's life expectancy, causing it to reach capacity in a little more than three years.

The assumptions of this analysis are conservative, but the limited landfill life that is estimated to remain if trona injection continues at a high rate may not provide sufficient lead time for siting a new ash landfill. If the Brandywine landfill were to reach capacity before a new ash landfill were sited, Mirant could ship fly ash to a commercial sanitary landfill until a new landfill became available.

Because commercial landfill capacity in the region is very limited (Metropolitan Washington Council of Governments 2001, VDEQ 2002, Harrison 2004, MDOE 2005), ash might need to be transported long distances if it is required to be sent to a commercial landfill licensed for municipal solid waste. Several large privately owned Virginia landfills receive municipal solid waste from outside the local area (Metropolitan Washington Council of Governments 2001). The nearest of these landfills is in King George County, about 60 miles (100 km) by road from the Plant; others are in the Richmond area, more than 100 miles (160 km) from the Plant. If the state regulatory agency allows coal combustion ash disposal in landfills permitted for disposal of construction and demolition debris (in Maryland, these are called "rubble landfills" or "rubblefills"), there are private landfills closer to the Plant (in Lorton, Virginia, and in Prince George's and Baltimore counties in Maryland) that possibly could be used. It has been estimated that the Lorton landfill will reach capacity before 2011 (Harrison 2004), but the state of Maryland has received applications to site several additional commercial rubble landfills (MDOE 2005), giving some assurance that the region will continue to have disposal capacity for construction and demolition waste.

4.3.5.2 Effects of trona use on the environmental consequences of waste management

In addition to increasing the volume of solid waste requiring management, operation of the Plant with trona injection alters the chemistry and physical properties of the fly ash waste, potentially changing the environmental consequences of its management. (Quantities and characteristics of the Plant's bottom ash are not affected by the use of trona.)

Chemical characteristics of Plant fly ash. Reaction of trona (sodium sesquicarbonate; $Na_2CO_3 \cdot NaHCO_3 \cdot 2H_2O$) with SO_2 in the exhaust gas results in the formation of solid sodium sulfate compounds (assumed to be Na_2SO_4), along with the release of gaseous CO_2. The resulting

sodium sulfate is incorporated into the fly ash captured in the Plant's precipitators, together with mineral ash derived from coal combustion and unreacted trona (which is assumed to be dehydrated in the exhaust gas stream, forming sodium carbonate). Because the trona feed rate is typically several times larger than the feed rate calculated to be necessary to react chemically with SO_2 in the air emissions, the fly ash captured in the precipitators contains several times more sodium carbonate than trona reaction products. Although trona use enhances particulate capture in precipitators (Mirant 2006c), thus adding to the volume of fly ash, the increase in Plant fly ash volume that results from trona injection is due almost entirely to incorporation of trona residue into the fly ash. The trona-ash waste stream also can be assumed to include minor amounts of (1) any trace elements found in the raw trona and (2) compounds formed when other gases in Plant emissions react with trona.

Table 4.3.5-2 presents results of chemical analyses of four samples of ash produced in October and November 2005, including two samples produced during Plant operations without trona injection and two samples produced during trona injection. Comparison of the two pairs of analyses illustrates that trona use converts the Plant's fly ash from a largely insoluble mineral ash (oxide percentages of silica and alumina total 84-86% in the pair of samples produced during operations without trona injection) into a mixture of mineral ash and water-soluble carbonates and salts (the high values for sodium and alkalinity in the second pair of samples in Table 4.3.5-2 identify the sodium carbonate component of the ashes produced during trona injection). Trona use increases ash pH (which already is high, indicating an alkaline material) but also greatly increases alkalinity, which is a quantitative measure of the amount of material available to react with acid. Sulfate, which is a very minor component of ash produced without trona injection (first pair of analyses), is a significant fraction of the ash produced with trona (second pair of analyses). With trona use measurements of loss on ignition (a test used to indicate the level of unburned carbon in a sample) increased from 5% and 12% to values of 20% and higher. Trona addition should not affect the amount of unburned carbon in fly ash, so the increased measured values of loss on ignition probably are attributable to volatilization of trona-related constituents. Chloride was not measured, but it is likely that some sodium chloride is included in the ash due to chemical reaction of trona with the small amounts of chlorine present in Plant emissions.

Selenium concentrations are increased approximately 10-fold in the ash produced when trona is used (second pair of selenium in Table 4.3.5-2) compared with ash produced by Plant operations without trona use (first pair of selenium results in Table 4.3.5-2). The source of the increased selenium in the trona ash has not been determined, but it is likely that selenium (a trace constituent in coal that can volatilize during coal combustion) in Plant exhaust gas reacts with sodium carbonate or trona and is incorporated into the fly ash as solid sodium selenate, Na_2SeO_3. This chemical reaction is used industrially when sodium carbonate (often referred to as "soda ash") is used in the commercial production of selenium metal to isolate selenium from various other compounds and convert it to the sodium selenate form (WebElements 2006). Although selenium might also be present as an impurity in the natural trona used in the Plant, it is not mentioned in published reports about this material (Dyni 1991, 1996).

Table 4.3.5-2. Concentrations of major constituents and trace elements in samples of Plant fly ash resulting from operations with and without trona injection.

Parameter (units)	Ashes produced without trona injection		Ashes produced during high-rate trona injection	
	Load following	Baseline	Low load	Full load
Silica (%)	56.4	59.3	33.2	38.6
Alumina (%)	27.4	26.6	15.4	17.5
Titania (%)	1.4	1.3	0.7	0.9
Iron (as % FeO)	5.6	5.3	3.1	3.4
Calcium (as % CaO)	1.4	1.3	0.8	1.1
Magnesium (as % MgO)	1.4	1.3	0.8	1.1
Potassium (as % KO)	3	2.5	1.3	1.7
Sodium (as % Na_2O)	0.34	0.32	39.2	28.3
Sulfate (as % SO_3)	0.22	0.17	3.4	5.7
pH (pH units)	10.2	10.2	11.1	11.0
Alkalinity (% $CaCO_3$ equivalent)	0.55	0.55	39.21	32.4
Lead (mg/kg)	15	15	8.7	10
Arsenic (mg/kg)	47	39	31	26
Barium (mg/kg)	680	660	310	360
Cadmium (mg/kg)	0.29	0.39	0.2	0.28
Chromium (mg/kg)	13	19	7.7	13
Selenium (mg/kg)	1.1	ND [a]	15	11

[a] ND = Not detectable

Source: Mirant (Personal communication between A. Wearmouth, Mirant Corporation, and E.D. Smith, Oak Ridge National Laboratory, July 21, 2006)

Measured concentrations of lead, arsenic, barium, and chromium are lower in ash produced during trona operations, probably indicating a dilution effect from the addition of trona components to the mineral ash. Cadmium concentrations are similar in both types of ash. Mercury and silver concentrations are not presented in Table 4.3.5-2 because these metals were below detection limits in all samples.

The ash samples were tested for leachability using the Toxicity Characteristic Leaching Procedure (TCLP) (Personal communication between A. Wearmouth, Mirant Corporation, and E.D. Smith, Oak Ridge National Laboratory, July 21, 2006). The TCLP simulates leaching in the acidic environment of a municipal solid waste landfill and is one of the tests specified under the Resource Conservation and Recovery Act (RCRA) for determining whether a solid waste is a hazardous waste. TCLP extracts were analyzed for lead, silver, arsenic, barium, cadmium,

chromium, selenium, and mercury. These test results do not affect the regulatory status of Plant ash because ash from the combustion of coal, including flue gas emission control waste (such as the trona component of Plant fly ash), is exempt from RCRA regulation as a hazardous waste (40 CFR 261.4).

Barium was the only metal detected in TCLP leachates from the two ash samples produced without trona injection, with concentrations of 0.28 and 0.43 mg/L. Leachates from the two ash samples obtained during trona use had somewhat higher concentrations of barium (0.63 and 0.93 mg/L), but all barium concentrations were below the primary drinking water standard of 1 mg/L, as well as the 100 mg/L threshold for identifying a waste material as a RCRA hazardous waste.

TCLP leachates from both of the ash samples produced during trona injection also contained detectable levels of arsenic and selenium. The measured arsenic concentrations of 1.4 and 1.1 mg/L exceed the primary drinking water standard of 0.05 mg/L, but not the 5 mg/L threshold for identifying a waste material as a hazardous waste. Measured selenium concentrations of 1.1 and 0.77 mg/L also exceed the primary drinking water standard, which is 0.01 mg/L, and the higher measurement exceeds the 1 mg/L threshold for identifying a waste material as a hazardous waste. (As discussed above, however, Plant ash is exempt from RCRA regulation as a hazardous waste.) Sodium selenate (the form in which selenium is likely to be present) is soluble in water, and the presence of sulfate is likely to increase the solubility of both arsenic and selenium.

Implications for waste management operations. Although ash produced during trona injection has reduced pozzolanic activity (Section 2.4.3), it still has significant pozzolanic properties that facilitate its management. Mirant personnel report that trona use does not adversely affect ash workability or its physical stability after placement in the Brandywine ash landfill (Personal communication between D. Cramer, Mirant Corporation, and E.D. Smith, Oak Ridge National Laboratory, July 12, 2006). Thus, there should be no adverse consequences for the emission of windblown dust or for successful stabilization and closure of completed portions of the landfill. Ash produced during trona injection has, however, been observed to be more corrosive than other ash wastes handled at the Brandywine ash landfill (presumably due to the sulfate component), increasing the need for equipment maintenance and possibly accelerating the need for equipment replacement (Personal communication between A. Wearmouth and D. Cramer, Mirant Corporation, and E.D. Smith, Oak Ridge National Laboratory, July 14, 2006).

Fly ash generated during trona use has pozzolanic activity that is too low for most structural uses (TFHRC undated) and contains substantial amounts of sulfate and other soluble constituents that would reduce its suitability for construction use. Therefore, it is unlikely that any Plant fly ash generated during trona use can be beneficially used as a construction material. However, Mirant might be able to find other beneficial uses for this material. For example, due to its high alkalinity, the ash generated during trona production might be a suitable fill material in settings where alkaline material is needed to neutralize acids, such as in waste-site restoration or coal mine reclamation.

Implications for impacts of the Brandywine ash landfill. Leaching of the fly ash produced during trona injection would increase the release of dissolved solids into the landfill leachate that eventually is discharged to Mataponi Creek.

Sodium sulfate, sodium carbonate, and sodium chloride, which are major chemical constituents of the ash produced during trona injection (see discussion above), are all soluble and could be readily released into the leachate. Leachate pH is likely to be higher due to the presence of large amounts of carbonate.

The TCLP test results indicate a potential for the waste produced during trona injection to release the trace constituents selenium and arsenic. The presence of soluble sulfate and carbonate in leachate might increase the solubility and mobility of these or other trace constituents in the fly ash. Because the TCLP test protocol uses acidic leaching conditions, the TCLP test results may not be good predictors of the potential for selenium and arsenic to leach in the alkaline conditions found in the fly ash landfill. Leach testing using "synthetic precipitation" or "synthetic groundwater" would be more reliable than the TCLP for predicting contaminant mobility in the environment of a fly ash landfill.

Modest increases in effluent pH could be beneficial due to buffering of acidity, but there is a possibility of generating a leachate with a pH higher than permitted for discharge. Release of arsenic and selenium to Mataponi Creek could result in adverse impacts to aquatic biota and other wildlife that consume these organisms (Section 4.3.4).

Increases in release of other dissolved solids are not expected to adversely affect creek water quality. Increased concentrations of sodium sulfate would not be expected to affect the creek's suitability for aquatic life, since sulfate compounds are neither toxins nor nutrients. Any increase in sodium chloride would likely be indistinguishable from background.

If landfill leachate or storm water had unacceptably high levels of pH, selenium, lead, iron, copper, or zinc, the monitoring required under the existing discharge permit for the landfill (Section 3.5) should identify the presence of these contaminants before the water was discharged, thus providing an opportunity to make arrangements to treat the water before discharges occur. Current discharge monitoring does not, however, provide for detection of arsenic, so surface water releases of arsenic could go undetected.

Similarly, the current groundwater monitoring program (Section 3.5) should provide for detection of unacceptably high levels of pH, chloride, sulfate, and several dissolved metals before any substantial migration occurred. However, groundwater is not monitored for either arsenic or selenium, so groundwater releases of these substances could go undetected. Because shallow groundwater in hydrologic settings similar to the landfill site flows primarily to nearby streams, any adverse impacts from undetected groundwater releases of selenium or arsenic would be experienced in Mataponi Creek and its tributaries.

4.3.6 Transportation Resources

The primary impacts to transportation associated with Plant operations are increases in rail and road traffic due to trains and trucks traveling to and from the Plant.

Impacts from traffic increases due to Plant operations are considered in the context of existing traffic conditions. Other ongoing and future actions in the area that generate traffic or affect the capacity of transportation facilities also contribute to cumulative transportation impacts, including increased traffic and noise. Actions that could combine with Plant operations to create cumulative impacts include the 13 background developments that have been identified (Baxter 2006) as increasing automobile and truck traffic in the vicinity of the Brandywine landfill facility and contributing to the exacerbation of existing road traffic problems, especially on Maryland Route 381. (See Section 3.6.2.) The Woodrow Wilson Bridge Project (Section 3.6.2) is the only highway construction and maintenance project in the Virginia or Maryland Department of Transportation databases (VDOT 2006, MDOT 2006) that is likely to contribute to the cumulative impacts of Plant operations. Truck traffic from the Plant that crosses the bridge going to and from the Brandywine facility would combine with the increased traffic, delays, and noise generated by the Woodrow Wilson Bridge Project to contribute to cumulative impacts on transportation.

The following sections discuss transportation impacts for each of the Plant operating scenarios.

4.3.6.1 Pre-shutdown operations

Rail. Under pre-shutdown operations the Plant used about 2,280 tons (2,052 metric tons) of coal per day. Assuming the use of 100-ton (91-metric ton) rail cars, the Plant required about 23 rail car loads of coal per day. This demand could be met with five coal deliveries to the Plant each week using a 40-car train. Because the Plant has its own rail spur and train yard, five 40-car trains per week did not have major impacts on rail traffic or service on the CSX, Inc. main line.

Also, pre-shutdown operations did not have a major impact in terms of wait times for vehicular traffic at the on-grade rail crossing on the George Washington Parkway. Typical daytime rail operations (20-car trains) stopped traffic on the Parkway for ten periods of about 2 minutes each week, while typical nighttime operations (40-car trains) stopped traffic on the Parkway for five periods of about 4 minutes each week (Personal communication between D. Cramer, Mirant Corporation, and L.N. McCold, Oak Ridge National Laboratory, July 7, 2006).

Road. Under pre-shutdown operations the Plant generated about 470 tons (430 metric tons) of ash per day. Assuming the use of 24-ton (22-metric ton) dump trucks, ash removal required about 28 round trips each weekday from the Plant to the Brandywine facility. These trips had a minor impact in terms of traffic on the local streets used to access the Plant, as the streets have relatively little traffic and operate at a level-of-service at or near “A” (Personal communication between B. Garbacz, Transportation Engineer, City of Alexandria, Virginia, and J.W. Saulsbury, Oak Ridge National Laboratory, May 26, 2006). Similarly, the 28 truck trips attributable to pre-shutdown Plant operations were not a major part of the traffic volume on the major roads between Henry Street and Maryland Route 381 (Table 3.6-1). However,

pre-shutdown operations did contribute to the existing traffic problems on Maryland Route 381 (see Section 3.6.2).

4.3.6.2 Pre-Order operations

Rail. Under pre-Order operations the Plant used about 540 tons (490 metric tons) of coal per day. Assuming the use of 100-ton (91-metric ton) rail cars, the Plant required about 5.5 rail car loads of coal per day. This total demand could be met with one coal delivery to the Plant each week using a 40-car train. Because the Plant has its own rail spur and train yard, one 40-car train per week did not have major impacts on rail traffic or service on the CSX, Inc. main line.

Also, pre-Order operations did not have a major impact in terms of wait times for vehicular traffic at the on-grade rail crossing on the George Washington Parkway. Typical daytime rail operations (20-car trains) stopped traffic on the Parkway for two periods of about 2 minutes each week, while typical nighttime operations (40-car trains) stopped traffic on the Parkway for one period of about 4 minutes each week (Personal communication between D. Cramer, Mirant Corporation, and L.N. McCold, Oak Ridge National Laboratory, July 7, 2006).

Road. Under pre-Order operations, the Plant is estimated to have generated about 95 tons (86 metric tons) of ash per day. Assuming the use of 24-ton (22-metric ton) dump trucks, ash removal required about five or six round trips each weekday from the Plant to the Brandywine facility. These trips had a negligible impact in terms of traffic on the local streets used to access the Plant, since the streets have relatively little traffic and operate at an level-of-service at or near "A" (Personal communication between B. Garbacz, Transportation Engineer, City of Alexandria, Virginia, and J.W. Saulsbury, Oak Ridge National Laboratory, May 26, 2006). Similarly, the addition of five or six truck trips to the existing traffic volume on the major roads between Henry Street and Maryland Route 381 (Table 3.6-1) represented only a small impact. However, pre-Order operations did contribute to a small extent to the existing traffic problems on Maryland Route 381. (See Section 3.6.2.)

4.3.6.3 Operations under the DOE Order, temporary extension, and potential additional extensions

Rail. Under the Order before the commencement of daily predictive modeling (between December 20, 2005, and June 30, 2006), the Plant is assumed to have used an average of about 1,990 tons (1810 metric tons) of coal per day. Assuming the use of 100-ton (91-metric ton) rail cars, the Plant required about 20 rail car loads of coal per day. In addition, the use of trona required delivery by two rail cars per day. This total demand (about 22 rail cars per day) could be met with four coal/trona deliveries to the Plant each week using a 40-car train. Because the Plant has its own rail spur and train yard, two 40-car trains per week did not have major impacts on rail traffic or service on the CSX, Inc. main line.

Also, operations between December 20, 2005, and June 30, 2006, did not have a major impact in terms of wait times for vehicular traffic at the on-grade rail crossing on the George Washington Parkway. Typical daytime rail operations (20-car trains) stopped traffic on the Parkway for eight periods of about 2 minutes each day, while typical nighttime operations (40-car trains) stopped traffic on the Parkway for four periods of about 4 minutes each night (Personal communication between D. Cramer, Mirant Corporation, and L.N. McCold, Oak Ridge National Laboratory, July 7, 2006).

Following commencement of daily predictive modeling (on July 1, 2006), including the temporary extension of the Order to December 1, 2006, and any extension beyond that date, the Plant is assumed to operate at a level similar to pre-shutdown operations, but with the addition of trona. Thus, the Plant uses an average of about 2,280 tons (2,050 metric tons) of coal per day. Assuming the use of 100-ton (91-metric ton) rail cars, the Plant requires about 23 rail car loads of coal per day. In addition, the use of trona requires delivery by two rail cars per day. This total demand (about 25 rail cars per day) could be met with five coal/trona deliveries to the Plant each week using a 40-car train. Because the Plant has its own rail spur and train yard, five 40-car trains per week do not have major impacts on rail traffic or service on the CSX, Inc. main line.

Also, following commencement of daily predictive modeling, the Plant is assumed to not have a major impact in terms of wait times for vehicular traffic at the on-grade rail crossing on the George Washington Parkway. Typical daytime rail operations (20-car trains) stop traffic on the Parkway for ten periods of about 2 minutes each week, while typical nighttime operations (40-car trains) stop traffic on the Parkway for five periods of about 4 minutes each week (Personal communication between D. Cramer, Mirant Corporation, and L.N. McCold, Oak Ridge National Laboratory, July 7, 2006).

Road. Under the Order before the commencement of daily predictive modeling (between December 20, 2005, and June 30, 2006), the Plant is estimated to have generated about 16 to 28 round trips each weekday (using 24-ton trucks) transporting ash from the Plant to the Brandywine facility. These trips had a negligible impact in terms of traffic on the local streets used to access the Plant, as the streets have relatively little traffic and operate at a level-of-service at or near “A” (Personal communication between B. Garbacz, Transportation Engineer, City of Alexandria, Virginia, and J.W. Saulsbury, Oak Ridge National Laboratory, May 26, 2006). Similarly, the addition of 16 to 28 truck trips to the existing traffic volume on the major roads between Henry Street and Maryland Route 381 (Table 3.6-1) represented only a small impact. However, the increase in traffic associated with operations between December 20, 2005, and June 30, 2006, contributed to the existing traffic problems on Maryland Route 381. (See the discussion in Section 3.6.2.)

Following commencement of daily predictive modeling (on July 1, 2006), including the temporary extension of the Order to December 1, 2006, and any extension beyond that date, the Plant is assumed to operate at a level similar to pre-shutdown operations, but with the addition of trona. Because the use of trona can approximately double the amount of ash produced, the Plant generates up to twice as much coal fly ash per day as under pre-shutdown operations (Section

4.3.6.1), requiring up to 56 round trips each weekday from the Plant to the Brandywine facility. Mirant is currently approved to deliver a total of 100 truckloads of ash to the Brandywine facility each weekday from the Potomac River Generating Plant and the Chalk Point Generating Plant combined (Baxter 2006).

Although the estimated level of truck traffic each weekday after July 1, 2006 (56 round trips), exceeds truck traffic under pre-shutdown operations (28 round trips), pre-Order operations (6 round trips), and operations between December 20, 2005, and June 30, 2006 (14 to 16 round trips), it does not appear to have a major impact in terms of traffic on the local streets used to access the Plant, since the streets have relatively little traffic and operate at a level of service at or near "A" (Personal communication between B. Garbacz, Transportation Engineer, City of Alexandria, Virginia, and J.W. Saulsbury, Oak Ridge National Laboratory, May 26, 2006). Similarly, the addition of about 56 truck trips to the existing traffic volume on the major roads between Henry Street and Maryland Route 381 (Table 3.6 1) represents a relatively minor impact in terms of traffic. The increase in traffic associated with operations after commencement of daily predictive modeling is, however, estimated to make a relatively large contribution to the existing traffic problems on Maryland Route 381. (See the discussion in Section 3.6.2.)

4.3.7 Environmental Justice

As discussed in Section 4.3.1, the elevated levels of air pollution from Plant operation that occur under certain conditions are highest very close to the Plant. Because of their proximity to the Plant, under all operating conditions residents of block groups 1 and 2 (Figure 3.7-1) experience higher exposures to air pollution from Plant emissions than residents of block groups 3 and 4. All of the gridded locations where maximum modeled ambient air concentrations occur (as reported in Tables 4.3.1-1 and 4.3.1-2) are located within block groups 1 and 2.

Thus, the populations with the highest exposure to impacts from the Plant are the non-minority and non-low-income populations in block groups 1 and 2. Consequently, the minority and low-income populations in block groups 3 and 4 (Section 3.7) do not experience "disproportionately high and adverse human health or environmental effects" related to air pollutant emissions from the Plant. In addition, DOE has not identified any different or unique ways that these or other minority and low-income populations in the area could be exposed to Plant air pollutants or otherwise affected by the Order or its potential extension. Thus, neither the Order nor any extension to the Order have "disproportionately high and adverse human health or environmental effects ... on minority and low-income populations" as discussed in Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*.

As discussed in Section 4.3.1, the elevated levels of air pollution from Plant operation that occur under certain conditions are highest close to the Plant. Thus, because of their proximity to the Plant, under all operating conditions residents of block groups 1 and 2 experience higher air pollution from Plant emissions than residents of block groups 3 and 4. Consequently, the minority and low-income populations in block groups 3 and 4 do not

experience “disproportionately high and adverse human health or environmental effects” related to air pollutant emissions from the Plant. In addition, these populations do not have different or unique ways of being affected by the Order or its potential extension.

5. ALTERNATIVES FOR FUTURE DECISION-MAKING

The DOE Order, as extended, expires on December 1, 2006. Before December 1, 2006, DOE will decide whether to allow the Order to expire, extend the Order, or take some other action, such as extending the Order with mitigation measures.

5.1 Allow the Order to Expire

As stated in the Order, Pepco's new 230-kV transmission lines are expected to provide a high level of electric reliability to the Central D.C. area even in the absence of production from the Plant. However, these new lines are not expected to be complete until the summer of 2007. DOE cannot speculate how Mirant would operate if DOE did not extend the Order; however, allowing the Order to expire would likely place the Central D.C. area in risk of a potential blackout.

It is difficult to specify the risk of death or health injury associated with blackouts because of the lack of statistical studies on such risk. However, blackouts can cause, and historically have caused, significant health and environmental impacts.

Blackouts create multiple public health problems that can lead to new or exacerbated injury or death. During hot weather blackouts can result in increased deaths, due to loss of air-conditioning or cooling ventilation. For example, 232 deaths were reported in the Midwest in the summer of 1999 during an extreme heat wave that also included a series of power disturbances; the majority of the deaths were attributable to elderly individuals without access to air-conditioning (Palecki and Changnon 1999). Blackouts can also cause significant problems for people with existing illnesses. During the Midwest/Northeast blackout of August 2003 paramedics from Passaic Beth Israel hospital had to respond to four times the usual number of calls, many involving respiratory ailments for patients whose batteries on home respirators had expired and for electronic breathing aids that went dead (WNBC 2003a).

Blackouts can also cause impacts to drinking water supplies and water bodies. The Midwest/Northeast blackout of August 2003 cut water service to 1.5 million people in Cleveland and caused officials in Detroit to warn residents to boil their water until the supply could be tested for potential bacteria (Water Quality and Health Council 2004). Because electricity powers pumps that push water through a city's water system, blackouts can cause the pressure in water pipes to drop, leaving the system open to bacteria entering the water supply. In addition, the discharge of sewage from treatment plants that run on electricity can cause environmental damage to water bodies. As recently as May 19, 2006, a 3-hr power failure at the Blue Plains Wastewater Treatment Plant in Washington, D.C. resulted in 17 million gallons (64,000 m^3) of raw untreated sewage being spilled into the Potomac River (Cohn 2006).

Blackouts also cause injury and death from fires (e.g. due to burning of candles), use of unvented portable emergency generators, accidents, and criminal activity. In the July 1977

blackout in New York City fires killed three, and one store owner shot and killed an armed looter (TIME 1977). Hundreds were also injured during widespread looting and other criminal activity in the July 1977 blackout. In a July 2006 blackout in Missouri that affected 150,000 people, a utility worker died after touching downed power lines, and another man died from burns while he tried to fix a generator he was using in his home (Associated Press 2006). In addition, during the Midwest/Northeast blackout of 2003 two people succumbed to carbon monoxide fumes from a gas generator aboard the boat they had been sleeping in overnight (WNBC 2003b).

5.2 Extend the Order as Currently Written

Impacts associated with extending the Order until either June 30, 2007, or December 31, 2007 (assuming a delay in installation of the new transmission lines), are assessed in Chapter 4. Extension of the Order until either date would result in increased impacts as compared to the Plant's "pre-Order" operating mode, but not the Plant's "pre-shutdown" operating mode. As presented in Chapter 4, impacts resulting from SO_2 emissions would be lower than under the pre-shutdown mode, while impacts resulting from trona use would be higher than under the pre-shutdown mode, and levels of other impacts would be similar to those from pre-shutdown operations.

5.3 Extend the Order with Mitigation Measures

Impacts of Plant operation under an extension of the Order could be mitigated by various alternatives including: (1) requiring Mirant to improve Plant operations and pollution control measures, (2) requiring Mirant to reduce exposure to pollutants to workers and nearby residents, (3) managing the demand for electricity in the Central D.C. area, (4) using alternative sources for generating electricity, and (5) expediting the installation of additional transmission lines.

5.3.1 Improve Plant Operations and Pollution Control Measures

- Require Mirant to store enough trona at or near the Plant to achieve 80% removal of SO_2 emissions for the full duration of any planned line outages. Mirant's experiments with trona indicate that this level of sulfur removal can be achieved. While Mirant has installed trona units on all five boilers, Mirant does not maintain sufficient trona on site or nearby to reduce emissions by 80% under high power operations for the duration of planned line outages.

    - Requiring Mirant to store sufficient trona at the Plant could help to ensure the logistical feasibility of achieving 80% removal of SO_2 emissions during a planned line outage, pursuant to the ACO. This could result in decreased modeled emissions

and any associated health effects. The quantity of trona available to Mirant may be limited, however, or it may take more time to increase current storage space at or near the Plant than required to install the two new transmission lines. DOE can consider working with EPA to monitor the ability of Mirant to gain and store enough trona for the Plant to achieve 80% SO_2 removal.

- Require that during non-outage situations Mirant operate the Plant at the minimum level of power generation that would maintain all units in a state in which they would be available to produce full power within a few hours of a line outage. Based on information provided by Mirant, minimum operation would require each baseload unit to operate 20 hours per day at minimum power (about 30 MW) and 4 hours at maximum power (about 105 MW). Similarly, the load-following or cycling units would need to operate 8 hours per day at minimum power (30 MW) and 4 hours at maximum power (88 MW).

    - This would reduce overall operation of the Plant and, therefore, reduce emissions and any associated health effects. DOE considered this operating mode before issuing the Order, but determined that it is not feasible because the baseload units at the Plant are designed for operation at high power levels and cannot sustain low levels of operation for a long period of time without damage.

- Require Mirant to increase the height of the Plant's exhaust stacks in order to create conditions conducive to better dispersion of emitted pollutants.

    - Taller stacks would reduce modeled air quality impacts of plant operations. The taller stacks would be visible at a greater distance and may also result in adverse visual impacts for neighbors of the Plant. Issues related to stack height increase are under the jurisdiction of the Federal Aviation Administration (FAA), which has granted Mirant permission to raise the stacks by 50 ft (15 m).

5.3.2 Reduce Exposure to Pollution

- Require Mirant to notify nearby residents when they would be potentially affected by a modeled NAAQS exceedance.

    - DOE is not able to estimate what people would do with such information and whether any decrease in health effects would occur. However, DOE can consider requiring Mirant to post daily when residents would be potentially affected by a modeled NAAQS exceedance during a line outage.

- DOE will post Mirant's monthly reports to EPA (as required by the ACO), as they become available to DOE, on DOE's website containing information related to the Plant. Such monthly reports would notify nearby residents of the results of monitored data, thereby allowing nearby residents to assess the likelihood of future exposure to an actual NAAQS exceedance.

- Pepco is filing monthly progress reports on the status of Pepco's new transmission lines and corresponding planned outages with FERC (FERC docket number EL05-145-000). Nearby residents can access Pepco's monthly reports through FERC's elibrary system at http//www.ferc.gov/docs-filing/elibrary.asp (search for FERC docket number EL-05-145-*).

  In addition, pursuant to the December 20, 2005, Order, Pepco is required to give advance notice of any planned outage and the estimated duration of any such outage to DOE. DOE will post any advance notice received from Pepco on DOE's website containing information related to the Plant (http://www.oe.energy.gov/permitting/372.htm).

  Therefore, nearby residents should be aware of planned line outage situations when the Plant is directed to produce power (up to full capacity) as directed by PJM.

- Require Mirant to provide the people who live in areas that would be affected by modeled exceedances of NAAQS during planned line outage situations the reasonable cost of moving to alternate locations until the threat of an exceedance is over if such people so choose.

  - Implementing this would involve several practical difficulties, such as determining the number of people who would be affected by a modeled exceedance, and whether relocation would be an appropriate response.

  - DOE believes that this many not be an appropriate use of its authority under Section 202(c) of the Federal Power Act (FPA) under these circumstances.

- Require Mirant to monitor outdoor levels of PM on the Plant site and provide suitable breathing protection for those working in high PM areas.

  - DOE can consider consulting with EPA about the need for PM monitoring. Determining the need for or type of suitable breathing protection is too speculative at this time.

5.3.3 Manage the Demand for Electricity in the Central D.C. Area

- Require the D.C. Public Service Commission (DCPSC) to develop a plan for reducing electrical demand in the Central D.C. area.

    - Reducing electrical demand in the Central D.C. area would reduce the need for operation of the Plant. However, the DCPSC and Pepco do not currently have a formal plan to reduce electrical demand in this area. Developing a plan would require rulemaking procedures, and implementing the plan would require infrastructure changes that may well take more time than required to install the new transmission lines. However, DOE has had several discussions with DCPSC encouraging DCPSC's efforts to reduce electrical demand in the Central D.C. area. DCPSC has informed DOE that:

        - DCPSC has given approval to Pepco to install "smart meters" in 2,250 homes as part of an effort to investigate how demand can be reduced in peak and other critical times.

        - DCPSC is currently in discussions with fellow state public service commissions in the Mid-Atlantic area and with PJM on how to improve demand response and related distributed energy resources.

        - A DCPSC commissioner is currently chairing the Mid-Atlantic Distributed Resources Initiative (http//www.energetics.com/madri/). DOE is currently providing technical advisory services and funding for facilitation efforts for this Initiative.

    - DOE can continue to encourage DCPSC to pursue demand-response initiatives in the Central D.C. area as in previous Orders.

- Order the development of specific, emergency load reduction programs to compensate for an unexpected loss of electricity generation or transmission capacity. For example, DOE could require emergency load shedding or load cycling for Federal and/or D.C. government buildings and/or other facilities during electrical emergencies.

    - Emergency load shedding or load cycling would reduce the need for operation of the Plant. DOE's Federal Energy Management Program is pursuing opportunities for energy management within the Federal government, both within and outside of emergency situations. Most recently, DOE and the General Services Administration held a workshop on April 26, 2006, on potential demand-response opportunities that

was attended by the majority of Federal electricity customers. The workshop educated Federal electricity customers on the reliability problems in the Central D.C. area and offered DOE technical assistance for demand-response initiatives.

5.3.4 Use Alternative Sources for Generating Electricity

- Require installation of temporary or back-up electricity generating equipment at specific facilities or government agencies to eliminate the need for the Mirant Plant.

    - Installation of temporary or back-up electricity generating equipment would not likely generate enough power to eliminate the need for the Plant. Alternative sources of electricity sufficient to eliminate the need for one or more units at the Plant could not be brought on line before the additional 230-kV power lines have been brought into service.

- Encourage Federal agencies in the Central D.C. area to operate on alternative sources of electricity, to reduce their peak electricity demand, or to develop a generating capability. For example, heating plants operated by the General Service Administration could be modified to cogenerate both heat and electricity, and essential government facilities could become capable of independently generating their own electricity in emergencies.

    - Alternative sources of electricity could reduce the need for the Plant and were discussed at DOE's April 2006 workshop described above. However, alternative sources of electricity sufficient to replace the Plant or eliminate the need for one or more units at the Plant could not be brought on line before the additional 230-kV power lines have been brought into service.

5.3.5 Expedite the Installation of Additional Transmission Lines or Encourage the Use of Other Existing Lines

- Expedite the installation of the two 230-kV transmission lines that Pepco is currently working on.

    - DOE has evaluated Pepco's construction schedule to make sure it is as efficient as possible. DOE can continue to monitor the construction and outage schedule to ensure, as much as possible, that the construction process remains on schedule and that any planned outages are essential. Pepco notified DOE on September 7, 2006, that the expected installation date of the new 230-kV lines is now June 21, 2007, instead of July 1, 2007.

- DOE can provide assistance to Pepco in expediting the installation of the new 230-kV lines that is requested by Pepco and that is practical and feasible. For example, at Pepco's request DOE met with Pepco representatives in March 2006 to discuss ways that DOE could help with the NEPA process for Pepco's proposed route for the new 69-kV lines to the Blue Plains Wastewater Treatment Plant (which partially fall on National Park Service land). The new 69-kV lines became operational on July 15, 2006.

- Encourage Pepco to construct additional new transmission lines, for example, from other plants in close proximity to the Central D.C. area, namely the Benning Road or Buzzard Point plants, to supply the power currently provided by the Plant.

    - Pepco already uses the power from these sources for other customers. Obtaining additional rights-of-way to construct new transmission lines would not be feasible in the time period required to solve the immediate reliability issues in the Central D.C. area.

- Encourage the use of additional transmission lines along existing corridors. Existing transmission lines enter the D.C. area from the north and south along, for example, railroad rights-of-way of the National Railroad Passenger Corporation ("AMTRAK") and CSX Corporation.

    - As described in Pepco's April 13, 2006, filing to DOE, although use of the existing transmission lines on the AMTRAK and CSX rights-of-way would reduce the need for the Plant in the Central D.C. area, the lines are already being used by Pepco. Adding additional lines along the same corridor would take more time than required to install the new 230-kV transmission lines already planned and under development.

- Encourage the use of currently existing, but inactive, transmission lines, such as the 69-kV circuits between Buzzard Point and the Plant.

    - As described in Pepco's April 13, 2006, filing to DOE, Pepco refurbished three 69-kV circuits between Buzzard Point and the Plant in 2004 to provide emergency back-up service, which would be used to restart the Plant and help the restoration process for any blackout of the Central D.C. area. These circuits cannot be energized under normal operating conditions because they are of small capacity and would overload quickly upon the failure of one of the existing 230-kV transmission circuits or the Plant; thus, their use would not provide an increase in reliability.

6. REGULATORY CONSULTATION AND COMPLIANCE

Under Section 7 of the Endangered Species Act (ESA) Federal agencies must consult with the Fish and Wildlife Service (FWS) or the National Marine Fisheries Service (NMFS) regarding actions that they may undertake that could adversely affect species and habitats protected under the Act. In order to comply with this requirement, DOE sent letters to FWS and NMFS as part of informal consultation describing the species that were likely to occur near the Plant and requesting concurrence from FWS and NMFS that the operation of the Mirant Potomac River Generating Station under the terms of the DOE Orders would not adversely impact Federally listed or proposed threatened or endangered species or designated or proposed critical habit. (See Appendix D.)

The responses from FWS and NMFS, also included in Appendix D, are discussed in Section 4.3.4.4.

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APPENDIX A

DOE Emergency Orders

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United States of America
Department of Energy

District of Columbia Public Service Commission) Docket No. EO-05-01

Order No. 202-05-3

I. Summary

Pursuant to the authority vested in the Secretary of Energy by section 202(c) of the Federal Power Act (FPA), 16 U.S.C. § 824a(c), and section 301(b) of the Department of Energy Organization Act, 42 U.S.C. § 7151(b), and for the reasons set forth below, I hereby determine that an emergency exists due to a shortage of electric energy, a shortage of facilities for the generation of electric energy, a shortage of facilities for the transmission of electric energy and other causes, and that issuance of this order will meet the emergency and serve the public interest. Therefore, Mirant Corporation and its wholly owned subsidiary, Mirant Potomac River, LLC (collectively referred to herein as Mirant), are hereby ordered to generate electricity at their Potomac River Generating Station (the "Plant") pursuant to the terms of this order.

II. Procedural History

On August 19, 2005, Mirant submitted to the Virginia Department of Environmental Quality (DEQ) a computerized emissions modeling study Mirant had conducted of its Plant that indicated that emissions from the Plant caused or contributed to significant localized exceedances of the National Ambient Air Quality Standards (NAAQS).[1] Also on August 19, 2005, DEQ issued a letter to Mirant which requested "that Mirant *immediately* undertake such action as is necessary to ensure protection of human health and the environment, in the area surrounding the Potomac River Generating Station, including the potential reduction of levels of operation, or potential shut down of the facility." (emphasis in original). The letter asked Mirant to provide DEQ with a summary of the actions taken and the progress toward eliminating NAAQS exceedances by August 24, 2005. At midnight on August 21, 2005, Mirant reduced production of all units at the Plant to their minimum load, and at midnight on August 24, 2005, Mirant shut down all five of the generating units at the Plant.

On August 24, 2005, the District of Columbia Public Service Commission (DCPSC) filed an *Emergency Petition and Complaint* with both the United States Department of Energy (DOE or Department) and the Federal Energy Regulatory Commission (FERC or Commission) pursuant to the FPA. The DCPSC requested the Secretary of Energy to find that an emergency exists under section 202(c) of the FPA and to issue an order directing Mirant to continue

[1] The Clean Air Act, 42 U.S.C. § 7401 *et seq.*, authorizes the United States Environmental Protection Agency (EPA) to establish NAAQS, 42 U.S.C. §§ 7408-7409, and states that it is the responsibility of the states and local governments for assuring that they are attained, 42 U.S.C. §§ 7401(a)(3) and 7416.

operation of the Plant. The basis for the petition was that the shutdown of the Plant "...will have a drastic and potentially immediate effect on the electric reliability in the greater Washington, D.C., area and could expose hundreds of thousands of consumers, agencies of the Federal Government and critical federal infrastructure to curtailments of electric service, load shedding and, potentially, blackouts." The DCPSC requested that the Commission issue a similar order under sections 207 and 309 of the FPA. Numerous parties filed interventions and comments in response to DCPSC's emergency petition, as well as subsequent comments and responses.[2] Further, both FERC and DOE issued information requests to Mirant, the Potomac Electric Power Company (PEPCO), the company responsible for supplying electricity to retail customers in the District of Columbia, and PJM Interconnection, LLC (PJM), the grid operator responsible for the administration of the bulk power grid and electricity market in the region.[3] In addition to the DCPSC petition proceedings, DOE has hosted and participated in numerous conference calls and meetings to gather information on the shutdown of the Plant and its effect on the reliability of D.C.'s electricity system.[4]

III. Background

The coal-fired Mirant Plant, which began operation in 1949, is located in Alexandria, Virginia, and is capable of producing 482 megawatts of electricity primarily for delivery to Washington, D.C. The Plant consists of five generating units, two of which are cycling units that range in output from 35 MW to 88 MW, and three of which are baseload units that range in output from 35 MW to 102 MW. It is one of only three sources of electricity that serve the central business district of the District of Columbia, many federal institutions, the Georgetown area in D.C., as well as other portions of Northwest, D.C., and the District of Columbia Water and Sewer Authority's Blue Plains Advanced Water Treatment Plant, the largest wastewater

[2] Several of these filings were only made in the FERC docket and not in DOE's docket. Even though a number of filers did not submit their comments in the DOE docket, the Department has, in the interest of rendering an appropriate and fully informed determination, reviewed all the filings in the FERC docket for any pertinent facts that will assist the Department in making its decision. Also, to the extent the filings contained analysis or legal arguments pertaining to the Department's 202(c) authority, they have been considered in the Department's decision making process.

[3] The data submitted contained Critical Energy Infrastructure Information and was submitted in both confidential and redacted versions, as defined in FERC's rules at 18 C.F.R. § 388.13. All information contained in this order is from public filings in the DOE and FERC dockets.

[4] The Administrative Procedure Act's prohibitions on ex parte communications in an adjudicatory proceeding, 5 U.S.C. § 557(d)(1), do not apply to DOE's 202(c) proceedings, because section 202(c) explicitly authorizes the Department to issue a 202(c) order "either upon its own motion or upon complaint, with or without notice, hearing, or report. . ." 16 U.S.C. § 824a(c).

treatment plant in the world.[5] The other two sources are two 230 kV lines that deliver electricity from other generating sources in the regional electric grid operated by PJM. Although there are other generating units in close physical proximity to the Central D.C. area, (e.g., the Benning Road and Buzzard Point generating facilities, which are dual-fueled oil and natural gas generating power plants, owned by PEPCO) there are no transmission lines that would allow delivery of power from these other units to reach the Central D.C. area. With regard to the sources of power that serve the Central D.C. area, PEPCO owns and operates the transmission lines, and PJM determines electricity demand.

Although Mirant shut down all of the Plant's generating units on August 24, 2005, it has since restarted unit number one which, the Department understands, is currently operating. Mirant is operating the unit on an 8/8/8 basis --- that is, in any given twenty-four hour period, the unit runs for eight hours at its maximum level of 88 MW, eight hours at its minimum level of 35 MW, and has eight hours when it does not run. DOE has been informed that both EPA and DEQ acknowledge that the operation of this unit in this manner does not result in any NAAQS exceedances. In addition, DOE understands that Mirant is taking other steps to increase production at the Plant in a manner which will be acceptable to DEQ and EPA.

PEPCO has applied to the DCPSC to construct two new 230 kV lines that would supply electricity to the Central D.C. area. In the same application, PEPCO has proposed building two new 69kV lines to supply the Blue Plains wastewater treatment plant. PEPCO proposes having the two 69 kV lines installed by the summer 2006 peak season, and the two 230 kV lines installed in 18 to 24 months. The two existing 230 kV lines that supply the Central D.C. area would need to be temporarily taken out of service sequentially in order to connect the new lines to the Central D.C. area. Once completed, these lines apparently would provide a high level of electric reliability in the Central D.C. area, even in the absence of production from the Plant.

IV. Discussion

A. Reliability Issues

The Department has conducted an independent analysis of the electricity reliability situation in the Central D.C. area and has analyzed the Plant's role in ensuring a sufficiently reliable supply of electricity to that area. DOE's analysis was conducted by the Department's Oak Ridge National Laboratory. Under North American Electric Reliability Council standards, at a minimum, the power system must carry at least enough contingency reserves of electricity to cover the most severe single contingency. The standards require that an area's system always be operated with sufficient reserves to compensate for the sudden failure of the area's most important single generator or transmission line.

[5] For purposes of this order, the area supplied with electricity by these three sources will be referred to as the "Central D.C. area," and the retail customers in this area will be referred to as the "Central D.C. area customers."

Based on the fact that the Central D.C. area has only three sources of supply, the Plant and the two 230 kV transmission lines, the Department's analysis concludes that in order to maintain a minimally reliable electric power system, the Plant must be available to run when one of the 230 kV lines is out of service, because if the remaining line failed there would be no other source of electricity to serve the Central D.C. area load. In addition, the analysis concludes that if one of the 230 kV lines failed unexpectedly, enough generation must be started as rapidly as possible so as to be able to serve all of the Central D.C. area load as a contingency reserve in the event the other line were to fail. The analysis also indicates that the Plant should be operated in such a way as to minimize the amount of time needed to bring it into production.

PEPCO has asserted that:

> Absent the generating capacity of the Plant, if the two 230 kV transmission circuits into the [Central D.C. area] fail, there will be a blackout in much of the District of Columbia until the circuits are repaired or the Plant's generators are restarted and can operate at a level that matches load. All electric customers in Georgetown, Foggy Bottom and major portions of downtown Washington will be affected. The affected customers will also include Blue Plains wastewater treatment plant. It is PEPCO's understanding that within 24 hours of the loss of electric supply, Blue Plains will have no option but to release untreated sewage directly into the Potomac River, which would result in a significant adverse impact to human health, aquatic wildlife and other environmental resources. Affected customers will also include numerous hospitals, schools, universities, commercial buildings, and residential customers. Importantly, numerous federal facilities will lose power, including those critical to the security, safety, and welfare of the whole country, such as the FBI, the Justice Department, the State Department, the Federal Emergency Management Agency, the Department of the Interior, and the Department of Energy to name but a few.[6]

No commenter has disputed these statements by PEPCO, and they have been generally corroborated by DOE's own independent analysis; therefore, DOE will accept them as correct statements of fact. Further, the 230 kV lines do go out of service on occasion; since 2000, there have been 34 one-line outages for maintenance, and seven occasions where one of the lines has tripped unexpectedly. DOE has been informed that, prior to 2000, there were two occasions when both of the lines failed simultaneously.

B. Environmental Issues

Some commenters have asserted that the renewed operation of the Plant would result in NAAQS exceedances and a violation of the Clean Air Act, and that DOE could not issue a 202(c) order which would contravene the Clean Air Act (42 U.S.C. §§ 7401-7626). In response to this assertion, DCPSC, PEPCO and PJM contend that there were no actual monitored

[6] *See* Potomac Electric Power Company's Leave to Answer and Answer to Comments, FERC Docket No. EL05-145-000 at pages 2 & 3 (September 9, 2005).

exceedances of the NAAQS at the Plant during operation, and that operation of the plant at full power does not exceed the emissions limits contained in the Plant's operating permit and therefore the operation of the Plant pursuant to a DOE order would not violate the Clean Air Act. EPA has shared information with DOE regarding NAAQS modeled results and other environmental issues at the Plant. In response to the environmental concerns raised, this order seeks to minimize, to the extent reasonable, any adverse environmental impacts. Should EPA issue a compliance order directed to operation of the Plant, DOE will consider whether and how this order should conformed to such order.

Another assertion raised is that DOE cannot issue an order without complying with the National Environmental Policy Act (NEPA), 42 U.S.C. § 4321 *et seq.* Responders to that assertion stated that NEPA review requirements do not apply because any order would merely require the Plant to operate in the manner and at the level it has historically operated, and thus is not a "major federal action" triggering NEPA. In addition, responders assert that "...the emergency nature of the relief sought in this case permits the [the Secretary] to act without conducting a NEPA analysis, even if it were required."[7] DOE has determined that the emergency circumstances here make it necessary to take action without performing a NEPA analysis. Indeed, in order for an order under FPA section 202(c) to be issued at all, the Secretary of Energy must determine that an emergency exists, and I have made that determination here. DOE has consulted with CEQ about alternative arrangements pursuant to 40 C.F.R. § 1506.11.

C. Other Issues

Commenters opposed to the issuance of a FPA section 202(c) order cited *Richmond Power & Light v. FERC*, 574 F. 2d 610 (D.C. Cir. 1978) as imposing a limit on the Secretary's authority to make an emergency finding under section 202(c). In *Richmond*, the New England Power Pool (NEPOOL) petitioned the Federal Power Commission (the Secretary's predecessor in exercising section 202(c) authority) for an order pursuant to FPA section 202(c) to have utilities east of the Mississippi River with excess electric generating capacity supply NEPOOL with that excess capacity. The request was based on fears of an oil shortage due to the 1973 Arab oil embargo. The Commission responded by holding a conference and a series of meetings which resulted in an agreement among the purchasing, transmitting and supplying utilities and participating state regulatory commissions. As a result of the agreement, NEPOOL moved to withdraw its petition, which the Commission allowed. Richmond Power & Light Company challenged the decision to allow the withdrawal and the court found that the Commission did not abuse its discretion in declining to issue an order under section 202(c), but rather settling on the temporary-voluntary agreement program reached by the interested parties. Instead of limiting its

[7] District of Columbia Public Service Commission Answer to Motion of the Virginia Department of Environmental Quality at page 24 (October 26, 2005), FERC Docket No. EL05-145-000. *See also* Answer of Potomac Electric Power Company and PJM Interconnection, LLC at page 18, (October13, 2005), FERC Docket No. EL01-145-000.

reach, *Richmond* underscores the discretionary nature of the Secretary's authority under section 202(c).[8]

Another case asserted to limit the Secretary's authority to issue an order under section 202(c) was *National Fuel Gas Supply v. FERC*, 909 F2d 1519 (D.C. Cir. 1990). In that case, National Fuel applied under section 7 of the Natural Gas Act (NGA), 15 U.S.C. § 717 *et seq.*, for a certificate of public convenience and necessity to allow it to make interruptible sales of natural gas. The Commission imposed a condition that National Fuel accept a blanket transportation certificate to provide open access transportation. The court ruled that the Commission was improperly using a NGA section 7 certificate condition in place of an individual or generic proceeding under section 5 of the NGA. The Department does not see the relevance of *National Fuel* here. I am using section 202(c) of the FPA for precisely the type of situation contemplated by section 202(c) of the FPA.

V. Decision

Section 202(c) of the FPA vests in the Secretary of Energy the authority to issue an order when "an emergency exists by reason of a sudden increase in the demand for electric energy, or a shortage of electric energy or of facilities for the generation or transmission of electric energy, or of the fuel or water for generating facilities, or other causes...." 16 U.S.C. § 824a(c). DOE's regulations acknowledge that "[e]xtended periods of insufficient power supply as a result of inadequate planning or the failure to construct necessary facilities can result in an emergency as contemplated by these regulations." 10 C.F.R. § 205.371.

I find that in the circumstances presented here, an emergency exists that justifies the issuance of a section 202(c) order. My determination is not based on any single factor, but on the combination of all relevant facts and circumstances. In particular, I find that an emergency exists because of the reasonable possibility an outage will occur that would cause a blackout, the number and importance of facilities and operations in our Nation's Capital that would be potentially affected by such a blackout, the extended number of hours of any blackout that might in fact occur, and the fact that the current situation violates applicable reliability standards.

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[8] The facts in *Richmond* and in the current situation are very different. *Richmond* dealt with a wide regional or even national energy shortage situation, while we are considering electricity reliability in a discrete geographic area. The facts here more closely resemble those considered by the Federal Power Commission in *City of Cleveland, Ohio v. Cleveland Electric Illuminating Company*, 47 FPC 747 (1972). In that case, the City of Cleveland petitioned the Commission pursuant to section 202(c) to order an interconnection with Cleveland Electric Illuminating Company to provide services during shortages caused by outages of the City of Cleveland's generating facilities, or delays getting generation on line. The Commission found that the City of Cleveland had an emergency due to periodic shortages of generating facilities caused by outages and ordered the establishment of a 69kV temporary emergency interconnection between the electric systems of the City and Cleveland Electric Illuminating. Similarly, here DOE is ordering the Plant to provide electricity in certain limited situations.

More specifically, if the Mirant plant is not available to generate electricity and one of the two transmission lines serving the Central D.C. area goes out of service, the Central D.C. area would be served by only one transmission line. Should that remaining line fail for any reason, a blackout would occur in the Central D.C. area, potentially for an extended period of time. In fact, if one or both of the transmission lines could not be brought back into service immediately and the only source of energy for the Central D.C. area was the Mirant Plant, in the absence of today's order it would take several hours at a minimum to bring the Plant into full operation.

The outage of one of these two lines is not merely a theortetical possibility. On Friday, December 16, 2005, PJM informed DOE that on the previous night, "one of the two circuits critical to providing service to the District tripped. Continued [electric] service to certain load within the District was at that time entirely dependent on the remaining circuit." As a result, PJM requested dispatch of a second generating unit at the Plant, but Mirant refused to do so. PJM informed DOE that "service was not interrupted because load was low and the remaining circuit performed without incident." Fortunately, full service to the line that had tripped was restored by the morning of December 16. Nonetheless, there can be no assurance that the Central D.C. area will be so lucky next time, either with respect to the timing of the event, the operation of the second transmission line, or the ability to bring the first transmission line back into service.

Furthermore, it is periodically necessary for an outage to occur on one of the transmission lines because of the need to perform maintenance. In fact, maintenance is scheduled on one of the lines in the next few weeks. Thus, as occurred on the night of December 15, 2005 and as will certainly occur again in the future, if the Mirant Plant is not made operational Central D.C. will find itself relying solely on one transmission line. The duration of an outage can range from up to several days (for maintenance) or even longer (up to weeks) if the outage of a line is due to a major equipment failure. Throughout such a period, if the Plant is not fully operational a blackout in Central D.C. is only one step away, i.e., if an event should occur that causes the second line to fail. Such a blackout could last for hours or days.

I recognize that, if past experience is any guide, the simultaneous failure or outage of both transmission lines serving the Central D.C. area is not a high probability. While this event has occurred in the past, it has not happened often. Moreover, the recent tripping of one circuit does not in itself dictate the existence of an emergency justifying issuance of a 202(c) order.

The facilities and functions that would be adversely affected by an extended blackout in this instance, however, is an important consideration. The Central D.C. area includes offices, facilities and operations involved in all three branches of government, and that are critically important to the Nation's national security, law enforcement and regulatory functions. The Central D.C. area also includes hundreds of thousands of residents and workers, and all manner of public safety and protection facilities, including hospitals, police, and fire facilities. Moreover, DOE has been informed that within 24 hours of a blackout in the Central D.C. area, untreated sewage from the Blue Plains Wastewater Treatment plant would be discharged into the Potomac River.

Finally, it is noteworthy that a blackout in the Central D.C. area not only would affect critically important facilities and operations, it could last for an extended period. Depending on the reason for the outage of the transmission lines, the lack of service on those lines accompanied by the lack of generation by the Plant could result in a large portion of the District of Columbia being without electricity for a period that could last hours or days. At the very least, if the two transmission lines were made unavailable with no advance notice and the only source of electricity for the Central D.C. area was the Mirant plant, in the absence of today's order DOE understands it would take at least 28 hours, and likely longer, to bring the Plant into full operation, during which time all or a substantial part of the Central D.C. area would be without electric power The results would be hardship and physical risk to hundreds of thousands of persons from loss of heat, elevator outages, medical equipment failure and numerous other causes. In addition, critical portions of the nation's government would also be severely impacted, with resulting adverse effects on a national scale.

Of course, the fact that the Department did not act immediately on the DCPCS petition does not argue against my finding that an emergency currently exists. After the petition was filed, DOE took several weeks to gather the relevant information, consider the facts, talk with environmental regulatory authorities, and develop an order that balanced the appropriate considerations. As explained in the text of this order, the current facts fully justify my finding that an emergency exists and that this order will meet that emergency. There certainly is nothing in the Federal Power Act that requires me to wait until a blackout actually has occurred, lives are put in jeopardy, and a significant disruption of National government functions already has happened before exercising my section 202(c) authority.

Accordingly, and based on all of the facts and circumstances, I find that an emergency exists justifying the issuance of this order under Federal Power Act section 202(c).

After finding the existence of an emergency, DOE has the authority, "either upon its own motion or upon complaint, with or without notice, hearing, or report, to order such temporary connections of facilities and such generation, delivery, interchange, or transmission of electric energy as in its judgment will best meet the emergency and serve the public interest." 16 U.S.C. § 824a(c). The statute gives the Secretary of Energy broad discretion to fashion the terms of an order that will, in the Secretary's judgment, "best meet the emergency and serve the public interest." Based on the circumstances described above in this order, I hereby direct Mirant to generate electricity at the Plant pursuant to the terms of this order.

While I am issuing this order to help ensure a reliable supply of electric energy to the Central D.C. area, I am cognizant of the concerns that have been expressed concerning the potential adverse environmental consequences of operating the Plant, and of the national interest in attainment of the NAAQS that have been established under the Clean Air Act. Ordering action that may result in even local exceedances of the NAAQS is not a step to be taken lightly. However, it would not be reasonable for the Department of Energy to stand by and take no positive action on the DCPSC petition, even though the Central D.C. area is in danger of an extended blackout and the Department and private parties have available to them the legal and operational tools to prevent such a blackout from occurring. In this order, I have sought to harmonize those interests to the extent reasonable and feasible by ordering Mirant to operate in a

manner that provides reasonable electric reliability, but that also minimizes any adverse environmental consequences from operation of the Plant.

DOE expects that the DCPSC, having sought an emergency order, will take such actions as are within its authority to provide adequate and reliable electric service for the Central D.C. area including, for example, expediting approval of PEPCO transmission system upgrades and instituting demand response programs.[9] Indeed, DOE views this order not as a permanent solution to the Central D.C. area's reliability issues, but rather as a bridge between the current untenable situation and a more permanent solution that must be crafted by appropriate parties, including the DCPCS, FERC, environmental regulatory authorities, and relevant private sector parties. This permanent solution may include the installation of the new transmission lines discussed above, the installation of new pollution control equipment at the Mirant Plant, or other means.

As explained above, in the event that one of the two transmission lines that serve the Central D.C. area is out of service (due either to a necessary planned outage or to unforeseen events) and sufficient electricity from the Mirant power plant were not available, then the Central D.C. area would experience an immediate blackout should the one remaining source of electricity fail. This situation must be avoided, and ordering paragraph A of this order ensures that this situation will be avoided. When an outage is planned, Mirant is to be given advance notice and is required to supply necessary generation throughout the period of the outage.[10] In the event of an unexpected outage, Mirant must provide such generation as soon as possible. In the very unlikely eventuality of both transmission lines failing at the same time, Mirant is required to provide sufficient generation to supply the electrical demands of the affected area as soon as possible.

It is essential to determine the level of operation and other steps that will enable Mirant to rapidly respond to an unplanned transmission line outage. Some commenters have urged the Department to order the Plant to run continuously, even if doing so causes ongoing exceedances of the NAAQS. This would assure a high level of reliability of the electricity supply, but of course would not be tailored to particular circumstances in which operation of the Plant would be most necessary to provide needed reliability for the Central D.C. area and might also cause local air quality concerns. Other commenters have urged the Department to do nothing.

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[9] Demand response programs prompt electricity customers to reduce demand, especially during periods of short supply.

[10] In making certain portions of this order effective only upon notice to Mirant by PEPCO of a planned or unplanned outage of one or both of the 230 kV lines, it is similar to the FPA section 202(c) orders issued during the 2000/2001 California energy crisis. In those, DOE ordered certain entities to generate, deliver, interchange and transmit electricity to the California Independent System Operator (California ISO), but the entities were not required to deliver energy or services unless the California ISO had filed with DOE a certificate that it had been unable to acquire adequate supplies of electricity in the market. *See* Order pursuant to Section 202(c) of the Federal Power Act (December 14, 2000); Order Pursuant to Section 202(c) of the Federal Power Act (January 11, 2001).

The Department is not prepared to order actions that could cause more localized NAAQS exceedances than are necessary in order to assure adequate electric reliability for the Central D.C. area. At the same time, the Department should address the risks that delays in responding to an unplanned transmission line outage would present if measures are available to mitigate that risk. In my judgment, the appropriate balance is struck by (1) requiring Mirant to keep as many units in operation, and take all other measures to reduce the start-up time of units not in operation, for the purpose of providing electrical reliability, as feasible (as further defined in the ordering paragraphs below). Thus, Mirant must take actions to reduce the time it takes to respond to an unplanned outage. This will serve to reduce the risk of a blackout but not at the price of unnecessary exceedances of health-based NAAQS. As Mirant improves its environmental performance, in cooperation with environmental regulators, its ability to react to an unforeseen outage also will improve. Environmental regulators and Mirant can work together, with the Department, to reduce, and perhaps eliminate, any conflict between environmental goals and electric reliability.

This order is effective immediately and will terminate at 12:01 a.m. October 1, 2006. This order may be modified or extended at any time upon order of the Secretary of Energy.

VI. Ordering Paragraphs

For the reasons set forth above, pursuant to section 202(c) of the Federal Power Act, it is hereby ordered that:

A. During any period in which one or both of the 230kV lines serving the Central D.C. area is out of service, whether planned or unplanned, Mirant will operate the Potomac River Generating Plant to produce the amount of power (up to its full capacity) needed to meet demand in the Central D.C. area as specified by PJM for the duration of the outage.

> In the event of a planned outage, Potomac River units will generate that amount of electricity specified by PJM to meet demand.
>
> In the event of an unplanned 230 kV line outage, Potomac River units will generate that amount of electricity specified by PJM to meet demand as soon as possible.

When producing electricity pursuant to this paragraph, Mirant shall utilize pollution control equipment and measures to the maximum extent possible to minimize the magnitude and duration of any exceedance of the NAAQS.

B. Mirant shall keep as many units in operation, and shall take all other measures to reduce the start-up time of units not in operation, for the purpose of providing electricity reliability, as "feasible." For purposes of this paragraph, "feasible" means as determined by the Department of Energy, after consideration of the plan submitted by Mirant pursuant to paragraph D of this order and after consultation with the Environmental Protection Agency, without regard to cost and without causing or significantly contributing to any exceedance of the NAAQS.

C. Notice

In instances of scheduled outages of one of the 230kV lines, PEPCO will give advance notice of the planned outage and the estimated duration of such outage to Mirant, PJM, DOE, FERC, EPA, and DEQ. The notice must be sufficiently in advance of the outage to allow Mirant to bring the required amount of generation needed for reliability purposes on line by the time the outage is scheduled. PEPCO will ensure that only those planned outages needed to maintain or enhance the reliability of the 230 kV lines (or to install new lines) are scheduled and that such outages are scheduled to minimize the environmental effects of the operation of the Plant.

PEPCO will notify DOE, PJM, FERC, EPA, and DEQ of any unplanned outage of one or both of the 230 kV lines as soon as possible, but in no event later than two hours after informing Mirant.

In the event of either a planned or unplanned outage, PJM will specify the amount of electricity that Mirant must provide in order to meet demand.

D. Mirant shall submit a plan to DOE, within 10 days of the date of this order, detailing the steps it will take to ensure compliance with this order. This compliance plan shall include, at minimum, information regarding adequate staffing, materials, and supplies; emissions controls; and length of time necessary to start-up the Plant's generating units in the event of an unplanned or planned outage. DOE will review the compliance plan and order additional requirements if necessary.

E. Pursuant to the terms of FPA section 202(c) and DOE regulations at 10 C.F.R. § 205.376, Mirant and its customers should agree to mutually satisfactory terms for any costs incurred by Mirant under this order. If no agreement can be reached, just and reasonable terms shall be established by a supplemental order.

F. DOE expects that the DCPSC will take all reasonable actions to augment electrical reliability and to reduce electricity demand in the Central D.C. area.

G. DOE will periodically reexamine the need for this order with particular emphasis on: (1) Mirant's progress, working with environmental regulators, in reducing emissions and/or the impact of emissions; and (2) whether the DCPSC is taking all reasonable actions available to it to support electricity reliability in the Central D.C. area.

H. Pursuant to section 313 of the Federal Power Act (16 U.S.C. § 8251), any person, State, municipality, or State commission that is a party to this proceeding and is aggrieved by this order may apply for a rehearing within thirty days. Requests for rehearing may be submitted by mail, facsimile, or electronic mail to the following: (1) mail should be directed to Lawrence Mansueti of the Permitting, Siting, and Analysis Division of the Office of Electricity Delivery and Energy Reliability at the United States Department of Energy, Routing Symbol OE-20, 1000

Independence Avenue, S.W., Washington, D.C. 20585; (2) facsimiles may be submitted to 202-586-5860; (3) e-mail may be submitted to Lawrence.Mansueti@hq.doe.gov.

Issued in Washington, D.C. at _____ this 20th day of December, 2005.

Samuel W. Bodman
Secretary of Energy

Department of Energy

Washington, DC 20585

District of Columbia Public Service Commission

Docket No. EO-05-01

Order No. 202-06-2

On December 20, 2005, in Order No. 202-05-3, I determined that an emergency existed in the Central District of Columbia area due to a shortage of electric energy, a shortage of facilities for the generation of electric energy, a shortage of facilities for the transmission of electric energy and other causes, and that issuance of the order would serve to alleviate the emergency and serve the public interest. Therefore, pursuant to the authority vested in the Secretary of Energy by section 202(c) of the Federal Power Act (FPA), 16 U.S.C. 824a(c), and section 301(b) of the Department of Energy (DOE) Organization Act, 42 U.S.C. 7151(b), and for the reasons set forth in Order No. 202-05-3, I ordered Mirant Corporation and its wholly owned subsidiary, Mirant Potomac River, LLC, to generate electricity at its Potomac River Generating Station (the Plant) pursuant to the terms of the order.

In Order No. 202-05-3, I noted that the Plant is one of only three sources of electricity that serve the central business district of Washington, D.C., many federal institutions, and the Georgetown area, as well as other portions of Northwest D.C., and the District of Columbia Water and Sewer Authority's Blue Plains Advanced Wastewater Treatment Plant. The order further noted that:

> PEPCO has applied to the [District of Columbia Public Service Commission] to construct two new 230 kV lines that would supply electricity to the Central D.C. area. In the same application, PEPCO has proposed building two new 69kV lines to supply the Blue Plains wastewater treatment plant. PEPCO proposes having the two 69 kV lines installed by the summer 2006 peak season, and the two 230 kV lines installed in 18 to 24 months. The two existing 230 kV lines that supply the Central D.C. area would need to be temporarily taken out of service sequentially in order to connect the new lines to the Central D.C. area. Once completed, these lines apparently would provide a high level of electric reliability in the Central D.C. area, even in the absence of production from the Plant.

The two 69 kV lines to the Blue Plains wastewater treatment plant have been completed. The two new 230 kV lines have been approved by the relevant regulatory authorities and are scheduled to be completed and in operation by mid-summer 2007.

Printed with soy ink on recycled paper

On January 18, 2006, DOE issued a notice of the emergency order (published in the Federal Register on January 20, 2006, 71 FR 3279) in which DOE stated that it would prepare a Special Environmental Analysis (SEA) pursuant to the Council on Environmental Quality's Regulations Implementing the Procedural Requirements of the National Environmental Policy Act. The SEA would examine the potential impacts of the operation of the Plant pursuant to Order No. 202-05-3. DOE said it would make the SEA publicly available and would consider information contained in the SEA, and public comments on the SEA, in any future decision making regarding the operation of the Plant. The SEA has not yet been issued, but DOE expects it to be completed shortly.

Because the reliability problems identified in Order No. 202-05-3 continue in the absence of the completion of the two new 230 kV lines, but the SEA has not been completed, I am issuing a short-term extension of the emergency order pending completion and consideration of the SEA and DOE's review of comments thereon.

The Department reiterates its expectation that the DC Public Service Commission pursue demand response initiatives and actively promote conservation as additional means of enhancing reliability in the central D.C. area.

On February 17, 2006, I issued Order No. 202-06-1, which granted certain requests for rehearing of Order No. 202-05-3 for the limited purpose of further consideration. The rehearing requests continue under consideration and no action is being taken on those requests by the issuance of this order.

Based on the above, I find that the circumstances which led to my previous determination that an emergency existed still continue, and therefore I hereby extend Order No. 202-05-3 and all the terms and conditions thereof until 12:01 a.m., December 1, 2006.

Issued in Washington D.C. at 6:00 PM this 28 day of September, 2006.

Samuel W. Bodman
Secretary of Energy

APPENDIX B

EPA's Administrative Compliance Order for the Mirant Potomac River Generation Station

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

In the Matter of:

Mirant Potomac River LLC
Potomac River Generating Station
Alexandria, Virginia

Docket No. CAA-03-2006-0163DA

ADMINISTRATIVE COMPLIANCE ORDER BY CONSENT

I. STATUTORY AUTHORITY

This Order is issued pursuant to Section 113(a)(1) of the Clean Air Act (the "Act"), 42 U.S.C. § 7413(a)(1). Under Section 113(a)(1) of the Act, the Administrator of the United States Environmental Protection Agency ("EPA" or "the Agency") has the authority to issue Orders requiring persons to comply with the requirements of an applicable State Implementation Plan ("SIP") or permit issued by a state. The Administrator has delegated his authority to issue such Orders within the geographical jurisdiction of EPA Region III to the Regional Administrator of EPA Region III, who has re-delegated this authority to the Director of the Air Protection Division of Region III. The geographical jurisdiction of EPA Region III includes the Commonwealth of Virginia.

This Order is issued to Mirant Potomac River, LLC ("Mirant") for its Potomac River Generating Station in Alexandria, Virginia.

II. FINDINGS OF FACT

1. Mirant owns and operates an electricity generating station known as the Potomac River Generating Station ("PRGS") in Alexandria, Virginia.

2. Mirant is a Limited Liability Company organized in the State of Delaware on August 2, 2000.

3. Pursuant to the Order By Consent entered into by Mirant and the Virginia Department of Environmental Quality ("VaDEQ"), effective September 23, 2004, Mirant performed a

Dispersion Modeling Analysis to assess the effect of Downwash (the "downwash study") of emissions from the PRGS. The downwash study used computer modeling to predict ambient concentrations of pollutants emitted by the PRGS under certain weather and atmospheric conditions.

4. Mirant provided the results of the downwash study to VaDEQ in August 2005. By letter dated August 19, 2005, VaDEQ informed Mirant that the downwash study demonstrated that emissions from the PRGS result in, cause or substantially contribute to, modeled violations of the primary National Ambient Air Quality Standards ("NAAQS") for sulfur dioxide ("S02"), nitrogen dioxide ("NO2"), and PM10 under certain atmospheric conditions.

5. VaDEQ's August 19th letter also requested that Mirant immediately undertake "such action as is necessary to ensure protection of human health and the environment, in the area surrounding the Potomac River Generating Station." VaDEQ cited 9 VAC 5-20-180(I) as the authority for this action.

6. The provision of the Virginia State Implementation Plan ("SIP") cited by VaDEQ, 9 VAC 5-20-180(I), has been approved and incorporated into the Virginia SIP at 40 C.F.R. § 52.2420(c), and is therefore federally-enforceable.

7. Mirant shut down all five Units of the PRGS at midnight on August 24, 2005.

8. On August 24, 2005, the District of Columbia Public Service Commission ("DCPSC") filed an "Emergency Petition and Complaint" with the United States Department of Energy ("DOE") and the Federal Energy Regulatory Commission ("FERC"), respectively, pursuant to the Federal Power Act ("FPA"), 16 U.S.C. § 824a(c), 824f and 825h, and Section 301(b) of the DOE Organization Act, 42 U.S.C. § 7151(b). The Emergency Petition requested that DOE find that an emergency exists under Section 202(c) of the FPA and issue an order requiring Mirant to continue operation of the PRGS.

9. Following additional modeling and assessment of the downwash study, Mirant re-started Unit 1 of the PRGS on September 21, 2005. Additional modeling conducted by Mirant indicated that operation of only Unit 1 would not cause any modeled NAAQS exceedances.

10. On December 20th, 2005, the Secretary of Energy issued Order No. 202-05-3 ("DOE Order") finding that an emergency did exist and ordering Mirant to, among other things, submit a plan to DOE detailing the steps to be taken to ensure Mirant's compliance with the DOE Order.

11. On December 30, 2005, Mirant submitted to DOE the Operating Plan setting forth the steps that Mirant would take to ensure compliance with the DOE Order.

12. By letter dated January 4, 2006, DOE required that Mirant "immediately take the necessary steps to implement Option A of the intermediate phase proposed in the [Operating Plan]." The DOE letter also noted that implementation of Option A was an interim measure.

13. In accordance with DOE's directive to maximize electric generation while not causing or contributing to a NAAQS violation, Mirant supplemented the original Operating Plan with additional operating configurations and modeling. The supplements contemplated that Mirant would use trona injection and a blend of low sulfur coal to manage SO2 emissions. Mirant stated that these supplemental operating scenarios result in no modeled NAAQS exceedances.

14. By letter dated December 22, 2005, EPA issued a Notice to Mirant and the VaDEQ, alleging that Mirant did not immediately undertake the necessary action to protect human health and the environment required by VaDEQ's August 19, 2005 letter, and that Mirant was therefore in violation of 9 VAC 5-20-180(I) and the federally-enforceable Virginia SIP for the period of time in which it failed to immediately shut down all the PRGS Units.

15. Following issuance of the Notice, EPA met with Mirant on several occasions to discuss settlement of EPA's possible enforcement action for the violation alleged in the Notice under Section 113 of the CAA. These discussions, along with discussions with DOE and VaDEQ, have resulted in this Order.

16. In its evaluation of potential PRGS operating scenarios, DOE has determined that the levels of PRGS operation allowed under the terms and conditions of Part IV of this Order are necessary to assure an acceptable level of electric reliability to the District of Columbia under the circumstances.

17. EPA will require use of the AERMOD model with a 24 hour background SO2 concentration of 51 micrograms per cubic meter ("ug/m3") when evaluating the PRGS's effects on the SO2 NAAQS. In Mirant's December 30, 2005 Operating Plan and subsequent submissions to DOE and EPA, Mirant has used varying background concentrations for SO2 in determining the maximum predicted impact of various operating scenarios at the PRGS. EPA has determined that Mirant's use of these varying background concentrations was technically defensible but that additional conservatism will be required in this Order. In an effort to build additional conservatism into Mirant's operating scenarios to ensure protection of the NAAQS, EPA has instructed Mirant to use a background concentration of 51ug/m3 to add to the AERMOD 24 hour SO2 modeled pollutant concentrations to determine the maximum predicted impacts for all operational scenarios considered during and incorporated into this Order.

18. EPA has determined through modeling and analysis that there is a strong correlation between the days, hours, and locations of predicted highest 24-hour concentrations of

SO2 and predicted highest 24-hour concentrations of PM10; that the predicted highest concentrations of SO2 are higher, relative to the SO2 NAAQS, than the predicted highest concentrations of PM10 relative to the PM10 NAAQS; and that measures taken to reduce SO2 emissions from the PRGS facility, such as reduced levels of operation and/or increased levels of trona usage, will also reduce emissions of PM10.

III. CONCLUSIONS OF LAW

19. Mirant is a "person" within the meaning of Section 302(e) of the CAA, 42 U.S.C. § 7602(e), and within the meaning of Section 113(a) of the CAA, 42 U.S.C. § 7413(a), because it is a corporation.

20. EPA concludes that Mirant violated 9 VAC 5-20-180(I) by failing to immediately shut down the boilers at the PRGS upon receipt of the letter from VaDEQ, and that such failure is also a violation of Section 113(a) of the CAA, 42 U.S.C. § 7413(a).

21. Mirant has had an opportunity to confer with the Administrator or his designee regarding this alleged violation and the terms of this Order. Mirant denies that any violation occurred, but agrees to the entry of this Order.

22. EPA has determined that the following schedule and plan for compliance is reasonable, taking into account the seriousness of the modeled NAAQS exceedances and the concerns of DOE regarding electric reliability in the Central D.C. area, and that this schedule is expeditious given the length of time it will take Mirant to take more permanent measures as well as the time it will take for additional electric transmission lines to be put into service to alleviate the emergency as determined by DOE.

IV. ORDER

Based upon the forgoing, under Section 113(a)(4) of the Act, 42 U.S.C. § 7413(a)(4), IT IS DETERMINED AND ORDERED that:

A. Definitions - For the purpose of this Order, the following terms shall have the meanings defined below:

3-Hour Rolling SO2 and 24-Hour Calendar Day SO2 Emission Rate. For the purpose of calculating the specified rate in Table 1 for a specified time period, the actual SO2 emission rate is determined by dividing the sum of the total pounds of actual SO2 emissions from the boiler stack of that unit, as determined by hourly CEMS data, as certified by 40 CFR Part 75, by the sum of the total heat input in million Btus from that coal-fired boiler unit.

For any 3 hour rolling period when there are fewer than 2 hours of actual emissions from a coal-fired boiler unit, an emission rate for that 3 hour period that would have to comply with the Table 1 emission rates does not need to be calculated for that unit.

For any calendar day when there are fewer than 3 hours of actual emissions from a coal-fired boiler unit, a 24 hour emission rate to comply with Table 1 need not be calculated for that unit.

On any day when a unit runs between 3 and 18 hours, the complying 24 hour emissions rate for Table 1 shall be calculated as follows:

If a unit operates between 3 hours and 10 hours, the SO2 limit for that unit equals the 3 hour rate in Table 1 minus 1/3 of the difference between the 3 hr and 24 hr rate for that unit configuration;

If a unit operates 10 hours or more up to 18 hours, the SO2 limit for that unit equals the 3 hour rate in Table 1 minus 2/3 of the difference between the 3 hr and 24 hr rate for that unit configuration.

If a unit operates 18 hours or more, the 24 hour rate in Table 1 shall apply.

Nothing in this paragraph is intended to allow greater operation of a unit than what is specified in Table 1 where this Order requires operation in accordance with Table 1. In addition, where this Order requires operation in accordance with Table 1 and that configuration calls for unit(s) to operate between 3 and 18 hours, then the Table 1 emission rates shall apply without the above adjustments.

AERMOD Default means Version 04300 of the AERMOD computer model, currently approved for general use by EPA.

AERMOD EBD means the AERMOD computer model with modified direction-specific building dimensions derived from the Wind Tunnel Study.

Alternative Operating Scenario means a method of operating the Potomac River Generating Station during the Model Evaluation Study, which has been approved by EPA and reviewed by VaDEQ.

DOE means the United States Department of Energy

DOE Order means Order No. 202-05-3, issued by the Department of Energy on December 20, 2005 in Docket No. EO-05-01 in response to an Emergency Petition and Complaint filed by the District of Columbia Public Service Commission.

EPA means the United States Environmental Protection Agency, Region III.

Line Outage Situation means that one or both 230 kV transmission lines, serving the Central D.C. area are out of service due to a planned or unplanned outage.

Mirant means Mirant Potomac River, LLC.

Modeled NAAQS Exceedance means a modeled 3-hour average sulfur dioxide concentration which, when a background concentration of 238.4 micrograms per cubic meter is added, exceeds 1,300 micrograms per cubic meter; or a modeled 24-hour average sulfur dioxide concentration which, when a background concentration of 51 micrograms per cubic meter is added, exceeds 365 micrograms per cubic meter; or, a modeled 24 hour PM10 concentration which, when a background concentration of 45 micrograms per cubic meter is added, exceeds 150 micrograms per cubic meter.

Model Evaluation Study or MES means a study proposed by Mirant and approved by EPA and reviewed by VaDEQ to compare multiple computer model predicted ambient air impacts to actual measured ambient air concentrations for the purpose of determining the best performing computer model in evaluating the effects of the emissions resulting from the operation of the PRGS.

Monitoring Plan means a plan proposed by Mirant and approved by EPA and reviewed by VaDEQ as part of the MES for the installation and use of ambient air monitors in the vicinity of the PRGS to monitor ambient air quality impacts of the PRGS.

Monitors means the ambient air monitors installed in accordance with the Monitoring Plan.

NAAQS means the National Ambient Air Quality Standards.

Non-Line Outage Situation means all periods of time that do not qualify as a Line Outage Situation.

Operating Parameters means the hourly average MW load of each unit for each hour of that day at the PRGS, the hourly average SO2 emission rate expressed in lb/MMBtu for each unit for each hour of that day, and the emission rate of PM10 expressed in lb/MMBtu.

Operating Plan means the December 30, 2005 Operating Plan submitted to DOE by Mirant to respond to the requirement for a compliance plan under the DOE Order.

Predictive Modeling means the daily use of an approved AERMOD computer model run in accordance with 40 C.F.R. Part 51, Appendix W, with forecasted weather conditions and planned Operating Parameters for the following day to predict modeled NAAQS compliance on a day-ahead basis.

PJM means the regional transmission organization for the region where the PRGS is located.

PRGS means the coal-fired electric generating station owned by Mirant and located in Alexandria, VA, comprised of three baseload generating units (Units 3, 4, 5) of approximately 102 MW each and two cycling units (Units 1 and 2) of approximately 88 MW each.

VaDEQ means the Virginia Department of Environmental Quality.

Wind Tunnel Study means a study proposed by Mirant using a physical model, as outlined in CPP Wind's Wind Tunnel Model Evaluation protocol, dated January 17, 2006, reviewed by EPA and VaDEQ, and conducted in accordance with EPA Guidance, to evaluate the accuracy of AERMOD Default's assumptions with respect to the direction-specific effective building dimensions when applied to the PRGS.

B. **Operation During Non-Line Outage Situations**

1. Mirant shall implement and comply with all of the single-unit, two-unit, and three-unit configuration constraints listed in Table 1 below until such time as Mirant is authorized by EPA and DOE to begin an alternative operating scenario as described below. Mirant shall operate each unit within the applicable hours-of-operation and SO2 emission rate restrictions listed in the table each calendar day. Generally, unit transitions and unit startups will occur within (+/-) four hours of midnight. The following procedures will be followed when there is a transition between operating scenarios:

a. When transitioning between two units, the unit that is coming offline will cease burning coal before the starting unit begins burning coal. Number 2 oil will be burned during the warm-up phase of the starting unit and during the shutdown phase of the unit coming offline. The number of boilers burning coal will not exceed at any time the constraints applicable to the Unit Configurations listed in Table 1.

b. When a change in operating Unit Configuration occurs, Mirant shall, for the balance of the calendar day, meet the more stringent of the 3-hour SO2 and/or 24-hour SO2 rate caps and hours of operation applicable to:

(i.) the Unit Configuration being ceased, and
(ii.) the Unit Configuration being commenced.

TABLE 1

Unit Configuration	24 Hr Calendar Day SO2 Rate - Lb/MBtu	3-Hr Rolling SO2 Rate - lb/MBtu	Operating Constraints
Unit 1	1.20	1.20	8 hrs max / 8 min / 8 off, 14,800 lb/day
Unit 1	0.84	1.14	None
Unit 2	0.41	0.73	None
Unit 3	0.31	0.66	None
Unit 4	0.36	0.70	None
Unit 5	0.61	0.90	None
Units 1 & 2	0.29	0.50	Both Units: 100% Load 24 hrs/day
Units 1 & 3	0.24	0.51	#1 @ 8 max / 8 min / 8 off, none on #3
Units 2 & 3	0.23	0.40	#2 @ 8 max / 8 min / 8 off, none on #3
Units 1 & 4	0.30	0.54	#1 @ 8 max / 8 min / 8 off, none on #4
Units 2 & 4	0.25	0.44	#2 @ 8 max / 8 min / 8 off, none on #4
Units 1 & 5	0.43	0.60	#1 @ 8 max / 8 min / 8 off, none on #5
Units 2 & 5	0.35	0.55	#2 @ 8 max / 8 min / 8 off, none on #5
Units 3 & 4	0.23	0.43	#3 @ 6 max / 18 min; #4 @ 7 max /17 min
Units 3 & 5	0.24	0.43	Both units @ 12 hr max / 12 hr min
Units 4 & 5	0.27	0.51	Both units @ 12 hr max / 12 hr min
Units 1, 2 & 3	0.21	0.36	#1&2 @ 5 max / 4 min / 15 off, none on #3
Units 1, 2, &4	0.24	0.35	#1&2 @ 6 max / 5 min / 13 off, none on #4
Units 1, 2, &5	0.27	0.42	#1&2 @ 8 max / 8 min / 8 off, none on #5

2. Schedule for Installation of Trona Injection at All Boiler Units

a. In accordance with the schedule set forth in Mirant's Operating Plan of December 30, 2005, Mirant shall ensure that Trona injection units are installed and operated as follows:

(1). March 20, 2006 - In addition to the two portable, rental Trona units, Mirant shall have a third operational Trona injection unit, whether an engineered unit or a rental unit. Mirant shall operate all three Trona units whenever three or more boilers are operating.

(2). April 28, 2006 - Mirant shall have installed and be operating three engineered Trona injection units, and shall operate each unit whenever the boiler to which it is attached is operating. Mirant shall operate the rental Trona units on boilers not equipped with operating engineered units.

(3). May 31, 2006 - Mirant shall have installed and be operating

all five engineered Trona injection units, and shall operate each unit whenever the boiler to which it is attached is operating.

3. **Model Evaluation Study**

a. Mirant shall undertake a Model Evaluation Study to determine the best performing model for predicting the computer-modeled ambient air quality impacts from the PRGS's operations. Prior to beginning the MES, Mirant must submit to EPA for approval an MES protocol, and simultaneously send a copy to VaDEQ. Mirant may begin operating the PRGS in a manner that does not cause or contribute to Modeled NAAQS Exceedances by using Predictive Modeling as described in subsection 4 below, after completing the following tasks:

(1). EPA approval of the MES protocol;
(2). installation and operation of at least 3 SO2 monitors in accordance with the approved monitoring plan;
(3). execution of this Order by EPA; and
(4). authorization by DOE for Mirant to operate in accordance with this Order.

b. Upon commencement of daily predictive modeling performed in conjunction with the MES, the SO_2 emission rate limitations and other unit operating restrictions set forth in Table 1 shall no longer apply unless otherwise indicated. The Table 1 restrictions apply if Mirant ceases to operate the PRGS in accordance with the MES.

4. **Operations in Accordance with Daily Predictive Modeling**

a. By 10 AM each morning, Mirant shall collect actual weather predictions from the National Weather Service for the Reagan National Airport and use them along with planned Operating Parameters as inputs to conduct a computer modeling run for the following day using AERMOD Default. If the modeling confirms that Mirant's planned operations for the following day will not cause or contribute to a Modeled NAAQS Exceedance, Mirant may operate on the day modeled in accordance with the modeled Operating Parameters. If the Predictive Modeling indicates that the planned Operating Parameters will result in one or more Modeled NAAQS Exceedances, Mirant shall not run under those operating parameters but shall continue to adjust its planned operations and conduct additional modeling runs using the adjusted Operating Parameters to confirm that the adjusted operations will not cause or contribute to a Modeled NAAQS Exceedance for the day modeled.

b. During Line Outage Situations, Predictive Modeling must continue to be performed but the PRGS shall be operated under the Line Outage Situation provision in accordance with the DOE Order and this Order.

c. If the Predictive Modeling indicates that the predicted weather conditions and planned Operating Parameters do not result in a Modeled NAAQS Exceedance,

Mirant is authorized to operate using the planned Operating Parameters and shall not be in violation of this Order; or 9 VAC 5-20-180(I), as incorporated into the Virginia SIP at 40 C.F.R. 52.2420(c); nor shall such operation be deemed to give a right for a cause of action for any alleged violation of the NAAQS as a result of Mirant causing or contributing to any modeled or monitored exceedance of the NAAQS. This release shall only apply to alleged exceedances or violations occurring during the lifetime of the Order or the duration of the MES if the requirements of this Order have been incorporated into a state operating permit; shall only apply to laws in existence on the effective date of the Order; and shall not prevent Virginia from issuing an order under 9 VAC 5-20-180(I) or EPA from taking action under Section 303 of the Clean Air Act.

5. **Operation During Certain Periods of Elevated SO2 Impacts After MES Approval**

a. As a precaution, after the installation of at least three monitors, Mirant shall institute additional measures that will apply whenever ambient concentrations of SO2 are elevated, as defined below. Specifically, Mirant shall:

(1). Install a monitor alert system in the Potomac River Control Room that registers an audible alarm if in any one hour the average measured ambient concentration of SO2 at any monitor is equal to or greater than 80% of the 3 hour SO2 National Ambient Air Quality Standard, measured as 400 parts per billion (1,040 $\mu g/m^3$).

(a). During the hour following the sounding of the alarm, Mirant shall make operational adjustments, which may include increasing Trona injection and/or decreasing operation and shall observe the effect of these adjustments on the average, measured ambient concentration of SO2.

(b). If, at the end of the second hour, the average measured ambient concentration of SO2 is not equal to or less than 1,040 $\mu g/m^3$, Mirant shall adjust its operations to conform to the scenarios described in Table 1 until the rolling 3 hour average is less than 1,040 $\mu g/m^3$.

(2). Mirant shall also configure the audible alarm to sound if, in any 12 hour period, any monitor measures an average, ambient concentration of SO2 equal to or greater than 80% of the 24 hour SO2 National Ambient Air Quality Standard, measured as 112 parts per billion (292 $\mu g/m^3$).

(a). During the following 6 hours, Mirant shall make operational adjustments, which may include increasing Trona injection and/or decreasing operation and shall observe the effect of these adjustments on the measured ambient concentration of SO2.

(b). If, at the end of the 6 hour period, the average, measured ambient concentration of SO2 is not equal to or less than 292 $\mu g/m^3$, Mirant shall adjust its operations to conform to the scenarios described in Table 1 for the balance of the calendar day.

(3). Mirant shall also configure the audible alarm to sound if, after the first 6 months of operation, any monitor measures an average, ambient concentration of SO2 equal to or greater than 80% of the annual average NAAQS, measured as 64 $\mu g/m^3$.

(a). During the following 3 months, Mirant shall monitor the 7 month, 8 month and 9 month averages.

(b). If, at the end of 9 months, the average, measured ambient concentration of SO2 is not equal to or less than 64 $\mu g/m^3$, Mirant shall adjust its operations so that the annual, measured ambient concentration of SO2 does not exceed 80 $\mu g/m^3$.

(4). If the audible alarm sounds more than 5 times in a calendar month, Mirant shall, on a one-time basis, adjust the alarm to 75% of the applicable NAAQS.

6. **PM10 Predictive Modeling**

Whenever Mirant operates 4 or more units, it shall abide by an emission rate of 0.055 lbs/MM Btu and shall first conduct Predictive Modeling using this rate to determine whether operation of the units causes or contributes to a Modeled NAAQS Exceedance. If the Predictive Modeling indicates that the planned Operating Parameters will result in a Modeled NAAQS Exceedance for PM10, Mirant shall adjust its planned operating scenario and re-run the Predictive Modeling with an emission rate of 0.055 lbs/MM Btu until such time as Mirant confirms through Predictive Modeling that the adjusted operations will not cause or contribute to a Modeled NAAQS Exceedance for PM10.

7. **AERMOD EBD - Physical Changes Requiring Model Changes**

If Mirant elects to refine the AERMOD Default model by performing a Wind Tunnel Study, Mirant will submit a Wind Tunnel Study evaluation protocol for review by EPA and VaDEQ and approval by EPA. The protocol will describe the technical features of the proposed Wind Tunnel Study and the theoretical basis for demonstrating that the data generated should be used to develop a site-specific set of assumptions, including equivalent building dimensions, to be applied to AERMOD Default.

The results of the Wind Tunnel Study shall be submitted to EPA for approval and may result in site-specific equivalent building dimensions to be used in lieu of the assumptions in the AERMOD Default model. The results must be submitted to EPA no later than 90 days following entry of this AO. Upon approval of AERMOD EBD by EPA and VaDEQ, Mirant shall operate for the balance of the MES study period applying AERMOD EBD in its Predictive Modeling.

As the Model Evaluation Study progresses, Mirant may make other changes at the PRGS, including physical changes such as changes to the stacks. In that event, inputs utilized during the Predictive Modeling and in the models evaluated at the conclusion of the Model Evaluation Study (and the model used to develop emission limits for the PRGS) may, after EPA

approval, be adjusted to correspond to these changes. However, the MES study period must be conducted for a minimum of six months following any physical change in order to obtain monitoring data upon which to evaluate the models.

8. Monitoring and Comparison Modeling During the Model Evaluation Study

In accordance with the MES Protocol, as attached, Mirant shall install and operate a total of six (6) ambient SO2 monitors in the preferred locations or alternate locations as described below:

a. Preferred locations

(1). Two monitors on the roof of Marina Towers, with one located on the Southeast wing and one at the center of the building;

(2). One monitor east of the PRGS, approximately due east of Stack 5 on the west bank of the Potomac River;

(3). One monitor southeast of the PRGS, along the facility fenceline, near the River;

(4). One monitor approximately 800 meters north of Marina Towers; and

(5). One monitor on the roof of a building in the Harbor Terrace complex three

EPA will work with Mirant to assist in obtaining permission needed to install monitors in these preferred locations.

b. Alternate Locations: If EPA determines that notwithstanding Mirant's good faith and reasonable efforts to obtain permission to install monitors in the preferred locations, it is impractical to install some or all of the monitors in the preferred locations in a timely manner because the owner of the preferred monitor location declines to host the SO2 monitor(s) or the preferred location is unavailable or impractical for any other reason, EPA will authorize installation of monitors at some or all of the five alternative SO2 monitor locations set forth in the MES Protocol, as summarized below:

(1) Southwest of the PRGS on the rooftop of Braddock Place;
(2) Approximately 600 meters South-Southeast of the stack locations, at ground level along the Potomac River;
(3) Approximately 300 meters Southwest of the PRGS at ground level;
(4) Approximately 600 meters South-Southwest of the PRGS at ground level; and

(5) Approximately 100 meters SW of the plant at ground level.

c. Deadline for ambient monitor installation: Mirant shall have all six monitors installed and operating within 60 days of the execution of this Order. EPA may, at its own discretion, extend the deadline, and/or change locations, for installation and/or operation of one or all of the monitors and in the event that EPA determines that one of the preferred locations is impractical and authorizes use of an alternate location, Mirant shall have an additional 30 days in which to install that monitor.

d. Operation, Maintenance, and Quality Assurance/Quality Control ("QA/QC") of monitors - It shall be the responsibility of Mirant to ensure that the monitors are operated, maintained, and subject to the appropriate QA/QC provisions set forth at Appendix A to 40 C.F.R. Part 58.

e. Follow-up modeling: The data generated by the monitors shall be used at the end of the study to conduct a model evaluation. Until such time as all the ambient air monitors are installed in accordance with the Monitoring Plan and begin measuring and recording ambient air data, Mirant shall perform "follow up" computer modeling using actual weather conditions and Operating Parameters, and shall report the results to EPA and VaDEQ on a monthly basis, as described below. This "follow-up" modeling will be performed on the Monday following the previous week of operation.

9. **Determination of Best Performing Model at Conclusion of Model Evaluation Study**

At the conclusion of the MES, the performance of the applicable models will be evaluated in accordance with the document "Protocol for Determining the Best Performing Model." EPA-454/R-92-025, Sept. 1992, Comparing Computer Model-Predicted Air Concentrations to Actual Ambient Air Concentrations Measured by the Monitors. The information yielded by the comparison of model predictions to measured ambient concentrations will result in a determination by EPA and VaDEQ as to which model is best-performing. Thereafter, the best-performing model shall be used to conduct computer modeling to develop permanent emission limits at the PRGS.

10. **Reporting**

a. Throughout the period of the MES, Mirant shall deliver to EPA and VaDEQ monthly: (1) the modeled input files and results of the daily Predictive Modeling for the preceding month, including the hourly average heat input in MMBtu for each unit and the exit velocity (or exhaust volume) for each unit; (2) verification that the planned Operating Parameters utilized for Predictive Modeling in the preceding month were not exceeded, or if exceeded, documentation describing that exceedance; (3) the inputs and results of "follow-up" modeling for the preceding month (or portion thereof during which all Monitors were not in place), including the hourly average heat input in MMBtu for each unit and the exit velocity (or

exhaust volume) for each unit, but only until commencement of operation of all Monitors, and; (4) after installation of the Monitors, the data generated by the Monitors.

b. If at any time the "follow-up" modeling demonstrates a modeled exceedance of the NAAQS or the Monitors demonstrate an actual exceedance of the NAAQS, Mirant shall report such modeled or monitored exceedance to EPA and VaDEQ within 3 days of the modeled or monitored exceedance for a determination as to whether corrective action is required.

C. **Operation During Line Outage Situations**

1. During a Line Outage Situation, Mirant shall operate the PRGS to produce the amount of power needed to meet the load demand in the Central D.C. area, as specified by PJM and in accordance with the DOE Order. During such operations, Mirant shall take all reasonable steps to limit the emissions of PM10, NOX and SO2 from each boiler, including operating only the number of units necessary to meet PJM's directive and optimizing its use of Trona injection to minimize SO2 emissions. During a Line Outage Situation, Mirant shall achieve 80% reduction of SO2 emissions unless: 1) Mirant demonstrates, through predictive modeling or otherwise, that 80% reduction is not necessary to achieve compliance with the NAAQS; or 2) Mirant demonstrates that 80% reduction is not logistically feasible because of factors such as the quantity of available Trona and predicted duration of the outage. In the event that Mirant demonstrates that 80% reduction is not logistically feasible, it shall submit a plan to EPA for optimizing its use of Trona injection so as to maximize SO2 reduction and the plan shall propose control measures and removal efficiencies to be achieved during the Line Outage Situation. If Mirant has 30 days notice in advance of the Line Outage Situation, it shall submit the plan to EPA for approval 15 days before commencement of the Line Outage. If Mirant has less than 30 days advance notice of the Line Outage Situation, Mirant shall submit the plan to EPA for approval as promptly as reasonably possible under the circumstances. It is understood and acknowledged that the plan to be followed for an unscheduled Line Outage Situation will depend upon the specific circumstances at the time of the unscheduled Line Outage Situation. Nothing here shall diminish Mirant's obligation to produce the amount of power needed to meet the load demand in the Central D.C. area, as specified by PJM, and in accordance with DOE's Order.

2. Malfunctions of emission control devices, such as Trona injection, shall not be deemed a failure to limit the emissions during a line outage, provided that Mirant has made reasonable efforts to avoid the malfunction and to promptly correct the malfunction. All emissions during a Line Outage Situation count toward any other permit, statutory, or regulatory limits for the PRGS. Upon Mirant's request, EPA (after consultation with DOE) will provide contemporaneous written confirmation of the existence of a Line Outage Situation. If Mirant operates the PRGS in accordance with dispatch directions from PJM and the relevant terms of this Order during a Line Outage Situation, Mirant shall not be in violation of this Order; or 9 VAC 5-20-180(I), as incorporated into the Virginia SIP at 40 C.F.R. 52.2420(c); nor shall such operation be deemed to give a right for a cause of action for any alleged violation of the

NAAQS as a result of Mirant causing or contributing to any modeled or monitored exceedance of the NAAQS. This release shall only apply to alleged exceedances or violations occurring during the lifetime of the Order or the duration of the MES if the requirements of this Order have been incorporated into a state operating permit; shall only apply to laws in existence on the effective date of the Order; and shall not prevent Virginia from issuing an order under 9 VAC 5-20-180(l) or EPA from taking action under Section 303 of the Clean Air Act.

D. General Provisions

1. At all times, Mirant shall not emit more than 3700 tons of NOx per year and shall limit the emission rate of PM10 to 0.055 lbs/MMBtu.

2. Mirant's actions shall be consistent with all provisions of federal and state law, including but not limited to, the Clean Air Act, all federal regulations promulgated under the Clean Air Act, and any other applicable laws, including the Virginia State Implementation Plan.

E. Permitting Requirements

Within the 12 month period following entry of this Order, Mirant must cooperate with VaDEQ in the development of operating permit emission limits protective of all NAAQS. Mirant agrees that the obligations of this Order, to the extent they have not been completed, may become obligations in the operating permit issued by VaDEQ. Mirant further agrees that during the implementation of this Order, it will prepare and submit to EPA and VaDEQ an analysis of the applicability of NSR/PSD to the PRGS due to the installation of Trona injection and any additional fugitive emissions resulting from that installation.

V. PARTIES BOUND

This Order shall apply to and be binding upon Mirant, its agents, successors, and assigns and upon all persons, contractors and consultants acting under or for Mirant, or persons acting in concert with Mirant who have actual knowledge of this Order or any combination thereof with respect to matters addressed in this Order. No change in ownership or corporate or partnership status will in any way alter Mirant's responsibilities under this Order.

In the event of any change in ownership or control of the PRGS, Mirant shall notify the EPA in writing at least thirty (30) days in advance of such change and shall provide a copy of this Order to the transferee-in-interest of the PRGS, prior to any agreement for transfer.

VI. RESPONSES TO ORDER

Information required to be submitted to EPA under this Order must be sent to:

Chief, Air Enforcement Branch
Air Protection Division,

U.S. Environmental Protection Agency, Region 3
1650 Arch St.
Philadelphia, PA 19103

And

Douglas J. Snyder
Assistant Regional Counsel
Office of Regional Counsel (3RC10)
U.S. Environmental Protection Agency, Region 3
1650 Arch St.
Philadelphia, PA 19103

VII. EFFECT OF COMPLIANCE ORDER

As set forth in Section 113(a)(4) of the Act, 42 U.S.C. § 7413(a)(4), nothing in this Administrative Compliance Order by Consent shall prevent EPA from assessing any penalties, or otherwise affect or limit the United States' authority to enforce other provisions of the Act, or affect any person's obligations to comply with any Section of the Act or with any term or condition of any permit or applicable implementation plan promulgated or approved under the Act. Further, nothing in this Order shall limit or otherwise preclude the United States from taking criminal or additional civil judicial or administrative enforcement action against Mirant or any third parties with regard to the PRGS pursuant to any other federal or state law, regulation or permit condition, or for Mirant's failure to comply with any requirements of this Order. Nothing herein shall be construed to limit the authority of the EPA to undertake action against any person, including Mirant, in response to any condition that EPA determines may present an imminent and substantial endangerment to the public health, public welfare or the environment. EPA reserves any rights and remedies available to it to enforce the provisions of this Order, the Act and its implementing provisions, and of any other federal laws or regulations for which it has jurisdiction following the entry of this Order.

For the purposes of this proceeding only, Mirant hereby expressly waives its right to any appeal of this Order which it may have under Section 307(b) of the CAA, 42 U.S.C. § 7607(b), and waives the right to challenge the terms of this Order in any action taken to enforce this Order pursuant to Section 113(b) of the CAA, 42 U.S.C. § 7413(b).

VIII. ENFORCEMENT

Failure to comply with this Order may result in a judicial or administrative action for appropriate relief, including civil penalties, as provided in Section 113 of the Act, 42 U.S.C. § 7413. EPA retains full authority to enforce the requirements of the Clean Air Act, 42 U.S.C. §§ 7401-7642, and nothing in this Order shall be construed to limit that authority except as otherwise provided herein.

IX. CERTIFICATION OF REPORTS

Any notice, report, certification, data presentation, or other document submitted by Mirant under or pursuant to this Order, which discusses, describes, demonstrates, or supports any finding or makes any representation concerning Mirant's compliance or non-compliance with any requirement(s) of this Order, shall be certified by a responsible corporate official of Mirant. The term "responsible corporate official" means (a) the Chairman or Chief Operating Officer of Mirant, or (b) Vice President of Operations for PRGS.

23. The certification required by the preceding paragraph of this Order shall be in the following form:

> Except as provided below, I certify that the information contained in or accompanying this (type of submission) is true, accurate, and complete. As to (the/those) portion(s) of this (type of submission) for which I cannot personally verify (its/their) accuracy, I certify under the penalty of law that this (type of submission) and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.
>
> Signature:_____
> Name(print):_____

X. EFFECTIVE DATE AND OPPORTUNITY FOR CONFERENCE

24. By signing this Order, Mirant agrees that it has had an opportunity to confer on the terms of this Order with EPA and thereby waives its opportunity pursuant to Section 113(a)(4) to confer further with EPA concerning the violation(s) alleged in the above Order before the Order takes effect. Therefore, this Order shall be effective upon Mirant's receipt of a copy of the Order signed by the Director of the Air Protection Division, Region 3, or her designee. This Order shall expire one year after execution of the Order, in accordance with Section 113(a)(4) of the CAA, unless it is terminated sooner by EPA.

XI. FAILURE TO PERFORM

25. In the event of an inability or anticipated inability on the part of Mirant to perform any of the actions or work required by this Order in the time and manner required herein, Mirant shall notify EPA orally within twenty-four (24) hours of such event (or, if the event occurs on a Friday

or Saturday, Sunday, or legal holiday, no later than the following business day) and in writing as soon as possible, but in no event more than three (3) days after such event. Such notice shall set forth the reason(s) for, and the expected duration of, the inability to perform; the actions taken and to be taken by Mirant to avoid and mitigate the impact of such inability to perform; and the proposed schedule for completing such actions. Such notification shall not relieve Mirant of any obligation of this Order. Mirant shall take all reasonable actions to prevent and minimize any delay.

XII. BUSINESS CONFIDENTIALITY

26. Mirant is entitled to assert a claim of business confidentiality covering all or part of any requested information, in the manner described in 40 C.F.R. § 2.203(b), unless such information is "emission data" as defined in 40 C.F.R. § 2.301(a)(2). Information subject to a claim of business confidentiality will be made available to the public only in accordance with the procedures set forth in 40 C.F.R. Part 2, Subpart B. Unless a confidentiality claim is asserted at the time requested information is provided, EPA may make this information available to the public without further notice to you.

XIII. COPIES OF ADMINISTRATIVE COMPLIANCE ORDER BY CONSENT

A copy of this Order will be sent to James Sydnor, Virginia Department of Environmental Quality.

Dated: June 1, 2006

Judith Katz, Director
Air Protection Division
U.S. Environmental Protection Agency
Region III

The undersigned represents that he or she is a duly authorized representative of Mirant Potomac River, LLC for the purpose of signing this Order, and that Mirant agrees to the terms of this Order.

Dated: June 1, 2006

Robert Driscoll
Chief Operating Officer

APPENDIX C

Federal Register Notice of Emergency Action and Correspondence with the Council on Environmental Quality

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ACTION: Notice of public meeting agenda.

DATE AND TIME: Thursday, February 2, 2006, 10 a.m.–1 p.m.

PLACE: Hyatt Regency (Valley Forge Room), 400 New Jersey Avenue, NW., Washington, DC 20001. (Metro Stop: Union Station).

AGENDA: The Commission will receive the following reports: Title II Requirements Payments Update; and updates on other administrative matters. The Commission will receive presentations on the following topics: Implementation of the EAC Voting System Certification Program.

This meeting will be open to the public.

FOR FURTHER INFORMATION CONTACT: Bryan Whitener. Telephone: (202) 566–3100.

Ray Martinez III,

Vice-Chairman, U.S. Election Assistance Commission.

[FR Doc. 06–607 Filed 1–18–06; 3:32 pm]

BILLING CODE 6820–KF–M

DEPARTMENT OF ENERGY

Emergency Order To Resume Limited Operation at the Potomac River Generating Station, Alexandria, VA, in Response to Electricity Reliability Concerns in Washington, DC

AGENCY: Department of Energy.

ACTION: Notice of emergency action.

SUMMARY: Pursuant to 10 CFR 1021.343, the U.S. Department of Energy is issuing this Notice to document emergency actions that it has taken, and to set forth the steps it intends to take in the future, to comply with the National Environmental Policy Act (NEPA) in the matter described in this Notice.

On August 24, 2005, Mirant Corporation, and its wholly owned subsidiary, Mirant Potomac River, LLC (collectively referred to herein as Mirant), ceased operations at its Potomac River Generating Station (the ''Plant'') in Alexandria, Virginia, after modeling that it conducted indicated that the Plant's operations were causing exceedances of the National Ambient Air Quality Standards (NAAQS) of the Clean Air Act. On the same day, the District of Columbia Public Service Commission (DCPSC) filed with the U.S. Department of Energy (DOE or ''Department''), a petition for an emergency order pursuant to section 202(c) of the Federal Power Act (FPA), asserting that the Plant's closure reduced the reliability of the electrical supply to much of the central business district of the District of Columbia, many federal institutions, the Georgetown area in DC, as well as other portions of Northwest DC, and the District of Columbia Water and Sewer Authority's Blue Plains Advanced Water Treatment Plant (collectively referred to herein as the ''Central DC area''), placing these electrical customers in risk of a blackout.

After an exhaustive review of the facts, and consultation with Federal and state officials responsible for environmental compliance and the private entities responsible for electricity transmission, the Secretary of the Department of Energy on December 20, 2005, issued an emergency order (the ''Order'') directing the Plant's owner, Mirant, to generate electricity at the coal-fired Plant under certain, limited circumstances. The section below on ''Further Information'' includes information on how to obtain paper and electronic copies of the Order.

In emergency situations such as this one, the Council on Environmental Quality (CEQ) Regulations Implementing the Procedural Requirements of NEPA at 40 CFR 1506.11 provide that a federal agency may take an action with significant environmental impacts without observing the provisions of the NEPA regulations associated with preparing an Environmental Impact Statement (EIS). Instead, the agency should consult with CEQ to determine what alternative arrangements the agency will take in lieu of preparing a normal NEPA EIS. DOE has consulted with CEQ about alternative arrangements it will take in this matter and is publishing this notice to inform the public of those arrangements pursuant to DOE's NEPA regulations at 10 CFR 1021.343.

Consistent with its consultation with CEQ, DOE will implement the following alternative arrangements: (1) Prepare a Special Environmental Analysis (SEA) that will examine the potential impacts from issuance of the order, and identify potential mitigation measures; (2) provide opportunities for public involvement by disseminating information related to the environmental effects of Mirant's operations and by accepting public comment on this notice, the compliance plan Mirant submitted to DOE, and the SEA; (3) continue consultations with appropriate agencies with regard to relevant environmental issues; and (4) identify in the SEA any steps that DOE believes can be taken to mitigate the impacts from its Order.

DATES: Comments on this notice and on issues to be addressed in the SEA should be submitted to DOE on or before February 21, 2006.

ADDRESSES: Comments should be addressed to: Lawrence Mansueti, Permitting, Siting, and Analysis Division, Office of Electricity Delivery and Energy Reliability (OE–20), U.S. Department of Energy, 1000 Independence Avenue, SW., Washington, DC 20585–0119; telephone: 202–586–2588; fax: 202–586–5860; *Lawrence.Mansueti@hq.doe.gov.*

FOR FURTHER INFORMATION CONTACT: For further information on this Notice, to obtain paper copies of the Order and compliance plan, to submit comments on the compliance plan, or for information on the emergency activities related to the Plant, contact Mr. Mansueti at the above address. In addition, all publicly available documents, including the Order and compliance plan, are available on DOE's Web site for this matter at *http://www.electricity.doe.gov/about/dcpsc_docket.cfm* or via hyperlinks from that Web site (referred to herein as the ''Mirant matter Web site''). Copies of the SEA will also be available on the DOE NEPA Web site at *http://www.eh.doe.gov/nepa/.*

For information on the DOE NEPA process, please contact: Carol M. Borgstrom, Director, Office of NEPA Policy and Compliance (EH–42), U.S. Department of Energy, 1000 Independence Avenue, SW., Washington, DC 20585–0119; telephone: 202–586–4600; fax: 202–586–7031; or leave a toll-free message at: 1–800–472–2756.

SUPPLEMENTARY INFORMATION:

Procedural Background

On August 19, 2005, Mirant submitted to the Virginia Department of Environmental Quality (DEQ) a computerized emissions modeling study Mirant had conducted of its Plant that indicated that emissions from the Plant caused or contributed to significant localized exceedances of the NAAQS. Also on August 19, 2005, DEQ issued a letter to Mirant which requested ''that Mirant *immediately* undertake such action as is necessary to ensure protection of human health and the environment, in the area surrounding the Potomac River Generating Station, including the potential reduction of levels of operation, or potential shut down of the facility.'' (emphasis in original). On August 24, 2005, Mirant shut down all five of the generating units at the Plant, and on the same day, the District of Columbia Public Service

Commission (DCPSC) filed an Emergency Petition and Complaint with DOE and the Federal Energy Regulatory Commission (FERC) pursuant to the Federal Power Act (FPA). The DCPSC requested the Secretary of Energy to find that an emergency existed under section 202(c) of the FPA and to issue an order directing Mirant to continue operation of the Plant. The basis for the petition was that the shutdown of the Plant ''* * * will have a drastic and potentially immediate effect on the electric reliability in the greater Washington, DC, area and could expose hundreds of thousands of consumers, agencies of the Federal Government and critical federal infrastructure to curtailments of electric service, load shedding and, potentially, blackouts.'' On September 20, 2005, Mirant restarted its unit number one on an 8/8/8 basis—that is, in any given 24-hour period, the unit runs for eight hours at its maximum level of 88 MW, eight hours at its minimum level of 35 MW, and has eight hours when it does not run. DOE has been informed that both the U.S. Environmental Protection Agency (EPA) and DEQ acknowledge that the operation of this unit in this manner does not result in any modeled NAAQS exceedances.

Electricity Reliability

The coal-fired Mirant Plant consists of five generating units, two of which are cycling units that range in output from 35 MW to 88 MW, and three of which are baseload units that range in output from 35 MW to 102 MW. The Plant is one of only three sources of electricity to the Central DC area. The other two sources are two 230,000-volt (230 kV) transmission lines that deliver electricity from other generating sources in the regional electric grid operated by PJM Interconnection (PJM). Although there are other generating units in close physical proximity to the Central DC area, there are no transmission lines that would allow delivery of power from these other units to reach the Central DC area. Under North American Electric Reliability Council (NERC) standards, at a minimum, the power system must carry at least enough contingency reserves of electricity to cover the most severe single contingency. The standards require that an area's system always be operated with sufficient reserves to compensate for the sudden failure of the area's most important single generator or transmission line. Based on the fact that the Central DC area has only three sources of supply, the Plant and the two 230 kV transmission lines, in order to maintain a minimally reliable electric power system, the Plant must be available to run when one of the 230 kV lines is out of service, because if the remaining line failed there would be no other source of electricity to serve the Central DC area load.

The outage of one of these two lines is not merely a theoretical possibility. Since 2000, there have been 34 one-line outages for maintenance, and seven occasions where one of the lines has failed unexpectedly. DOE has been informed that, prior to 2000, there were two occasions when both of the lines failed simultaneously. Moreover, just days before issuance of the Order, PJM informed DOE on December 16, 2005, that on the previous night, ''one of the two circuits critical to providing service to the District tripped. Continued [electric] service to certain load within the District was at that time entirely dependent on the remaining circuit.'' Fortunately, full service to the line that failed was restored by the morning of December 16, 2005. Nonetheless, there can be no assurance that the Central DC area would be so lucky next time. In addition, the Potomac Electric Power Company (PEPCO) informed DOE that it needed to perform maintenance on the lines in January of 2006.

The Order

On December 20, 2005, DOE found that in the circumstances presented, an emergency existed within the meaning of section 202(c) of the FPA because of the reasonable possibility an outage would occur that would cause a blackout, the number and importance of facilities and operations in our Nation's Capital that would be potentially affected by such a blackout, the extended number of hours of any blackout that might in fact occur, and the fact that the current situation violated applicable reliability standards. PEPCO has applied to the DCPSC to construct two additional 230 kV lines that would supply electricity to the Central DC area and in the same application, proposed building two new 69kV lines to supply the Blue Plains wastewater treatment plant. Once completed, these lines will likely provide a high level of electricity reliability in the Central DC area, even in the absence of production from the Plant. However, it will likely take 18–24 months to construct the new lines.

Based on this finding, on December 20, 2005, DOE issued an Order requiring Mirant to, among other things, (1) operate the Plant to produce the amount of power (up to its full capabilities) needed to meet demand in the Central DC area during any period in which one or both of the 230kV lines serving the Central DC area is out of service as specified by PJM for the duration of the outage, and (2) keep as many generating units in operation and take all other measures to reduce the start-up time of units not in operation, for the purpose of providing electricity reliability, as feasible, as determined by DOE after consideration of the plan submitted by Mirant pursuant to the Order and after consultation with EPA, without regard to cost, and without causing or significantly contributing to any exceedance of the NAAQS. A blackout in the Central DC area would have drastic impacts on the environment, as well as for the employees and citizens of the Central DC area, affecting hundreds of thousands of residents and workers, as well as public safety and protection facilities, including hospitals, police, and fire facilities. In addition, DOE has been informed that within 24 hours of a blackout in the Central DC area, untreated sewage from the Blue Plains Wastewater Treatment plant would be discharged into the Potomac River.

The time period for DOE's Order extends through October 1, 2006.

Mirant's Compliance Plan

Pursuant to DOE's Order, Mirant submitted a compliance plan (referred to as the Operating Plan by Mirant) on December 30, 2005. The plan outlines a proposed temporary phase, and two options for a proposed intermediate phase, Option A and Option B. All proposals include the use of ''trona'' (sodium sesquicarbonate, a naturally occurring substance similar to baking soda) and/or lower sulfur coal to manage air emissions. On January 4, 2006, DOE authorized Mirant to ''immediately take the necessary steps to implement Option A of the intermediate phase proposed in the implementation plan,'' stating that ''Mirant represents that implementation of this option will produce no NAAQS exceedences.'' DOE will work with EPA to verify the accuracy of that representation. DOE is still in the process of reviewing the other proposals described in Mirant's compliance plan in consultation with EPA.

NEPA Compliance Actions

Pursuant to CEQ regulations at 40 CFR 1506.11, DOE consulted with CEQ on December 20, 2005, December 22, 2005, January 13, 2006, and January 17, 2006, about formulating a plan for alternative arrangements. Under the agreed upon alternative arrangements plan, which will expire October 1, 2006, unless extended, DOE will:

1. *Prepare a Special Environmental Analysis (SEA).* The SEA will examine potential impacts resulting from issuance of the Order, and describe further DOE decisionmaking regarding reasonable future alternatives and potential further mitigation actions DOE may take in this matter. The analysis will present reasonably foreseeable impacts from possible changes in operations of the Plant over the time until two additional transmission lines planned by PEPCO are installed. DOE intends to issue its SEA no later than August 2006 and will make it available to the public on the DOE NEPA and Mirant matter Web sites as well as announce its availability in the **Federal Register**. DOE will consider information contained in the SEA, and public input received on the SEA, in any future decisionmaking in this matter.

2. *Provide Opportunities for Public Involvement.* DOE is currently accepting public comments on the compliance plan that DOE required Mirant to submit under the DOE Order. DOE also invites public comments on this Notice, as well as on issues to be addressed in the SEA. DOE will consider public input in determining appropriate mitigation measures and any additional actions DOE may take as DOE adaptively manages implementation of the Order. DOE will post on the Mirant matter Web site publicly available information (not exempt from disclosure under the Freedom of Information Act) regarding the environmental effects of ongoing or alternative operations of the Plant (*e.g.*, reasonably available ambient air quality data and results of air quality modeling), that the Department receives from Mirant, EPA, and DEQ.

3. *Continue Agency Consultations.* DOE will continue to consult with EPA and DEQ concerning information on emissions, modeling results, potential mitigation measures, and any changes to the operation of the Plant. EPA will act as a ''cooperating agency'' (see 40 CFR 1501.6 and 1508.5) for purposes of providing reasonably available public information regarding the environmental effects of operations of the Plant to be disseminated via DOE's Mirant matter Web site and evaluated in the SEA.

4. *Identify Mitigation.* DOE will identify in its SEA any steps that it believes can be taken to mitigate the impacts from its Order. DOE will continue to track the impacts of its Order and public input and provide for appropriate mitigation where practicable. DOE will publish on its Web sites, as noted above, its discussion of which mitigation measures are adopted for any future decision, and if not, why they are not adopted.

DOE may modify, in consultation with CEQ, the foregoing alternative arrangements as conditions warrant and will notify the public in the **Federal Register** if it does so.

Issued in Washington, DC, on January 18, 2006.

John Spitaleri Shaw,

Assistant Secretary for Environment, Safety and Health.

[FR Doc. 06–570 Filed 1–19–06; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Project No. 12481–002]

AMG Energy, LLC; Notice of Surrender of Preliminary Permit

January 12, 2006.

Take notice that AMG Energy, LLC, permittee for the proposed Selden Dam Project, has requested that its preliminary permit be terminated. The permit was issued on April 20, 2004, and would have expired on March 31, 2007.[1] The project would have been located on the Black Warrior River in Greene and Hale Counties, Alabama.

The permittee filed the request on December 7, 2005, and the preliminary permit for Project No. 12481 shall remain in effect through the thirtieth day after issuance of this notice unless that day is a Saturday, Sunday, part-day holiday that affects the Commission, or legal holiday as described in section 18 CFR 385.2007, in which case the effective date is the first business day following that day. New applications involving this project site, to the extent provided for under 18 CFR Part 4, may be filed on the next business day.

Magalie R. Salas,

Secretary.

[FR Doc. E6–598 Filed 1–19–06; 8:45 am]

BILLING CODE 6717–01–P

[1] 107 FERC ¶ 62,053.

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Project No. 12485–002]

AMG Energy, LLC; Notice of Surrender of Preliminary Permit

January 12, 2006.

Take notice that AMG Energy, LLC, permittee for the proposed Claiborne Hydroelectric Project, has requested that its preliminary permit be terminated. The permit was issued on June 28, 2004, and would have expired on May 31, 2007.[1] The project would have been located on the Alabama River in Monroe County, Alabama.

The permittee filed the request on December 7, 2005, and the preliminary permit for Project No. 12485 shall remain in effect through the thirtieth day after issuance of this notice unless that day is a Saturday, Sunday, part-day holiday that affects the Commission, or legal holiday as described in section 18 CFR 385.2007, in which case the effective date is the first business day following that day. New applications involving this project site, to the extent provided for under 18 CFR part 4, may be filed on the next business day.

Magalie R. Salas,

Secretary.

[FR Doc. E6–599 Filed 1–19–06; 8:45 am]

BILLING CODE 6717–01–P

[1] 107 FERC ¶ 62,287.

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Docket No. RP03–36–015]

Dauphin Island Gathering Partners; Notice of Negotiated Rate

January 13, 2006.

Take notice that on January 9, 2006, Dauphin Island Gathering Partners (Dauphin Island) tendered for filing as part of its FERC Gas Tariff, First Revised Volume No. 1, the revised tariff sheets listed below to become effective February 9, 2006.

Twenty-Fourth Revised Sheet No. 9.
Nineteenth Revised Sheet No. 10.
Seventh Revised Sheet No. 359.
Third Revised Sheet No. 427.

Dauphin Island states that these tariff sheets reflect changes to its statement of negotiated rates and nonconforming transportation and reserve commitment agreement tariff sheets.

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Department of Energy
Washington, DC 20585

January 18, 2006

Ms. Dinah Bear, General Counsel
Council on Environmental Quality
Executive Office of the President
722 Jackson Place, NW
Washington, DC 20503

Dear Ms. Bear:

The purpose of this letter is to document the Department of Energy's (DOE) consultations with the Council on Environmental Quality (CEQ) regarding compliance with the National Environmental Policy Act (NEPA) analyses and documentation requirements associated with the issuance of an emergency order under section 202(c) of the Federal Power Act (the Order) as a result of the shutdown of the Potomac River Generating Station (the Plant) in Alexandria, Virginia, on August 24, 2005. We thank you and others at CEQ for consulting with DOE on this matter on December 20 and 22, 2005, and January 13 and 17, 2006.

As you are aware, DOE issued its Order on December 20, 2005, requiring the owners of the Plant, Mirant Corporation and its wholly owned subsidiary, Mirant Potomac River, LLC (collectively referred to herein as Mirant), to generate electricity in certain limited circumstances. Due to the emergency nature of this matter, DOE issued the Order, despite potentially significant environmental impacts, without observing all of the normal provisions of the CEQ Regulations for Implementing the Procedural Requirements of the National Environmental Policy (NEPA) [40 CFR Parts 1500-1508]. Therefore, DOE is pursuing alternative arrangements to comply with NEPA, as provided in Section 1506.11 of the CEQ regulations. As a result of our discussions with CEQ, we propose the following alternative arrangements, which will expire October 1, 2006, unless extended:

1. Issuance of a *Federal Register* Notice, in accordance with DOE's NEPA regulations at 10 CFR 1021.343. The enclosed draft *Federal Register* Notice documents the emergency action that DOE has taken and actions it intends to pursue in the near term to address the electricity reliability emergency in the District of Columbia. The Notice provides background on Plant operations, outlines the Order DOE issued on December 20, 2005, and acknowledges potential environmental impacts from the Order. The Notice also describes DOE's continuing public involvement and preparation of a Special Environmental Analysis, as discussed below.

2. Prepare a Special Environmental Analysis (SEA). The SEA will examine potential impacts resulting from issuance of the Order, and describe further DOE decisionmaking regarding reasonable future alternatives and potential further

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mitigation actions DOE may take in this matter. The analysis will present reasonably foreseeable impacts from possible changes in operations of the Plant over the time until two additional transmission lines planned by Potomac Electric Power Company are installed. DOE intends to issue its SEA no later than August 2006 and will make it available to the public on the NEPA and Mirant matter websites as discussed in the enclosed Notice as well as announce its availability in the *Federal Register*. DOE will consider information contained in the SEA, and public input received on the SEA, in any future decisionmaking in this matter.

3. Provide Opportunities for Public Involvement. DOE is currently accepting public comments on the compliance plan that DOE required Mirant to submit under the DOE Order. DOE also invites public comments on this Notice as well as on issues to be addressed in the SEA. DOE will consider public input in determining appropriate mitigation measures and any additional actions DOE may take as DOE adaptively manages implementation of the Order. DOE will post on DOE's Mirant matter website publicly available information (not exempt from disclosure under the Freedom of Information Act) regarding the environmental effects of ongoing or alternative operations of the Plant (e.g., reasonably available ambient air quality data and results of air quality modeling) that the Department receives from Mirant, the Environmental Protection Agency (EPA), and the Virginia Department of Environmental Quality (DEQ).

4. Continue Agency Consultations. DOE will continue to consult with EPA and DEQ concerning information on emissions, modeling results, potential mitigation measures, and any changes to the operation of the Plant. EPA will act as a "cooperating agency" for purposes of providing reasonably available public information regarding the environmental effects of operations of the Plant to be disseminated via DOE's Mirant matter website and evaluated in the SEA.

5. Identify Mitigation. DOE will identify in its SEA any steps that it believes can be taken to mitigate the impacts from its Order. DOE will continue to track the impacts of its Order and public input and provide for appropriate mitigation where practicable. DOE will publish on its websites as noted above its discussion of which mitigation measures are adopted for any future decision, and if not, why they are not adopted.

We welcome any further suggestions you may have regarding our efforts to comply with NEPA under these emergency circumstances. Thank you for your assistance.

Sincerely,

John Spitaleri Shaw
Assistant Secretary for
Environment, Safety and Health

Enclosure

EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL ON ENVIRONMENTAL QUALITY
WASHINGTON, D.C. 20503

January 18, 2006

John Spitaleri Shaw
Assistant Secretary for
Environment, Safety and Health
Department of Energy
Washington, DC 20585

Dear Mr. Shaw:

This letter is in response to your January 18, 2006 letter documenting the Department of Energy's (DOE) request, under 40 C.F.R. 1506.11 and 10 CFR 1021.343, that the Council on Environmental Quality (CEQ) provide alternative arrangements for National Environmental Policy Act (NEPA) compliance. Consultation with CEQ is necessary to provide for a NEPA process that addresses the environmental effects of proposals for DOE action needed to maintain a minimally reliable electric power system for the central area of the District of Columbia (DC).

Your letter accurately reflects DOE's consultations with CEQ prior to and following issuance of its December 20, 2005 Order, which requires owners of the Potomac River Generating Station to generate electricity as necessary to address the current limitations of the electricity transmission system that serves central DC. The alternative arrangements proposed in your January 18, 2006 letter are limited to the immediate actions necessary to reduce electricity supply risks to acceptable levels, provide for local involvement and informed decision-making, and otherwise comply with NEPA in a manner appropriate to the nature and scope of the emergency described in the associated Federal Register notice.

Your proposal of alternative arrangements for NEPA compliance is accepted by CEQ. Thank you for your diligent coordination with CEQ. We plan to follow the implementation of these alternative arrangements closely and will remain available for consultation with DOE in this matter at any time.

Sincerely,

Dinah Bear
General Counsel

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APPENDIX D

Consultation Letters with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service

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August 17, 2006

U.S. Fish and Wildlife Service
Threatened and Endangered Species Branch
Chesapeake Bay Office
177 Admiral Cochrane Drive
Annapolis, MD 21401
ATTN: Mary Ratnaswamy

RE: Informal Consultation under Section 7 of the Endangered Species Act (ESA) for Operation of the Potomac River Generating Station in Alexandria, Virginia, Pursuant to DOE Order.

Dear Ms. Ratnaswamy:

This letter is intended to serve as informal consultation under section 7 of the ESA. In this regard, the Department of Energy (DOE) requests that you indicate if there are any additional protected species and habitat (beyond those described below) that should be considered for this ongoing action. If there are not any additional species or habitats and if you agree that the Plant would not impact any species when operating under the DOE Order, we request your concurrence that the operation of the Plant under the terms of the DOE Order would not adversely impact Federally listed or proposed threatened or endangeredspecies or designated or proposed critical habitat and that the consultation requirements of section 7 of the ESA have been satisfied.

Background: On August 24, 2005, Mirant Corporation, and its wholly owned subsidiary, Mirant Potomac River, LLC (collectively referred to herein as Mirant), ceased operations at its Potomac River Generating Station (the "Plant") in Alexandria, Virginia, after modeling that it conducted indicated that the Plant's operations were causing exceedances of the National Ambient Air Quality Standards (NAAQS) of the Clean Air Act.

Also on August 24, 2005, the District of Columbia (D.C.) Public Service Commission filed an *Emergency Petition and Complaint* with DOE pursuant to section 202(c) of the Federal Power Act.

On December 20, 2005, after an exhaustive review of the facts and consultation with Federal and state officials responsible for environmental compliance and the private entities responsible for operation of the region's electrical grid, the Secretary of Energy issued an emergency order (the "Order") directing Mirant to generate electricity at the coal-fired Plant under certain, limited circumstances. On June 1, 2006, Mirant entered into an Administrative Consent Order (ACO) with the Environmental Protection Agency (EPA) regarding the operation of the Plant. On June 2, 2006, DOE instructed Mirant to comply with the ACO and operate as required under it.

After consultations with the Council on Environmental Quality (CEQ), DOE's Office of Electricity Delivery and Energy Reliability decided to prepare a special environmental analysis (SEA) under the emergencies provision of CEQ's National Environmental Policy Act (NEPA) Implementing Regulations (40 CFR 1506.11) and the emergency circumstances provision of DOE's own NEPA implementing regulations [10 CFR 1021.343(a)]. The SEA will document the assessment of the impacts associated with the emergency activities under DOE Order 202-05-03. The time period for DOE's Order extends to October 1, 2006; however, the SEA also addresses the 15-month period from October 1, 2006, through December 31, 2007, at which time new transmission lines are expected to be available to provide a high level of electric reliability to customers in the Central D.C. area, even in the absence of production from the Plant.

The Plant: The Potomac River Generating Station began operation in 1949 and is capable of producing 482 megawatts of electric power. The Plant site encompasses 28 acres (11 has) near D.C. and Reagan National Airport on the western bank of the Potomac River (Figure 1). Most of the property is used for power generation, coal storage, office buildings, and parking areas. The site was relatively remote when the power plant was built, but Alexandria has grown up around it. The Plant is beneath the flight path of Reagan National Airport.

EPA issued a National Pollutant Discharge Elimination System (NPDES) permit to the Plant on April 20, 2000, authorizing discharges into the Potomac River. The Virginia Department of Environmental Quality approved a Stationary Source Permit to Operate on September 18, 2000, and a Phase II Acid Rain Permit on February 23, 2003.

Coal combustion ash from the Plant is sent to the Brandywine Fly Ash Facility, which is located in southeastern Prince George's County, Maryland (Figure 2). Water from this landfill discharges into the upper reaches of Mataponi Creek.

Action at the Plant under DOE's Order: The DOE Order resulted in no new disturbances from construction at the Plant site. The provisions of DOE's Order and subsequent instructions to Mirant have, however, caused changes in the level of operation at the Plant. These changes have reduced the operating level of the Plant to below that at which it was historically operating before August 24, 2005, but increased the operating level above that at which it was operating between August 24 and December 20, 2005. To reduce sulfur dioxide (SO_2) emissions, Mirant has been using a compound known as "trona" (sodium sesquicarbonate, a naturally occurring substance similar to baking soda) and/or lower sulfur coal. Thus, even if the Plant were operating at the same level as before August 24, 2005, its emissions of SO_2 would be lower.

Threatened and Endangered (T&E) Species Impacts: Because the Plant site is heavily industrialized and surrounded by development in the City of Alexandria, no Federally listed or proposed threatened or endangered species are known or likely to occur on the Plant site. Also, there is no known designated or proposed critical habitat in the area of the action.

Of the permits issued for the Plant or landfill, only the NPDES permit for the Plant mentions T&E species. That permit states that two species listed by the U.S. Fish and Wildlife Service (FWS) under the ESA occur or may occur at locations near the Plant. These are the endangered Hay's Spring amphipod *(Stygobromus hayi)* and the threatened bald eagle *(Haliaeetus leucocephalus).*

The Plant's NPDES permit states, "The FWS and NMFS indicate that at the present time [i.e., April 20, 2000] there is no evidence that the ongoing wastewater discharges covered by this permit are adversely affecting these Federally listed species." Furthermore, "(w)astewater discharges, construction, or any other activity that adversely affects a Federally listed endangered or threatened species are [sic] not authorized under the terms of this permit."

The Hay's Spring amphipod occurs only in a small area in Rock Creek in D.C. The bald eagle is unlikely to occur near the Plant as the area around it is developed and provides no suitable habitat. There has been no known impact to these species due to the Plant's operation prior to the DOE Order. Thus, since there has been no impact to Federally listed threatened or endangered species when the Plant was operating at the higher historical level before August 24, 2005, adverse impacts to such species from the lower level of operation at the Plant under DOE's Order would not be expected.

Since the DOE Order is scheduled to expire on October 1, 2006, receipt of your reply and/or concurrence before that date will allow DOE to consider your comments in determining what, if any, future actions to take in this matter.

If you need additional information or wish to discuss this matter further, please contact me at (202) 586-5935.

Sincerely,

Anthony J. Como
Director, Permitting and Siting
Office of Electricity Delivery and
Energy Reliability
U.S. Department of Energy

Enclosures (2)

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August 17, 2006

Northeast Regional Office
National Marine Fisheries Service
Protected Resource Division
One Blackburn Drive
Gloucester, MA 01930
Attn: Julie Crocker

RE: **Informal Consultation under Section 7 of the Endangered Species Act (ESA) for Operation of the Potomac River Generating Station in Alexandria, Virginia, Pursuant to DOE Order.**

Dear Ms. Crocker:

This letter is intended to serve as informal consultation under section 7 of the ESA. In this regard, the Department of Energy (DOE) requests that you indicate if there are any additional protected species and habitat (beyond those described below) that should be considered for this ongoing action. If there are not any additional species or habitats and if you agree that the Plant would not impact any species when operating under the DOE Order, we request your concurrence that the operation of the Plant under the terms of the DOE Order would not adversely impact Federally listed or proposed threatened or endangered species or designated or proposed critical habitat and that the consultation requirements of section 7 of the ESA have been satisfied.

Background: On August 24, 2005, Mirant Corporation, and its wholly owned subsidiary, Mirant Potomac River, LLC (collectively referred to herein as Mirant), ceased operations at its Potomac River Generating Station (the "Plant") in Alexandria, Virginia, after modeling that it conducted indicated that the Plant's operations were causing exceedances of the National Ambient Air Quality Standards (NAAQS) of the Clean Air Act.

Also on August 24, 2005, the District of Columbia (D.C.) Public Service Commission filed an *Emergency Petition and Complaint* with DOE pursuant to section 202(c) of the Federal Power Act.

On December 20, 2005, after an exhaustive review of the facts and consultation with Federal and state officials responsible for environmental compliance and the private entities responsible for operation of the region's electrical grid, the Secretary of Energy issued an emergency order (the "Order") directing Mirant to generate electricity at the coal-fired Plant under certain, limited circumstances. On June 1, 2006, Mirant entered into an Administrative Consent Order (ACO) with the Environmental Protection Agency (EPA) regarding the operation of the Plant. On June 2, 2006, DOE instructed Mirant to comply with the ACO and operate as required under it.

After consultations with the Council on Environmental Quality (CEQ), DOE's Office of Electricity Delivery and Energy Reliability decided to prepare a special environmental analysis (SEA) under the emergencies provision of CEQ's National Environmental Policy Act (NEPA) Implementing Regulations (40 CFR 1506.11) and the emergency circumstances provision of DOE's own NEPA implementing regulations [10 CFR 1021.343(a)]. The SEA will document the assessment of the impacts associated with the emergency activities under DOE Order 202-05-03. The time period for DOE's Order extends to October 1, 2006; however, the SEA also addresses the 15-month period from October 1, 2006, through December 31, 2007, at which time new transmission lines are expected to be available to provide a high level of electric reliability to customers in the Central D.C. area, even in the absence of production from the Plant.

The Plant: The Potomac River Generating Station began operation in 1949 and is capable of producing 482 megawatts of electric power. The Plant site encompasses 28 acres (11 ha) near the D.C. and Reagan National Airport on the western bank of the Potomac River (Figure 1). Most of the property is used for power generation, coal storage, office buildings, and parking areas. The site was relatively remote when the power plant was built, but Alexandria has grown up around it. The Plant is beneath the flight path of Reagan National Airport.

EPA issued a National Pollutant Discharge Elimination System (NPDES) permit to the Plant on April 20, 2000, authorizing discharges into the Potomac River. The Virginia Department of Environmental Quality approved a Stationary Source Permit to Operate on September 18, 2000, and a Phase II Acid Rain Permit on February 23, 2003.

Coal combustion ash from the Plant is sent to the Brandywine Fly Ash Facility, which is located in southeastern Prince George's County, Maryland (Figure 2). Water from this landfill discharges into the upper reaches of Mataponi Creek.

Action at the Plant under DOE's Order: The DOE Order resulted in no new disturbances from construction at the Plant site. The provisions of DOE's Order and subsequent instructions have, however, caused changes in the level of operation at the Plant. These changes have reduced the operating level of the Plant to below that at which it was historically operating before August 24, 2005, but increased the operating level above that at which it was operating between August 24 and December 20, 2005. To reduce sulfur dioxide (SO_2) emissions, Mirant has been using a compound known as "trona" (sodium sesquicarbonate, a naturally occurring substance similar to baking soda) and/or lower sulfur coal. Thus, even if the Plant were operating at the same level as before August 24, 2005, its emissions of SO_2 would be lower.

Threatened and Endangered (T&E) Species Impacts: Because the Plant site is heavily industrialized and surrounded by development in the City of Alexandria, no Federally listed or proposed threatened or endangered species are known or likely to occur on the Plant site. Also, there is no known designated or proposed critical habitat in the area of the action.

Of the permits issued for the Plant or landfill, only the NPDES permit for the Plant mentions T&E species. That permit states that one species listed by the National Marine Fisheries Service (NMFS) under the ESA, the endangered shortnose sturgeon *(Acipenser brevirostrum)*, occurs or may occur at locations near the Plant.

The Plant's NPDES permit states, "The FWS and NMFS indicate that at the present time [i.e., April 20, 2000] there is no evidence that the ongoing wastewater discharges covered by this permit are adversely affecting these Federally listed species." Furthermore, "(w)astewater discharges, construction, or any other activity that adversely affects a Federally listed endangered or threatened species are [sic] not authorized under the terms of this permit."

The Shortnose Sturgeon Recovery Plan reports that one shortnose sturgeon was captured in 1996 at the mouth of Potomac Creek off the Potomac River downstream from the Plant. However, there are no other recent reports of it occurring in the Potomac River; therefore, there has been no known impact to this species due to the Plant's operation prior to the DOE Order. Since there has been no known impact to Federally listed threatened or endangered species when the Plant was operating at the higher historical level before August 24, 2005, adverse impacts to such species from the lower level of operation at the Plant under DOE's Order would not be expected.

Since the DOE Order is scheduled to expire on October 1, 2006, receipt of your reply and/or concurrence before that date will allow DOE to consider your comments in determining what, if any, future actions to take in this matter.

If you need additional information or wish to discuss this matter further, please contact me at (202) 586-5935.

Sincerely,

Anthony J. Como
Director, Permitting and Siting
Office of Electricity Delivery and
Energy Reliability
U.S. Department of Energy

Enclosures (2)

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
One Blackburn Drive
Gloucester, MA 01930-2298

OCT - 3 2006

Anthony J. Como, Director
Permitting and Siting
Office of Electricity Delivery and Energy Reliability
US Department of Energy
Washington, DC 20585

Dear Mr. Como,

This is in response to your letter dated August 17, 2006 requesting consultation pursuant to Section 7 of the Endangered Species Act (ESA) of 1973, as amended, regarding the operation of Mirant's Potomac River Generating Station in Alexandria, Virginia.

The Potomac River Generating Station is a coal fired plant located on the western bank of the Potomac River. The Plant began operation in 1949. On August 24, 2005, Mirant ceased operations at its Plant after modeling indicated that the Plant's operations were causing exceedences of the National Ambient Air Quality Standards of the Clean Air Act. On December 20, 2005, the Secretary of Energy issued an emergency order directing Mirant to generate electricity at the Plant under certain circumstances. On June 1, 2006, Mirant entered into an Administrative Consent Order (ACO) with the US Environmental Protection Agency (EPA) regarding the operation of the Plant. The DOE requires the Plant to operate at lower levels and to reduce sulfur dioxide emissions by using a compound known as "trona" (sodium sesquicarbonate) and/or lower sulfur coal. On June 2, 2006, the Department of Energy (DOE) instructed Mirant to comply with the ACO and operate as required under it. Operation of the Plant is necessary to ensure an uninterrupted supply of electricity to the District of Columbia. DOE has indicated that its order to comply with the ACO is scheduled to expire on October 1, 2006. The operation of the Plant from October 1, 2006 through summer 2007 under the terms of the DOE Order is the subject of this consultation. The DOE has made the determination that the operation of the Plant under the Order is not likely to adversely affect any species listed under the jurisdiction of NOAA's National Marine Fisheries Service (NMFS) and has requested that NMFS concur with this determination.

As noted in your letter, the only species listed under the jurisdiction of NMFS that may be present in the vicinity of the proposed project is the endangered shortnose sturgeon (*Acipenser brevirostrum).* During the 1996-2005 time period, the incidental capture of seventy-two different shortnose sturgeon in the Chesapeake Bay and its tributaries had been reported via the US Fish and Wildlife Service Atlantic sturgeon reward program. This number includes six shortnose sturgeon captured incidentally in fishing gear in the Potomac River. Additionally, researchers conducting a survey for shortnose sturgeon in the river captured one mature egg bearing female

in September 2005 and an additional mature egg bearing female in the same location in March 2006. Both fish have been outfitted with sonic tags and are being actively tracked by researchers. The female caught in September overwintered in the Potomac River near Mattawoman Creek. One of the females was documented at the presumed spawning grounds near Little Falls in the spring of 2006. The occurrence of pre-spawning females in the Potomac River suggests that a spawning population of shortnose sturgeon continues to exist in this river system. The Plant is located approximately 24 miles upstream of the suspected overwintering area. Population dynamics of shortnose sturgeon in the Potomac River have not been documented. However, based on patterns in other river systems, shortnose sturgeon likely migrate past the Plant while moving to and from the spawning grounds near Little Falls in the spring (March – June). It is unknown if shortnose sturgeon would occur in this region of the river during other times of the year. If appropriate forage items are present, shortnose sturgeon could also occur in the area in the summer and fall while foraging.

The continuation of operations from October 1, 2006 through summer 2007, would not result in any new construction or in-water disturbances at the plant. The only aspect of the Plant's continued operation that has the potential to impact shortnose sturgeon is the discharge of waste water from the Plant to the Potomac River. These discharges are authorized under a NPDES permit issued by the EPA. NMFS has previously consulted with the EPA on the NPDES permit for the Plant and determined that the discharges are not likely to adversely affect shortnose sturgeon. While the past operation of the plant has resulted in air quality impairments, there is no information available that indicates that the operation of the plant has had an adverse effect on water quality in the Potomac River. No other impacts from the operation of the Plant under the DOE order are likely. As such, NMFS concurs with DOE's determination that the continued operation of the Plant through summer 2007 is not likely to adversely affect any species listed under NMFS jurisdiction. Therefore, no further consultation pursuant to section 7 of the ESA is required. Should project plans change or new information become available that changes the basis for this determination, or a new species be listed or critical habitat designated, consultation should be reinitiated. Should you have any questions about this correspondence please contact Julie Crocker at (978) 281-9300 ext. 6530.

Sincerely,

Patricia A. Kurkul
Regional Administrator

Cc: Scida, F/NER3
Nichols, F/NER4
Williams, GCNE

File Code: Sec 7 DOE Mirant Potomac Generating Station
PCTS I/NER/2006/04102

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401
410/573-4575

November 20, 2006

RE: Informal Consultation under Section 7 of the Endangered Species Act (ESA) for Operation of the Potomac River generating Station in Alexandria, Va.

Dear Mr. Como,

This responds to your letter, received November 20, 2006, requesting information on the presence of species which are federally listed or proposed for listing as endangered or threatened in the above referenced project area. We have reviewed the information you enclosed and are providing comments in accordance with section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

Except for occasional transient individuals, no proposed or federally listed endangered or threatened species are known to exist within the project impact area. Therefore, no Biological Assessment or further section 7 consultation with the U.S. Fish and Wildlife Service is required. Should project plans change, or should additional information on the distribution of listed or proposed species become available, this determination may be reconsidered.

This response relates only to federally protected threatened or endangered species under our jurisdiction. Limited information is currently available regarding the distribution of other rare species in the District of Columbia. However, the Nature Conservancy and National Park Service (NPS) have initiated an inventory of rare species within the District. For further information on such rare species, you should contact Mary Pfaffko of the National Park Service at (202)-535-1739.

An additional concern of the Service is wetlands protection. Federal and state partners of the Chesapeake Bay Program have adopted an interim goal of no overall net loss of the Basin's remaining wetlands, and the long term goal of increasing the quality and quantity of the Basin's wetlands resource base. Because of this policy and the functions and values wetlands perform, the Service recommends avoiding wetland impacts. All wetlands within the project area should be identified, and if alterations of wetlands is proposed, the U.S. Army Corps of Engineers, Baltimore District, should be contacted for permit requirements. They can be reached at (410) 962-3670.

We appreciate the opportunity to provide information relative to fish and wildlife issues, and

thank you for your interests in these resources. If you have any questions or need further assistance, please contact Devin Ray at (410) 573-4531.

Sincerely,

Mary Ratnaswamy

Mary J. Ratnaswamy, Ph.D.
Program Supervisor, Threatened and Endangered Species

APPENDIX E

Organizational Conflict of Interest Statement

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NEPA DISCLOSURE STATEMENT FOR PREPARATION OF A
SPECIAL ENVIRONMENTAL ANALYSIS FOR ACTIONS TAKEN UNDER DOE ORDER 202-05-3 REGARDING OPERATION OF THE POTOMAC RIVER GENERATING STATION IN ALEXANDRIA, VIRGINIA

CEQ Regulations at 40 CFR 1506.5(c), which have been adopted by the DOE (10 CFR 1021), require contractors who will prepare an environmental impact statement to execute a disclosure specifying that they have no financial or other interest in the outcome of the project. The term "financial interest or other interest in the outcome of the project" for purposes of this disclosure is defined in the March 23, 1981, guidance "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations," 46 FR 18026-18038 at Question 17a and b.

"Financial or other interest in the outcome of the project" includes "any financial benefit such as a promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g., if the project would aid proposals sponsored by the firm's other clients)." 46 FR 18026-10838 at 10831.

In accordance with these requirements, the offeror and any proposed subcontractors hereby certify as follows: [check either (a) or (b) to assure consideration of your proposal].

(a) __X__ Offeror and any proposed subcontractor have no financial or other interest in the outcome of the project.

(b) _____ Offeror and any proposed subcontractor have the following financial or other interest in the outcome of the project and hereby agree to divest themselves of such interest prior to award of this contract.

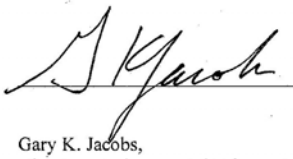
Financial or Other Interests

1.

2.

3.

Certified by:



Signature

Gary K. Jacobs,
Director, Environmental Sciences Division
Printed Name and Title

Oak Ridge National Laboratory,
Managed for the U.S. Department of Energy
by UT-Battelle, LLC
Company

11-1-06
Date

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APPENDIX F

Glossary

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GLOSSARY

Anadromous - species that spend their adult lives in saltwater and spawn in freshwater.

Ash - the mineral content of a product remaining after complete combustion.

Baseload - generating units that produce power at a steady rate for extended periods.

Biochemical oxygen demand - a standard quantitative measure of water pollution. It is the amount of oxygen consumed in the biological oxidation (by bacteria or other microorganisms) of organic material in a unit volume of waste water, as measured over a five-day period. Biochemical oxygen demand sometimes is divided into two components: carbonaceous oxygen demand and nitrogenous oxygen demand. Carbonaceous biochemical oxygen demand is the result of the breakdown of organic molecules such as cellulose and sugars, while nitrogenous oxygen demand is the result of the breakdown of proteins.

Biocide - a substance (e.g., chlorine) that is toxic or lethal to many organisms and is used to treat water.

Blowdown - the portion of steam or water removed from a boiler at regular intervals to prevent excessive accumulation of dissolved and suspended materials.

Bottom ash - combustion residue composed of large particles that settle to the bottom of a combustor from where they can be physically removed.

Calcining - the effects of heating a substance to a high temperature (below the melting or fusing point) at which point loss of moisture, reduction or oxidation, or the decomposition of carbonates and other compounds occurs.

Candidate species - plants and animals native to the United States for which the Fish and Wildlife Service or the National Marine Fisheries Service has sufficient information on biological vulnerability and threats to justify proposing to add them to the threatened and endangered species list, but cannot do so immediately because other species have a higher priority for listing. The Services determine the relative listing priority of candidate taxa in accordance with general listing priority guidelines published in the *Federal Register*. (See endangered species and threatened species.)

Cooling water - water that is heated as a result of being used to cool steam and condense it to water.

Cyanobacteria - blue-green algae.

Diadromous - fish spending part of their lives in both fresh and salt water.

Downwash (building) - the downward movement of an elevated plume toward the area of low pressure created on the lee side of a structure in the wake around which the air flows.

Electrostatic precipitator - a device that removes particles from a stream of exhaust gas. It imparts an electrical charge to the particles, which causes them to adhere to metal plates that can be rapped to cause the particles to fall into a hopper for disposal.

Endangered species - plants or animals that are in danger of extinction through all or a significant portion of their ranges and that have been listed as endangered by the Fish and Wildlife Service or the National Marine Fisheries Service following the procedures outlined in the Endangered Species Act and its implementing regulations (50 CFR 424). (See threatened species.) The lists of endangered species can be found in 50 CFR 17.11 (wildlife), 50 CFR 17.12 (plants), and 50 CFR 222.23(a) (marine organisms). The state of Virginia also lists species as endangered under its Endangered Species Act.

Entrainment - incorporation of any life stage of fish and shellfish with water flow entering and passing through a cooling water intake structure and into an industrial, municipal or electric utility power plant cooling water system.

Estuary - region of interaction between rivers and near-shore ocean waters, where tidal action and river flow mix fresh and salt water. Such areas include bays, mouths of rivers, salt marshes, and lagoons. These brackish water ecosystems shelter and feed marine life, birds, and wildlife. (See wetlands.)

Fall line - the boundary zone where the upland piedmont region meets the coastal plain. Waterfalls and rapids occur where rivers and streams cross the fall line.

Finfish - a fish with fins (which is most fish), in contrast to shellfish, crayfish, and jellyfish (which are not fish).

Fly ash - combustion residue composed of fine particles (e.g., soot) that are entrained with the draft leaving the combustor.

Fresh water - water with a low concentration of salts (typically less than 1,000 parts per million of dissolved solids).

Hazardous waste - a category of waste regulated under the Resource Conservation and Recovery Act (RCRA). To be considered hazardous, a waste must be a solid waste under RCRA and must exhibit at least one of four characteristics described in 40 CFR 261.20 through 40 CFR 261.24 (i.e., ignitability, corrosivity, reactivity, or toxicity) or be specifically listed by the Environmental Protection Agency in 40 CFR 261.31 through 40 CFR 261.33.

Impingement - the entrapment of any life stage of fish and shellfish on the outer part of an intake structure or against a screening device during intake water withdrawal.

Leachate - solution or product obtained by leaching, in which a substance is dissolved by the action of a percolating liquid.

Load following - power generating units that are capable of changing power levels quickly as demand rises or falls. They are also known as cycling units.

pH - a measure of the relative acidity or alkalinity of a solution, expressed on a scale from 0 to 14, with the neutral point at 7. Acid solutions have pH values lower than 7, and basic (i.e., alkaline) solutions have pH values higher than 7.

Plume (atmospheric) - a visible or measurable, elongated pattern of emissions spreading downwind from a source through the atmosphere.

Pozzolanic - material that when mixed with water "sets," like cement.

Riparian - areas adjacent to rivers and streams with a differing density, diversity, and productivity of plant and animal species relative to nearby uplands.

Saline - describes water with high concentrations of salts (typically more than 10,000 parts per million dissolved solids), making it unsuitable for use.

Stratosphere - the portion of the atmosphere 10 to 25 mi (16 to 40 km) above the earth's surface.

Threatened species - any plants or animals that are likely to become endangered species within the foreseeable future throughout all or a significant portion of their ranges and which have been listed as threatened by the Fish and Wildlife Service or the National Marine Fisheries Service following the procedures set out in the Endangered Species Act and its implementing regulations (50 CFR 424). (See endangered species.) The lists of threatened species can be found at 50 CFR 17.11 (wildlife), 17.12 (plants), and 227.4 (marine organisms). The state of Virginia also lists species as threatened under its Endangered Species Act.

Tidal river - a river segment with fresh water (salinity less than 500 mg/L) and a net seaward flow direction throughout the water column.

Transmission (electric) - movement of electrical power from the source where it is produced to end users.

Trona - a naturally occurring chemical compound, sodium sesquicarbonate, similar to baking soda.

Troposphere - the layer of the atmosphere closest to the earth's surface.

Watershed - the region draining into a river, river system, or other body of water.

Wetlands - areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs, and similar areas.

Wind rose - a graph in which the frequency of wind blowing from each direction is plotted as a bar that extends from the center of the diagram. Wind speeds are denoted by bar widths and shading; the frequency of wind speed within each wind direction is depicted according to the length of that section of the bar.

Department of Energy
Washington, DC 20585

October 1, 2021

Enclosed is the final special environmental analysis (DOE/SEA-05) prepared by ICF, Incorporated (ICF) under direction of the Department of Energy (DOE) pursuant to the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. 4331 et seq., and DOE's implementing regulations, 10 CFR 1021.343(a).

On February 14, 2021, DOE issued an emergency order pursuant to section 202(c) of the Federal Power Act (FPA), 16 U.S.C. § 824a(c), and section 301(b) of the DOE Organization Act, 42 U.S.C. § 7151(b), DOE Order No. 2020-21-1, to the Electric Reliability Council of Texas (ERCOT) authorizing specific electric generating units located within the ERCOT area to operate at their maximum generation output levels under limited circumstances due to extreme weather conditions and to preserve the reliability of bulk electric power system (Order).

DOE issued the Order after determining that the emergency situation underlying ERCOT's request demanded immediate action consistent with DOE's NEPA regulations (10 CFR 1021.343(a)). As described in DOE's notice of emergency action (86 FR 18046; April 7, 2021), DOE reviewed the final data report received from ERCOT on March 31, 2021, and determined that a special environmental analysis would be the appropriate level of NEPA review. DOE has prepared special environmental analyses in other emergency situations that required immediate action. (See https://www.energy.gov/nepa/special-environmental-analyses). This special environmental analysis examines potential impacts resulting from issuance of the Order on air quality and environmental justice. DOE has independently reviewed the analysis provided by ICF and agrees with its conclusions. No further analysis will be conducted.

U.S. Department of Energy, Office of Electricity

Air Quality and Environmental Justice Analysis Memorandum, July 21, 2021

Introduction

During 5 days in February 2021 (February 15–19), the Electric Reliability Council of Texas (ERCOT) requested the Department of Energy (DOE) to authorize the emergency use of power generation under Section 202(c) of the Federal Power Act. This resulted in air emissions at times exceeding their permitted emissions levels for 28 power units located in East Texas, with most power units (20) located in Harris County. At the request of the DOE Office of Electricity (OE), ICF has examined whether these additional emissions from these power units covered by the Section 202(c) authorization may have led to an exceedance of the National Ambient Air Quality Standards (NAAQS). Further, ICF conducted an environmental justice analysis of the communities potentially affected by any additional emissions during this 5-day period.

We determined at the outset that for one power unit, ERCOT was unable to obtain any information on its air emissions. Therefore, our analyses included 27 units. Although the ERCOT Section 202(c) permit covered 27 power units, only 14 of the 27 power units were at unique locations.

1 Air Quality Analysis Approach

To assess whether emissions from the power units could potentially contribute to a NAAQS violation, ICF gathered the air quality monitoring data for stations in East Texas. The Texas Commission on Environmental Quality (TCEQ) maintains an extensive network of air monitoring stations throughout the state.[1] This hourly air monitoring and meteorological data, resultant wind speed and direction, outdoor temperature, standard deviation in wind direction, and solar radiation were downloaded from TCEQ. In addition, ERCOT provided the locations for each power generating unit. Using this collected data, ICF determined if any exceedances occurred during the emergency period (February 15–19, 2021) for air pollutants having short-term ambient air quality standards. This included 1- and 8-hour CO, 1-hour NO_2, 1-hour SO_2, and 24-hour PM^2 standards. No assessment was made for mercury or CO_2 emissions.

ERCOT provided DOE with hourly air emission rates for each unit above its permitted levels, along with the location of each power unit. This information was used to pair air quality monitoring stations with power units. We examined pairings using proximate radial distances of 10 km and 15 km. To determine if an air monitoring station was downwind of the power unit, we used each hour's wind direction to determine if the air monitoring station aligned in a downwind direction within a ±20-degree window.

To further strengthen conclusions, we compared the 5-day average temperature with historical average February temperatures using climatological data from Houston International Airport as an overall representative site. Lower than average temperatures are favorable for increased

[1] https://www.tceq.texas.gov/cgi-bin/compliance/monops/select_month.pl

[2] Although PM_{10} is the reported emission rate, we used the $PM_{2.5}$ standard, as nearly all (>97 percent by mass) of the power plant emissions have a mean mass diameter of less than 2.5 microns.

buoyancy from the exhaust stack, which means the plume will rise higher, favoring lower ground-level air concentrations. A similar analysis was performed for wind speeds but using the Houston Aldine site (EPA AIRS ID 48_201_0024). Here, higher wind speeds led to increased ventilation, which decreases residence time of air pollutants, leading to lower air pollutant concentrations.

Lastly, we discuss the concept of mixing height. The *mixing height* (or depth) is defined as the height above the Earth's surface through which vertical mixing occurs. The concept of a mixing layer is well-founded on theoretical principles. The mixing height acts as a lid on air pollutants, tending to prevent further vertical mixing of emissions higher into the atmosphere. Thus, we calculated the mixing heights during the 5-day emergency period and compared them to the average February mixing heights based on the Holzworth method (U.S. Environmental Protection Agency, 1972). Mixing heights can be determined from twice daily upper-air soundings performed at 6 a.m. and 6 p.m. The nearest upper-air station to Harris County is Lake Charles, Louisiana.

Review of ERCOT Emission Rates Against Total Emissions Rates During the Emergency Use Period

We reviewed the hourly emission rate data provided by ERCOT for each power unit. The dataset is intended to report the incremental emissions for each hour that exceeded the power units' maximum permitted emission rates. To compare these incremental emissions against the total emissions from each power unit, we downloaded the Continuous Emission Monitoring System (CEMS) from EPA's Air Markets Program Data (ampd.epa.gov/ampd). CEMS data reports the total emissions for each power unit on an hour-by-hour basis either as directly measured or as calculated from other measured parameters. The ERCOT data reported hourly emissions for SO_2, NO_X, CO, PM_{10}, and CO_2; however, CEMS does not report emissions for CO and PM_{10}, so the only pollutants that can be cross-referenced between the two datasets are SO_2, NO_X, and CO_2. However, SO_2 and CO_2 are rarely reported in the ERCOT-supplied data, likely because SO_2 emission rates are well below permitted levels even during the emergency period, and CO_2 emission rates are likely not specified in operating permit levels.

Because the ERCOT emission rates are in, we expected that in most cases the ERCOT incremental increase would only be a small fraction of the total CEMS rates and that the ERCOT rates could never be greater than CEMS rates because CEMS emissions are the total emissions from the power units. To see if our understanding is consistent with the reported data, we made a graphical presentation between the NO_X incremental emission rate versus the CEMS emissions rate for each hour in which ERCOT reported an emission rate over the 5-day emergency period.

1.1 Findings – Potential for NAAQS Exceedances

We discuss a series of analyses undertaken using available air quality and meteorological data to present a weight-of-evidence approach in trying to answer the principal question—*Could the power units' excess air emissions during this emergency period have caused an exceedance of the NAAQS?*

No one analysis can definitively answer this question, so we performed a series of analyses to provide a more defensible and robust conclusion and instill greater confidence in the answer.

1.1.1 Air Quality Monitoring Stations

A review of air quality monitoring stations in all air quality modeling regions in East Texas showed no violations of the NAAQS during the emergency period. However, many of the air quality monitoring stations failed to operate during the emergency period, presumably because of power outages. Tables 1a and 1b below show the daily percentage of missing air quality data during the emergency period for power units and air quality stations that we could pair using a 10-m radius. Only 14 of the 27 power units had unique locations, and of the 14 locations, only 10 had an air quality station within 10 km. The pollutant most widely monitored, as well as the pollutant most widely reported as having emissions exceeding permit levels, is NO_X. Of the 14 locations, seven had NO_2 monitors.[3] However, as highlighted in light blue and indicated with an asterisk (*), about half have missing data (likely as a result of power outages), particularly on the first 3 days of the emergency period. Other air pollutants have less air monitoring coverage but also show considerable missing data, particularly during the first 3 days of the emergency period.

The power unit codes shown in the rest of this report are defined in Appendix 1.

[3] Although the emitted pollutant is NO_X, the air quality standard is for NO_2. Typically, about 10 percent of the in-stack NO_X is in the form of NO_2, and the rest is emitted as NO. However, NO is converted to NO_2 in the atmosphere with a reaction rate on the order of minutes to hours, depending on available ozone and atmospheric mixing.

Table 1a. Ambient Air Quality Monitoring Stations (CO and NO_2) Within 10 km of the Power Generation Units

Power Unit Name	Pollutants of Interest Monitored				Data Coverage by Day CO					Data Coverage by Day NO_2				
	CO	NO_2	$PM_{2.5}$	SO_2	2/15	2/16	2/17	2/18	2/19	2/15	2/16	2/17	2/18	2/19
BOSQUE_CC1														
DDPEC_CC1	X	X	X	X	100%	21%*	0%*	50%	100%	100%	21%*	75%	100%	100%
FREC_CC2				X										
TXCTY_CC1				X										
CHAMON_CTG_0101		X								75%	0%*	17%*	100%	100%
CALHOUN_UNIT1														
THW_THWGT32		X								100%	92%	38%*	100%	100%
WAP4_WAP4														
GBY_GBYGT74		X	X							100%	96%	50%	100%	100%
PHR_CLCWA_5UNITS		X								8%*	88%	42%*	100%	96%
LH_LYN_30UNITS		X								75%	0%*	17%*	100%	100%
DSN_NEWP_10UNITS														
SOE_SEWP_10UNITS	X	X	X	X	100%	21%*	0%*	50%	100%	100%	21%*	75%	100%	100%
FEGC_UNIT1				X										

See Appendix 1 for definition of the unit codes.

Table 1b. Ambient Air Quality Monitoring Stations (PM25, SO_2) Within 10 km of the Power Generation Units

Power Unit Name	Pollutants of Interest Monitored				Data Coverage by Day $PM_{2.5}$					Data Coverage by Day SO_2				
	CO	NO_2	$PM_{2.5}$	SO_2	2/15	2/16	2/17	2/18	2/19	2/15	2/16	2/17	2/18	2/19
BOSQUE_CC1														
DDPEC_CC1	X	X	X	X	100%	17%*	71%	100%	83%	100%	21%*	67%	100%	100%
FREC_CC2				X						0%*	0%*	0%*	46%*	100%
TXCTY_CC1				X						100%	100%	100%	100%	100%
CHAMON_CTG_0101		X												
CALHOUN_UNIT1														
THW_THWGT32		X												
WAP4_WAP4														
GBY_GBYGT74		X	X		100%	92%	33%*	0%*	50%					
PHR_CLCWA_5UNITS		X												
LH_LYN_30UNITS		X												
DSN_NEWP_10UNITS														
SOE_SEWP_10UNITS	X	X	X	X	100%	17%*	71%	100%	83%	100%	21%*	67%	100%	100%
FEGC_UNIT1				X						0%	0%	0%	0%	25%

Increasing the search radius from 10 km to 15 km picked up two additional air quality monitoring stations; however, the influence from the power station at that distance is substantially diminished, particularly in urban environments, where other sources of emissions will affect the monitor.

Tables 2a and 2b show the three highest monitored concentrations for NO_2, $PM_{2.5}$, and SO_2 over the 5-day period.[4] The only pollutant within 50 percent of the air quality standard was $PM_{2.5}$, although the $PM_{2.5}$ standard is an average over 24 hours, whereas those for NO_2 and SO_2 are 1-hour standards. No exceedances of any air quality standard occurred at these stations, nor at any air quality monitoring stations in the region of study. The highest concentration, to any air quality standard, was for the 24-hour $PM_{2.5}$ standard at 56 percent.

The highest elevated $PM_{2.5}$ concentrations all occurred during the late evening hours (8 p.m.–11 p.m.) on February 19, 2021. Many sources contribute to $PM_{2.5}$ pollution, including buses, trucks, cars, and off-road sources (e.g., construction equipment, portable generators). In addition, meteorology and atmospheric chemistry play a significant role in determining the air concentration. However, it is not possible from this analysis to estimate the source contribution from the power units without additional air quality modeling analysis.

Table 2a. Top 3 Highest Air Concentrations Monitored Within 10 km of the Power Generation Units

Power Unit	NO_2 (ppb)			$PM_{2.5}$ (µg/m^3)			SO_2 (ppb)		
Unit Code	**First**	**Second**	**Third**	**First**	**Second**	**Third**	**First**	**Second**	**Third**
DDPEC_CC1	37	33	29	17	12	11	1	1	1
FREC_CC2							0	0	0
TXCTY_CC1							3	2	2
CHAMON_CTG_0101	31	30	29						
THW_THWGT32	37	37	36						
GBY_GBYGT74	40	36	35	20	14	14			
PHR_CLCWA_5UNITS	27	18	17						
LH_LYN_30UNITS	31	30	29						
SOE_SEWP_10UNITS	37	33	29	17	12	11	1	1	1
FEGC_UNIT1							0	0	0

Note: For NO_2 and SO_2 these are 1-hour averages; $PM_{2.5}$ is a daily average.

Table 2b. Top 3 Highest Air Concentrations (as Percentage of Air Quality Standard[a]) Monitored Within 10 km of the Power Generation Units

Power Unit	NO_2			$PM_{2.5}$			SO_2		
Unit Code	**First**	**Second**	**Third**	**First**	**Second**	**Third**	**First**	**Second**	**Third**
	37%	33%	29%	48%	34%	30%	1%	1%	1%
FREC_CC2							0%	0%	0%
TXCTY_CC1							3%	3%	3%
CHAMON_CTG_0101	31%	30%	29%						
THW_THWGT32	37%	37%	36%						
GBY_GBYGT74	40%	36%	35%	56%	40%	39%			
PHR_CLCWA_5UNITS	27%	18%	17%						

[4] CO is not shown because the values were <1 percent of the NAAQS.

Power Unit	NO_2			$PM_{2.5}$			SO_2		
Unit Code	**First**	**Second**	**Third**	**First**	**Second**	**Third**	**First**	**Second**	**Third**
LH_LYN_30UNITS	31%	30%	29%						
SOE_SEWP_10UNITS	37%	33%	29%	48%	34%	30%	1%	1%	1%
FEGC_UNIT1							0%	0%	0%

[a] The 1-hour NO_2 standard is 100 ppb, 1-hour SO_2 standard is 75 ppb, and 24-hour $PM_{2.5}$ standard is 35 µg/m3.

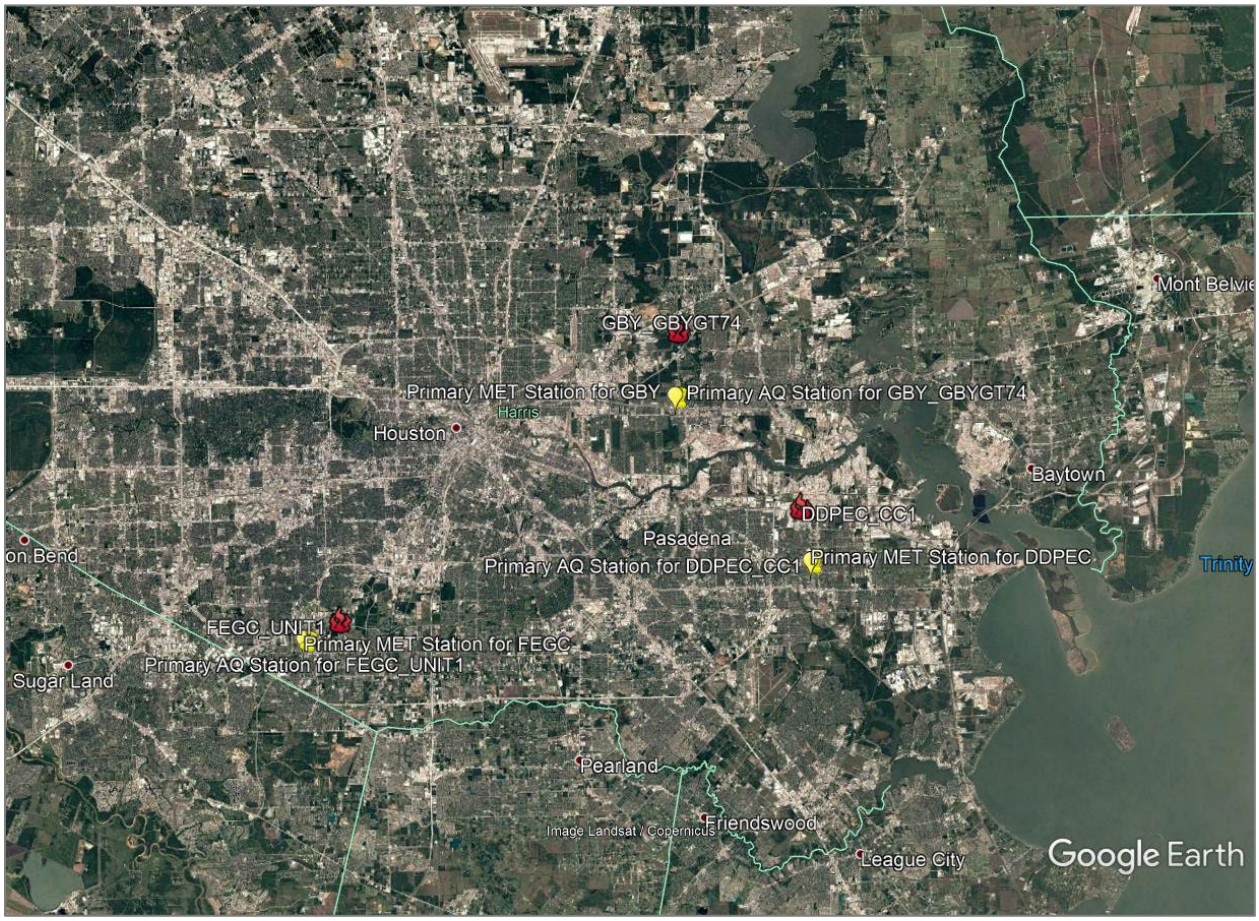
1.1.2 Downwind Air Quality Monitoring Sites

Besides being in close proximity to the power unit, an air quality monitoring station must also be oriented in the downwind direction of the power unit. Table 3 shows the percentage of time that the air quality monitoring station was downwind of the power unit. As shown, only one air quality monitoring site was downwind more than 50 percent of the hours. All other pairs of air quality monitoring stations and power units only had the correct alignment window 25 percent or less of the time. The air quality monitoring unit paired with the Deer Park Energy Center (DDPEC_CC1) power unit was downwind more than half the hours. This was the best pairing of any power unit and air quality station and shows good supporting evidence that the power units' excess emissions were unlikely to have caused an exceedance of the NAAQS (except on February 16, 2021, when the monitoring stations only had valid measurements for 20 percent of the hours that day). All other meteorological/air quality station pairs had too few hours to draw a conclusion. Figure 1 shows the locations of three of the power units relative to the air monitoring stations in Harris County.

Table 3. Power Unit Pairings With Nearby Meteorological Stations and Percentage of Time Downwind

Power Unit Code	Distance to MET Station (km)	AQ Station Direction – Lower Bound	AQ Station Direction – Upper Bound	% of MET Station Data Within +/-20 Degree Range of AQ Station Location
DDPEC	4.9	320°	360°	58%
FREC	10.3	320°	360°	25%
TXCTY	1.4	220°	260°	3%
CHAMON	8.6	0°	40°	6%
THW	17.5	220°	260°	<1%
GBY	5.6	345°	25°	25%
PHR	11.1	135°	175°	<1%
LH	1.2	100°	140°	10%
SOE	5.0	185°	225°	1%
FEGC	3.5	25°	65°	3%

Figure 1. Location of Three Power Units Operating in Harris County and the Paired Air Monitoring Station



1.1.3 Meteorological Conditions Conducive to High Concentrations

Wind Speed

As discussed, lower wind speeds result in poorer dispersive conditions that lead to higher air concentration levels. Average wind speeds for February, based on the 23-year average (1998–2020) from the Houston Aldine site (EPA Airs ID# 48-201-0024), is 6.2 mph. During the 5-day emergency-use period, the winds were slightly higher (14 percent) than the average wind speed of 7.0 mph. Thus, the slightly higher wind speeds are favorable to having lower air concentrations.

Temperature

As discussed, lower temperatures will lead to increased buoyancy, resulting in lower air concentrations. The climatological average air temperature for February at the Houston International Airport is 57.7°F. During the 5-day event, the average air temperature was 28.4°F, almost 30°F below average. These substantially colder temperatures are favorable to having lower ground-level air concentrations, assuming the plume rise from the power units is sufficiently high that these concentrations are not trapped in a shallow stable layer (i.e., temperature inversion) near the surface.

Mixing Heights

We determined mixing height by using the same method as the historical data from Lake Charles (the closest upper air station to Harris County). The February morning mean mixing height during the 5-day emergency event was 530 m, and the afternoon mixing height was 607 m. This compares with a climatological morning mixing height of 319 m in February and a climatological afternoon mixing height of 822 m. The higher mixing height observed during the event reduced the tendency for the trapping of air pollutants in a shallow layer near the Earth's surface, so air concentrations should be lower due to higher mixing height. The lower mixing heights observed during the event in the afternoon relative to the climatological average is the reverse of the morning, but the mean depth of the mixed layer is still higher than the morning period, so in general, concentrations are lower in the afternoon than the morning if emissions are the same.

1.1.4 Emission Rates: ERCOT versus CEMS

To better understand the emissions data, we graphically displayed the ratio of the ERCOT emission rates for NO_X to the CEMS NO_X emission rates for every hour using three representative emission profiles observed during our review of the ERCOT dataset. We report results for three representative types of findings. These are:

1. Peaking Plant, where the ERCOT is thought to be a large fraction of the CEMS data
2. Large amount of volatility in the ERCOT dataset
3. Does not make sense (ERCOT emission rate >> CEMS emission rate)

In no case should the ERCOT to CEMS ratio be greater than 1.

The three representative stations are:

1. Port Comfort Peaking Unit 2
2. Chamon Power Unit 1
3. Bosque CCP-GT-1

Figure 2 shows the ratio of the ERCOT NO_X emission rate to the CEMS NO_X emission rate for Port Comfort Peaking unit, with most hours reporting a ratio between 60 to 80 percent of the CEMS emission rate and with the unit off during most of February 18, 2021. A few anomalous hours occur where the ERCOT-to-CEMS ratio exceeds 1. Overall, this pattern appears to be a reasonable behavior.

Figure 2. Port Comfort Peaking Unit Hourly ERCOT/CEMS Emission Ratio During Emergency Period

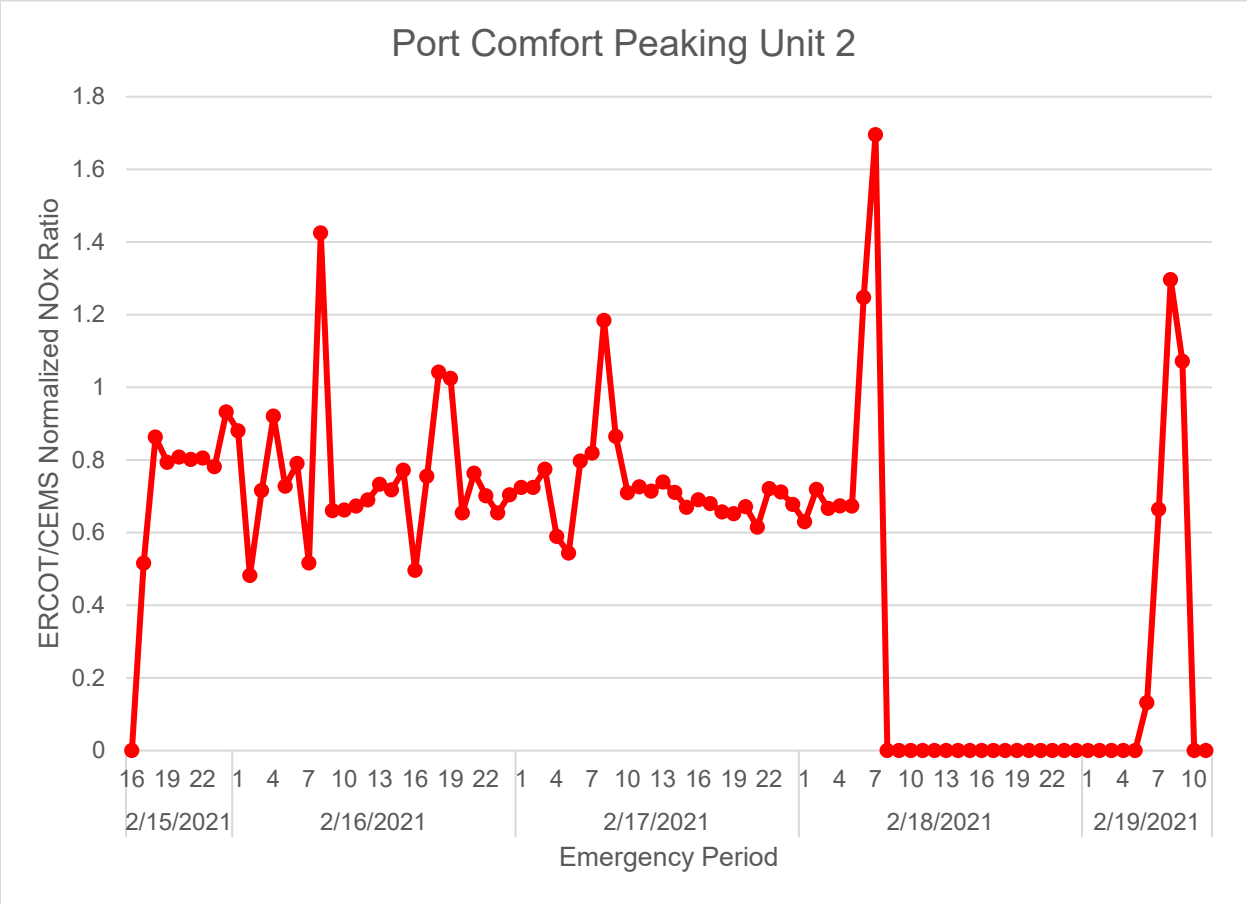


Figure 3 shows the ratio of the ERCOT NO_X emission rate to the CEMS NO_X emission rate for the Port Chamon unit, with most hours having a value of less than 100 percent. There are a few hours with a ratio excursion that well exceeds a ratio of 1. Overall, this pattern can likely be explained if further information can be obtained from the plant about the few hourly ratio excursions that were much greater than 1.

Figure 3. Chamon Unit 1 Hourly ERCOT/CEMS Emission Ratio During Emergency Period

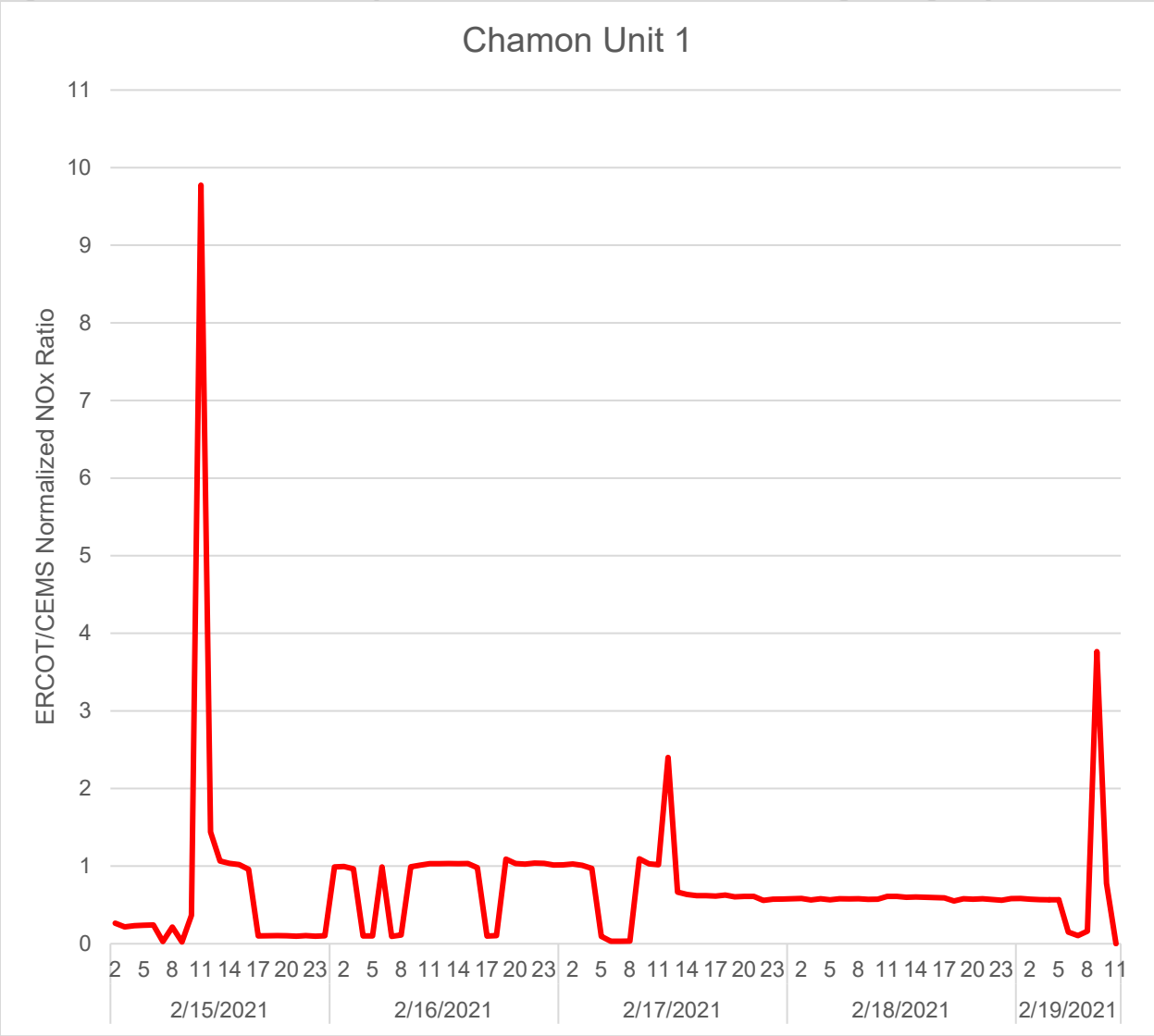
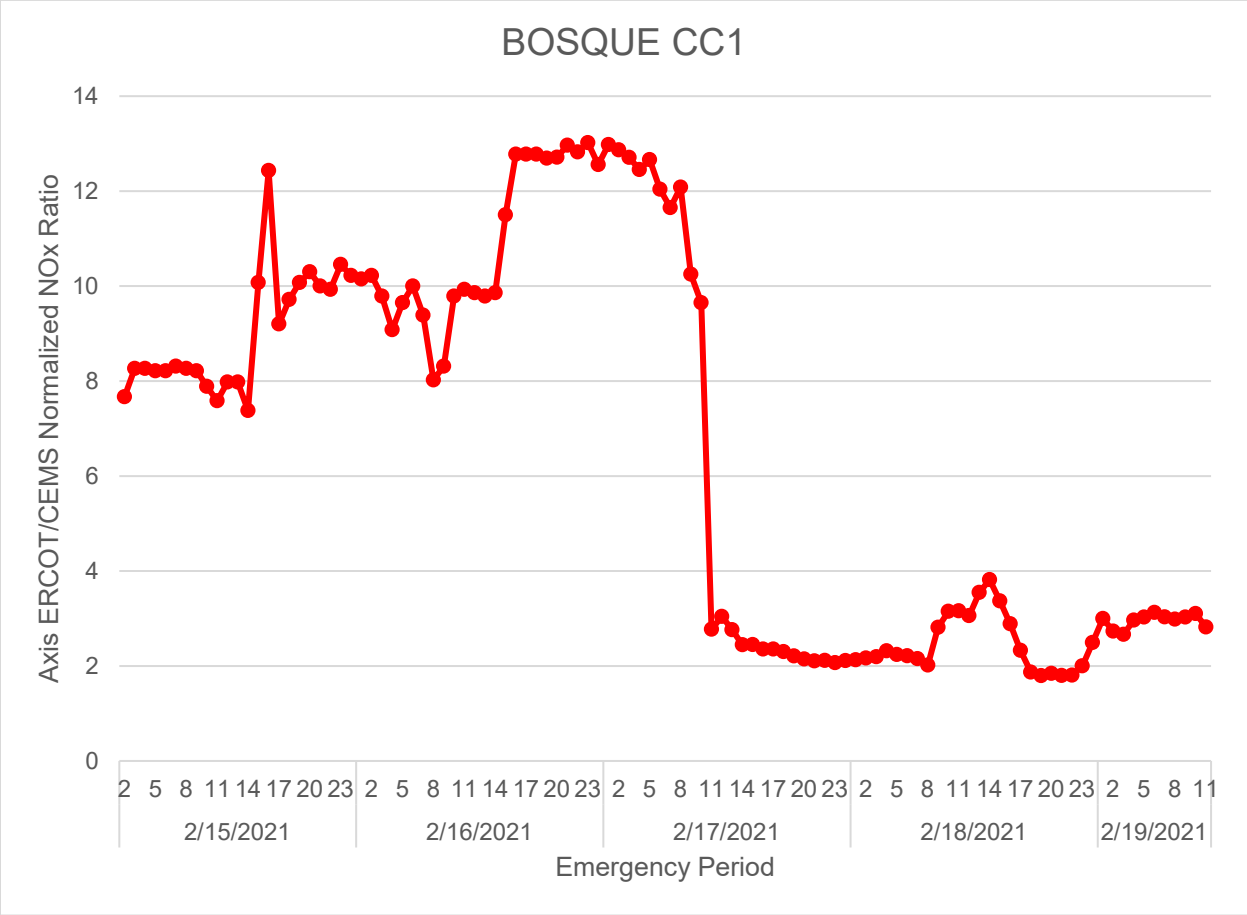


Figure 4 shows the ratio of the ERCOT NO_X emission rate to the CEMS NO_X emission rate for the BOSQUE unit, with all hours having a ratio in excess of 1, or less than 100 percent, but a few hours having a ratio excursion that well exceeds a ratio of 1. In fact, no ratio is less than 2, with a maximum of 13. Overall, these high values in comparison to the CEMS data are irregular. We suspect that incorrect values may have been reported by BOSQUE, as well as other units that exhibited similar behavior. However, further discussion with the plant is needed to clarify this finding.

Figure 4. BOSQUE Unit 1 Hourly ERCOT/CEMS Emission Ratio During Emergency Period



1.2 Conclusions – Air Quality Analysis

We reviewed ambient air quality monitoring data, meteorological data, and emission information for the power units that operated in exceedance of their permitted levels during the emergency use of power generation authorization under Section 202(c). We paired air quality monitoring stations with power units that were near each other. We found parings for 10 of the 14 unique power generation units, most often for NO_2. We found no exceedances of the NAAQS standards; however, many of the air quality stations were missing air quality measurements on February 16 and 17, 2021. The highest concentration, to any air quality standard, was for the 24-hour $PM_{2.5}$ standard at 56 percent of the exceedance threshold value. Further review of the air quality monitoring station and power unit data showed just one air quality monitoring station downwind of the power unit for the majority of hours during the emergency use period. A review and discussion of the meteorological conditions (e.g., wind speeds, temperature, mixing heights)

during the emergency period showed that the meteorology was conducive to better mixing and dispersion than average conditions in February. Reported incremental emissions did not compare favorably with the CEMS data available for NO_X.

Although no exceedances for the NAAQS occurred during the emergency use period, the large percentage of missing data, particularly on February 16 and 17, 2021, make it difficult to conclusively conclude that no violation of the NAAQS may have occurred. Furthermore, the limited number of downwind air quality monitors in close proximity to the power units makes it difficult to definitively conclude there were no air quality exceedances. However, based on the weight-of-evidence approach presented herein, it appears unlikely that the power units may have caused an exceedance of the NAAQS.

2 Environmental Justice Implications for the Affected Population

This section highlights the potential environmental justice (EJ) implications of the affected population in the region of interest. Our evaluation was based on data from U.S. Environmental Protection Agency's (EPA) EJSCREEN tool, available at ejscreen.epa.gov/mapper. EJSCREEN is a tool EPA has developed over the years to allow users to evaluate potential EJ impacts in different parts of the country using a GIS-based mapping platform. The tool allows users to combine demographic and environmental information on a user-selected area. The data used for these purposes in EJSCREEN are based on publicly available data sources, such as the American Community Survey from the Census Bureau for demographic data and various EPA data sources for environmental indicators. We used this screening tool for this analysis because it provides a method consistent with EPA's approach for defining EJ vulnerabilities for affected populations.

2.1 Analyzing Demographic Characteristics of Nearby Population

In order to identify the vulnerable population around these 14 unique power plants and 27 units that are likely to be impacted by any potential exceedances during the 5-day period, we extracted the demographic and environmental characteristics of those living with a pre-specified 5- and 10-km radius around each power plant. Note that we conducted this analysis at the plant level (as opposed to the unit level) because the unique location coordinates were available only at the plant level.

Figure 5 below overlays the 5-km circles around the individual power plants. Most of the plants are located around the Houston area, with a few farther away. Populations living around plants in the Houston area are likely to be more susceptible to potential EJ concerns. There is an overlap between the Lynchburg (LH) and Deer Park Energy Center (DDPEC) plant radii, as well as between the DDPEC and Southeast WPP (SOE) plant radii. Individuals in the intersections may experience EJ effects from both plants, and therefore may be more affected.

Figure 5. 5-km Radius Around Plants

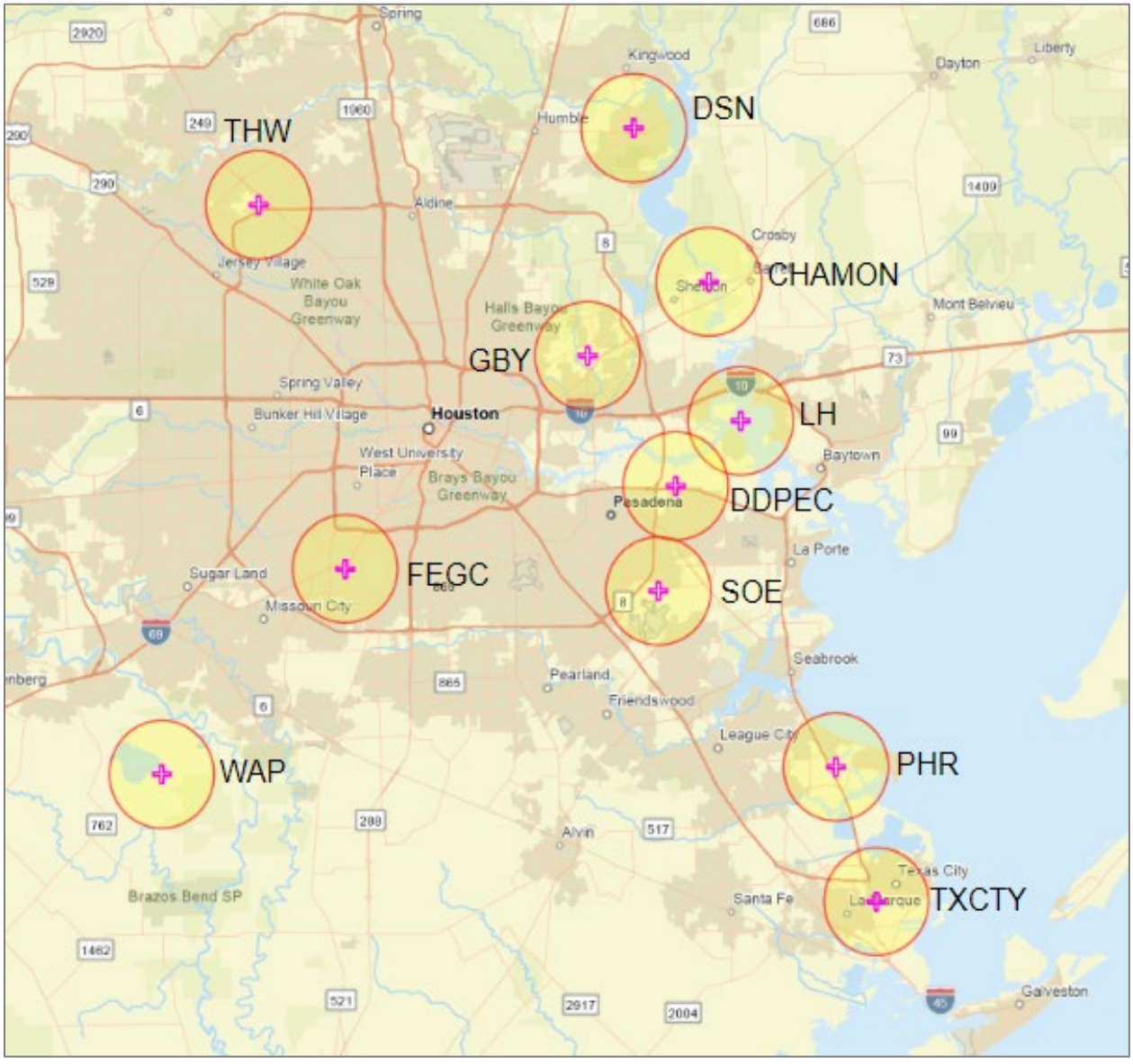
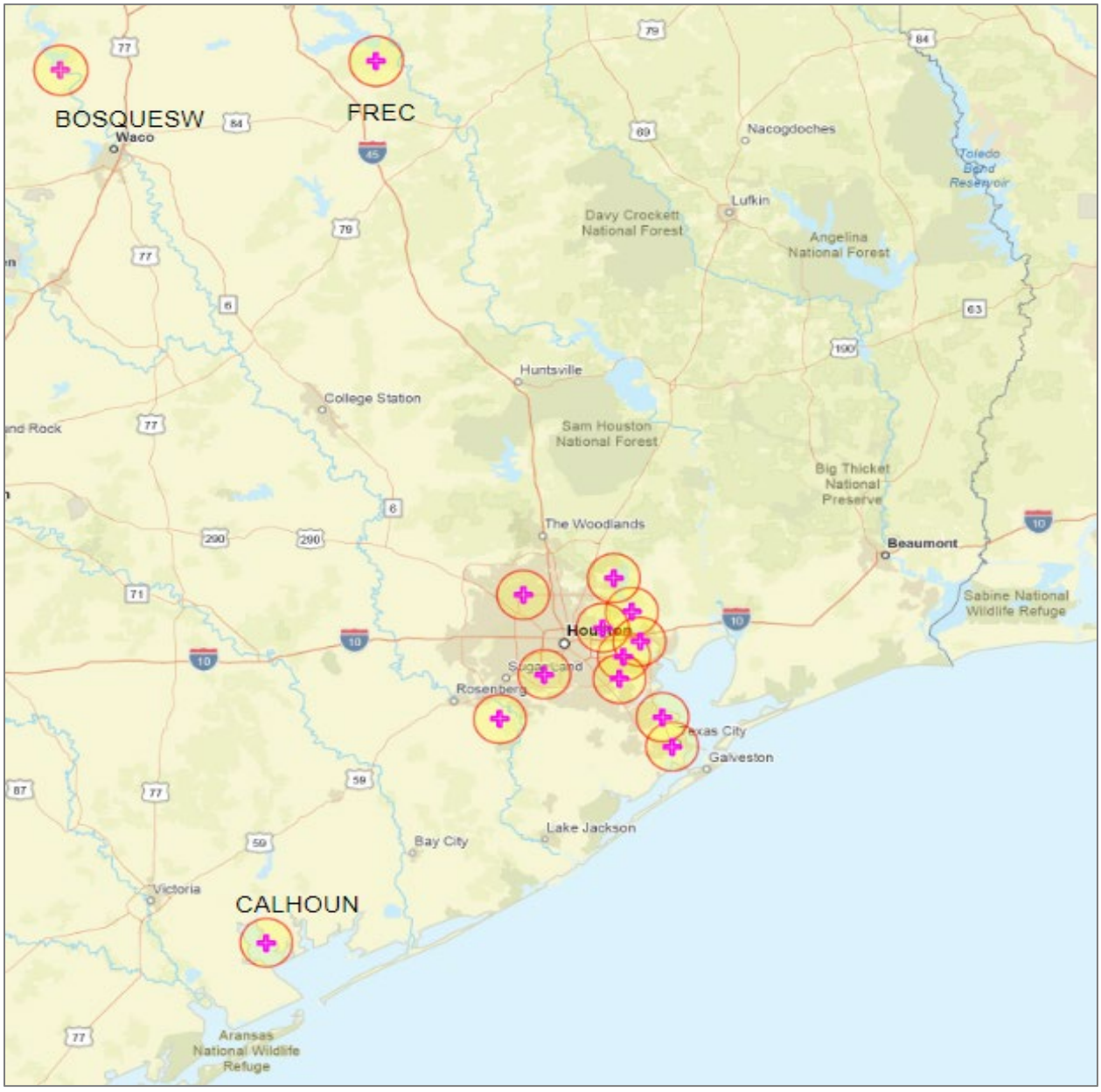


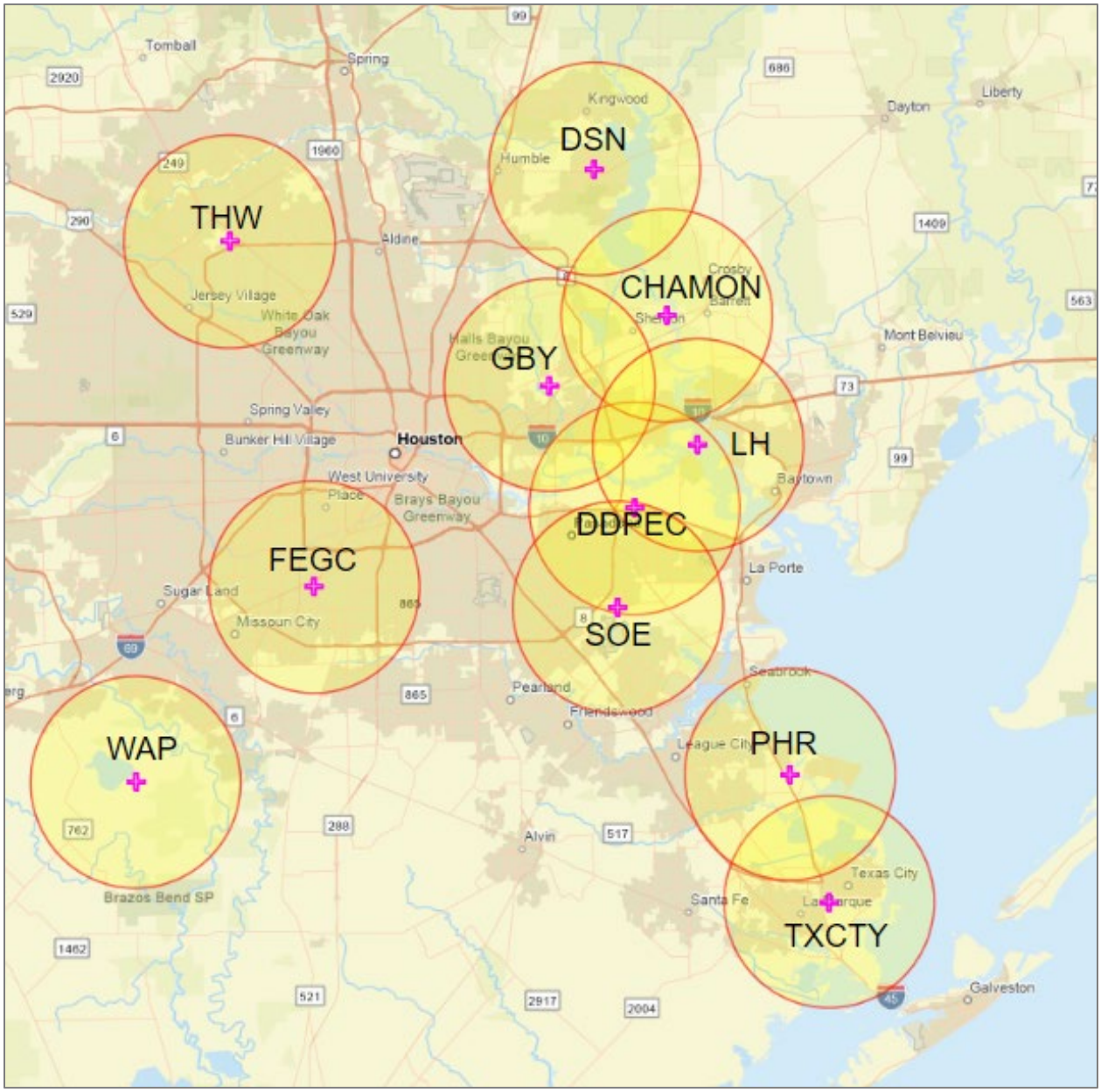
Figure 6 below overlays 10-km circles around the individual power plants. Using a 10-km radius around these plants captures a greater share of the potentially affected population and is consistent with the air quality analysis discussed above. It also creates more overlapping areas, which increases the EJ concerns for the people living in those areas. This is discussed in more detail below.

Figure 6. 10-km Radius Around Plants



Given the relative proximity of some of these plants, particularly those in the Houston area, several of the 10-km circles tended to have some overlapping areas among them, which suggests that some members of the population are likely to be affected by activities from multiple plants and are therefore exposed to higher EJ risks than others. In order to analyze those risks, Figure 7 below focuses on the plants around Houston to identify intersecting circles.

Figure 7. Intersecting Areas With 10-Km Radius Around the Plants



Using these custom boundaries, ICF extracted demographic and enviromental data from EJSCREEN to identify potential EJ vulnerabilities for the population living around these plants. Table 4 indicates the age ranges of populations in both the 5- and 10-km radii from the power plant indicated. As the table shows, there is a wide variablity of the exposure in the 5- and 10-km ranges around these plants. The total population exposed to any potential EJ concerns within a

5-km radius of these plants can range from about 50 people to over 100,000 people, with FREC being the lowest and FEGC being the highest. Similar patterns hold for the 10-km radii, except the range is from about 900 to over 500,000 people.

Table 4. Distribution of the Affected Population by Age

	5-Km Radius					10-Km Radius				
Power Plant	**Total Population**	**0 to 4**	**5 to 17**	**18 to 64**	**65+**	**Total Population**	**0 to 4**	**5 to 17**	**18 to 64**	**65+**
BOSQUE	**1,989**	5%	12%	55%	29%	**4,176**	4%	13%	55%	28%
CALHOUN	**751**	10%	17%	65%	8%	**11,735**	7%	17%	59%	17%
CHAMON	**10,469**	6%	20%	60%	15%	**90,052**	9%	21%	62%	8%
DDPEC	**53,680**	7%	21%	61%	10%	**276,938**	8%	22%	61%	9%
DSN	**67,599**	8%	22%	61%	9%	**201,458**	7%	21%	61%	11%
FEGC	**112,417**	7%	18%	63%	12%	**568,858**	8%	18%	64%	10%
FREC	**56**	4%	20%	61%	16%	**868**	5%	16%	65%	14%
GBY	**79,700**	9%	21%	62%	8%	**258,116**	8%	22%	61%	9%
LH	**12,839**	9%	21%	57%	14%	**128,113**	8%	22%	61%	10%
PHR	**18,722**	9%	19%	62%	10%	**93,580**	8%	19%	61%	12%
SOE	**56,345**	6%	18%	63%	13%	**394,451**	8%	20%	62%	10%
THW	**107,393**	7%	20%	63%	10%	**461,570**	7%	20%	63%	10%
TXCTY	**43,452**	8%	19%	59%	15%	**71,729**	7%	18%	60%	16%
WAP	**745**	8%	20%	61%	11%	**54,391**	7%	23%	61%	10%

The majority of the people living in these areas seem to fall into what is likely the least vulnerable from an age perspective for EJ concerns. As the table above shows, more than 50 percent of the population falls within the 18–64 age group. However, some of these plants do have a relatively large share of the population that can be considered to be more susceptible to EJ problems. For example, BOSQUE has the highest percentage of people age 65+ in a 5- and 10-km radius, but is among the lowest in total population. Also, four of these plants have roughly 30 percent of the population below the age of 18, with about 20 percent or so in the 5–17 age group and the remaining 10 percent or so in the 0–4 age group.

Table 5 shows the distribution of the population by household incomes in both the 5- and 10-km radii. Note that the income data presented below are for households and not in per capita terms, which is different from how the data are shown in the other demographic tables.

Many of these plants have a relatively large share (20–30 percent) of the households that have incomes less than $25,000 or close to the federal poverty line. Among them, GBY and TXCTY have the highest percentage (13 percent for the 10-km radius) of people with incomes below $15,000 for a household, which is likely to exacerbate potential EJ concerns for this region. Correspondingly, GBY and TXCTY have the lowest percentage of people with a household income above $50,000, falling between 40 and 50 percent for both radii. This indicates that the majority of people in these radii have household incomes below $50,000, and both of these power plants are among those with a larger surrounding population.

Table 5. Distribution of the Affected Households by Income

	5-Km Radius					10-Km Radius				
Power Plant	**Total Households**	**< $15,000**	**$15,000–$25,000**	**$25,000–$50,000**	**$50,000 +**	**Total Households**	**< $15,000**	**$15,000–$25,000**	**$25,000–$50,000**	**$50,000 +**
BOSQUE	**809**	10%	14%	23%	52%	**1,812**	11%	15%	22%	52%
CALHOUN	**285**	7%	7%	20%	65%	**4,137**	11%	8%	27%	53%
CHAMON	**3,418**	7%	8%	23%	62%	**28,248**	7%	7%	20%	66%
DDPEC	**16,779**	7%	9%	21%	63%	**85,473**	9%	10%	24%	56%
DSN	**22,212**	4%	4%	13%	78%	**67,417**	6%	5%	15%	74%
FEGC	**39,063**	11%	8%	21%	59%	**207,938**	12%	11%	22%	55%
FREC	**30**	10%	17%	17%	57%	**533**	10%	20%	19%	51%
GBY	**24,514**	11%	11%	30%	48%	**77,689**	13%	13%	30%	45%
LH	**4,234**	12%	10%	23%	55%	**39,892**	10%	9%	23%	59%
PHR	**6,527**	11%	12%	21%	56%	**34,256**	9%	8%	18%	64%
SOE	**19,748**	7%	7%	19%	68%	**130,051**	9%	8%	23%	60%
THW	**34,429**	7%	9%	25%	59%	**155,731**	8%	8%	24%	60%
TXCTY	**15,489**	15%	13%	30%	41%	**26,149**	13%	12%	27%	48%
WAP	**307**	2%	1%	9%	88%	**16,375**	3%	2%	8%	86%

The table below shows the breakdown of the population in these regions by race, in both the 5-km and 10-km radii. Race information is broken down to show populations that self-identify as Black, Hispanic, Other non-White (i.e., American Indian, non-Hispanic Asian, Pacific Islander, or another race), and White.

Not surprisingly, some of the regions with the lowest income distribution also have the largest minority populations. For example, the area around GBY, which had one of the largest shares of the low-income population, also has around 90 percent Black and Hispanic populations. TXCTY, which also had a high proportion of the low-income population around it, is about two-thirds Black and Hispanic. Among the others, the population around FEGC, THW, and LH is also high in non-White or minority populations.

Table 6. Distribution of Population by Race

	5-Km Radius					10-Km Radius				
Power Plant	**Total Population**	**Black**	**Hispanic**	**Other Non-white**	**White**	**Total Population**	**Black**	**Hispanic**	**Other Non-white**	**White**
BOSQUE	**1,989**	1%	7%	1%	91%	**4,176**	1%	7%	1%	90%
CALHOUN	**751**	5%	29%	9%	57%	**11,735**	4%	55%	7%	34%
CHAMON	**10,469**	21%	39%	3%	38%	**90,052**	18%	46%	4%	32%
DDPEC	**53,680**	2%	55%	2%	41%	**276,938**	4%	65%	2%	29%
DSN	**67,599**	17%	27%	6%	51%	**201,458**	15%	25%	5%	54%
FEGC	**112,417**	32%	39%	7%	22%	**568,858**	31%	35%	11%	23%
FREC	**56**	13%	7%	4%	77%	**868**	24%	7%	4%	65%
GBY	**79,700**	30%	59%	2%	9%	**258,116**	29%	61%	2%	9%
LH	**12,839**	7%	51%	3%	40%	**128,113**	14%	53%	4%	29%
PHR	**18,722**	4%	33%	7%	55%	**93,580**	9%	27%	5%	59%
SOE	**56,345**	3%	42%	10%	45%	**394,451**	6%	55%	7%	32%
THW	**107,393**	20%	40%	16%	24%	**461,570**	21%	39%	12%	29%
TXCTY	**43,452**	29%	32%	5%	34%	**71,729**	27%	29%	4%	40%
WAP	**745**	19%	22%	11%	48%	**54,391**	11%	13%	34%	41%

2.2 Combining Demographic Information With Environmental Indicators

In order to understand the EJ vulnerabilities of the population living around these power plants, we analyzed various pollutant indicators from EJSCREEN and used their estimated percentile rankings to compare the potential vulnerabilities across the various plants. The estimated percentile rankings, developed by EPA, combine the environmental indicator with the appropriate demographic data to account for the vulnerable groups in the calculation of the EJ indicator. In this context, EPA defines the vulnerable groups as the average of the count of minorities and low-income households. In terms of the individual percentile rankings, a low number signifies that this group is relatively better off than the rest of the state population, whereas a high ranking signifies a relatively worse off situation than the rest of the state. As an example, if a certain ranking is 80, it means that this place is at the 80th percentile, which implies that only 20 percent of the state population experiences pollution that is higher than those experienced by people in this region. Thus, as a general principal, percentile rankings that are on the high side generally imply the region in question is comparatively worse off than other places in the state.

Table 7 shows the relative rankings of the various populations around these plants that are exposed to the various environmental indicators of interest (see Table 7 notes for definitions of these pollutant indicators). We present the percentile rankings for both the 5- and 10-km radii around each power plant. Table 7 also presents a calculated average percentile ranking in order for us to easily compare across the various plants. Average percentile rankings greater than 50 percent are highlighted in light blue and indicated with an asterisk (*). Note that these averages are simple arithmetic means, which essentially puts equal weights on each environmental indicator, irrespective of their implications on human health. Thus, one could argue that these averages are not reflective of the individual pollutants' effect on the vulnerable populations. We included them here for easy comparison across the groups without any value judgement on the individual pollutants.

Table 7. Percentile Ranking of Various Environmental Indicators

	5-Km Radius					
Power Plant	**Particulate Matter ($PM_{2.5}$ in ug/m3)**	**NATA Diesel PM (ug/m3)**	**NATA Air Toxics Cancer Risk (risk per MM)**	**NATA Respiratory Hazard Index**	**Hazardous Waste Proximity (facility count/km distance)**	**Average Percentile Ranking**
BOSQUE	26	30	28	28	35	**29.4**
CALHOUN	40	38	40	40	50	**41.6**
CHAMON	57	59	69	62	60	**61.4***
DDPEC	52	62	64	54	85	**63.4***
DSN	16	16	12	15	25	**16.8**
FEGC	80	87	83	81	93	**84.8***
FREC	31	33	31	31	32	**31.6**
GBY	91	92	95	95	96	**93.8***
LH	62	67	84	68	95	**75.2***
PHR	41	40	40	40	49	**42**
SOE	44	51	50	46	66	**51.4***
THW	83	90	83	85	93	**86.8***
TXCTY	62	61	61	61	92	**67.4***
WAP	11	13	12	12	20	**13.6**
	10-Km Radius					
Power Plant	**Particulate Matter ($PM_{2.5}$ in ug/m3)**	**NATA Diesel PM (ug/m3)**	**NATA Air Toxics Cancer Risk (risk per MM)**	**NATA Respiratory Hazard Index**	**Hazardous Waste Proximity (facility count/km distance)**	**Average Percentile Ranking**
BOSQUE	22	27	23	23	33	**25.6**
CALHOUN	51	48	48	47	46	**48**
CHAMON	81	80	94	87	94	**87.2***
DDPEC	70	77	85	79	95	**81.2***
DSN	30	32	28	30	50	**34**
FEGC	77	86	80	78	87	**81.6***
FREC	48	44	48	48	42	**46**
GBY	89	91	95	94	97	**93.2***
LH	78	80	92	87	96	**86.6***
PHR	31	26	26	30	58	**34.2**
SOE	66	75	77	69	86	**74.6***
THW	78	86	79	80	87	**82***
TXCTY	56	56	56	56	87	**62.2***
WAP	50	54	49	49	48	**50**

Particulate Matter ($PM_{2.5}$ in ug/m3) – $PM_{2.5}$ levels in the air, measured in µg/m3 annual average.

NATA Diesel PM (ug/m3) – Diesel particulate matter level in the air, measured in µg/m3.

NATA Air Toxics Cancer Risk (risk per MM) – Lifetime cancer risk from inhalation of air toxics.

NATA Respiratory Hazard Index – Air toxics respiratory hazard index (the ratio of exposure concentration to health-based reference concentration).

Hazardous Waste Proximity (facility count/km distance) – The count of hazardous waste facilities (TSDFs and LQGs) within 5 km (or nearest beyond 5 km), each divided by the distance in kilometers.

In order to identify which of these regions may have a vulnerable population exposed to disproportionately higher environmental justice concerns than the rest of the state, we chose an arbitrary 50-percent threshold and highlighted in the tables above those regions that are above that threshold. The results imply that the vulnerable populations living in these regions are experiencing higher levels of EJ concerns than a majority of the rest of Texas. Unsurprisingly, among these regions around power plants that are of higher EJ concerns, the ones that we identified above as having the most vulnerable populations are the ones with the highest average ranking. This includes populations around power plants GBY, FEGC, and THW as the most at-risk, with an average percentile ranking of over 80. Following those are SOE, LH, and TXCTY, with rankings between 60 and 70. Some power plants seem to jump considerably, moving from the 5-km to the 10-km radii. These include CHAMON and DDPEC, where the rankings jump from the 60s to 80s when we move from the 5-km to 10-km radius. Thus, when we analyze the vulnerable population within a 10-km radius of these plants, the majority of these power plants (i.e., 8 out of 14) have a baseline EJ vulnerability, higher than the rest of the state, affecting the population living near these power plants.

2.3 Population in Close Proximity to Multiple Plants

As discussed previously (see Figure 7), several of these power plants, particularly those around the Houston area, have significant overlapping regions when we analyze the populations within a 10-km radius around these plants. Populations living in these “intersecting circles” are likely to face even higher EJ concerns, given that they may have been exposed to higher emissions from multiple power plants. Here we present data for these population groups in these intersecting circles and their potential for higher EJ concerns.

Table 8 below shows the age distribution of the population living in these intersecting regions with two or more 10-km radii. The intersecting radii are of different sizes, which is part of the reason for the differences in population between areas. Overall, the percentage of people in each intersecting region that are between ages 0 and 4 are comparable to those 65+, with the latter only a slightly higher percentage in most areas. In total, approximately 12 percent, or about 325,000 of the 2.6 million total population living within a 10-km radius of all power plants, live in these intersecting regions and are thus likely to face higher levels of baseline EJ concerns than those that live outside of these intersecting regions. Most of this population group lives in an area that has two plants within 10 km, but about 20 percent of them live in areas that are close to three or more power plants.

Table 8. Distribution of the Affected Population in the Intersecting Regions by Age

	10-Km Radius Intersections				
Power Plants	**Total Population**	**0 to 4**	**5 to 17**	**18 to 64**	**65+**
CHAMON & DSN	**14,817**	10%	19%	65%	5%
GBY & CHAMON	**21,330**	10%	21%	63%	6%
GBY & DDPEC	**22,002**	9%	23%	60%	8%
LH & CHAMON	**11,605**	7%	20%	61%	12%
LH & DDPEC	**6,337**	10%	20%	60%	10%
LH & GBY	**1,073**	3%	22%	66%	10%
PHR & TXCTY	**8,678**	7%	17%	61%	16%
SOE & DDPEC	**175,158**	8%	21%	61%	10%
DDPEC & LH & GBY	**28,277**	8%	25%	59%	8%
GBY & LH & CHAMON	**10,371**	8%	25%	62%	6%
LH & DDPEC & CHAMON	**3,495**	9%	24%	56%	10%
LH & DDPEC & SOE	**15,072**	5%	19%	65%	11%
DDPEC & LH & GBY & CHAMON	**7,275**	7%	25%	62%	5%

Table 9 shows the household income of populations living in intersections of two or more 10-km radii. Household incomes for the intersecting regions are comparable to the incomes of the 5- and 10-km radii. Two intersecting areas have a majority of households with incomes less than $50,000, which are the LH/DDPEC/CHAMON intersection and the GBY/DDPEC intersection. Alternatively, the highest percentage of households with incomes over $50,000 is 81 percent, in the intersection of CHAMON and DSN.

Table 9. Distribution of the Affected Population in the Intersecting Regions by Income

	10-Km Radius Intersections				
Power Plants	**Total Households**	**< $15,000**	**$15,000–$25,000**	**$25,000–$50,000**	**$50,000 +**
CHAMON & DSN	**4,652**	3%	4%	12%	81%
GBY & CHAMON	**6,424**	4%	5%	26%	65%
GBY & DDPEC	**6,320**	12%	15%	29%	44%
LH & CHAMON	**3,972**	9%	11%	24%	56%
LH & DDPEC	**1,989**	11%	12%	24%	54%
LH & GBY	**281**	2%	2%	20%	76%
PHR & TXCTY	**3,095**	13%	9%	25%	53%
SOE & DDPEC	**55,947**	10%	10%	24%	57%
DDPEC & LH & GBY	**7,730**	7%	12%	29%	52%
GBY & LH & CHAMON	**2,873**	6%	3%	20%	71%
LH & DDPEC & CHAMON	**959**	13%	20%	21%	46%
LH & DDPEC & SOE	**4,917**	2%	5%	17%	75%
DDPEC & LH & GBY & CHAMON	**2,081**	8%	5%	20%	67%

Table 10 below shows the racial composition of the population living in intersections of two or more 10-km substation radii. Most of these intersecting regions have a predominantly minority population, with the Hispanic population comprising the bulk. The intersection with the highest total population is also among the highest in percentage of non-Whites, SOE/DDPEC. With a population over 100,000 greater than the next largest population, 69 percent of the population is either Black, Hispanic, or another non-White race. Other areas with a high percentage of non-White races are GBY/LH/CHAMON, DDPEC/LH/GBY/CHAMON, and LH/GBY.

Table 10. Distribution of the Affected Population in the Intersecting Regions by Race

	Race of Population				
	10-Km Radius Intersections				
Power Plants	**Total Population**	**Black**	**Hispanic**	**Other Non-White**	**White**
CHAMON & DSN	**14,817**	21%	28%	5%	46%
GBY & CHAMON	**21,330**	24%	54%	6%	16%
GBY & DDPEC	**22,002**	4%	82%	1%	13%
LH & CHAMON	**11,605**	7%	47%	1%	44%
LH & DDPEC	**6,337**	0%	56%	1%	43%
LH & GBY	**1,073**	37%	44%	7%	12%
PHR & TXCTY	**8,678**	19%	28%	4%	48%
SOE & DDPEC	**175,158**	2%	64%	3%	31%
DDPEC & LH & GBY	**28,277**	11%	72%	1%	16%
GBY & LH & CHAMON	**10,371**	22%	66%	3%	9%
LH & DDPEC & CHAMON	**3,495**	0%	67%	2%	31%
LH & DDPEC & SOE	**15,072**	0%	29%	6%	65%
DDPEC & LH & GBY & CHAMON	**7,275**	25%	65%	2%	9%

Table 11 below shows the EJ indexes in intersections of two or more 10-km substation radii. As discussed above, the environmental indicator listed in the Table 11 incorporates the value of the pollutant within the radius, as well as the percentage of minority people and low-income people in the radius. The table also presents the “average” percentile ranking as a way to ordinally rank these intersecting circles. Average percentile rankings greater than 50 percent are highlighted in light blue and indicated with an asterisk (*).

Table 11. Environmental Justice Index in State Percentiles for People Living in the Intersecting Points of Two or More Substations in a 10-km Radius

	10-Km Radius Intersections					
Power Plants	**Particulate Matter (PM 2.5 in ug/m3)**	**NATA Diesel PM (ug/m3)**	**NATA Air Toxics Cancer Risk (risk per MM)**	**NATA Respiratory Hazard Index**	**Hazardous Waste Proximity (facility count/km distance)**	**Average Percentile Ranking**
CHAMON & DSN	42	44	43	43	41	**42.6**
GBY & CHAMON	94	93	97	96	94	**94.8***
GBY & DDPEC	78	85	89	94	98	**88.8***
LH & CHAMON	54	60	71	59	75	**63.8***
LH & DDPEC	64	69	90	72	97	**78.4***
LH & GBY	68	73	81	79	94	**79***
PHR & TXCTY	65	62	65	63	87	**68.4***
SOE & DDPEC	64	74	78	68	92	**75.2***
DDPEC & LH & GBY	88	89	97	96	99	**93.8***
GBY & LH & CHAMON	96	95	99	98	99	**97.4***
LH & DDPEC & CHAMON	78	80	97	84	98	**87.4***
LH & DDPEC & SOE	13	10	2	10	0	**7**
DDPEC & LH & GBY & CHAMON	95	93	99	97	99	**96.6***

Using the same 50 percent threshold, the table shows which of these intersecting circles have a value higher than 50 percent, which implies that the population living in these intersecting regions have a higher level of exposure to EJ concerns than a majority of the rest of the population in Texas. Only two intersections have an average state percentile under 50 percent, which are LH/DDPEC/SOE and CHAMON/DSN. Thus, almost 85 percent of the population living in these intersecting regions have higher exposure to EJ concerns than the rest of the state. Given that these population groups, consisting mostly of minority populations, live near multiple power plants (and presumably other stationary sources), it is not surprising that these groups are more vulnerable when it comes to environmental justice considerations compared to the rest of the state.

2.4 Conclusion – Environmental Justice Analysis

Using data from EPA's EJSCREEN, it appears that people of color and those with limited socioeconomic means in and around the Houston area are more vulnerable to environmental justice considerations compared to the rest of Texas. Given the paucity of data discussed in the air quality analysis above, we could not determine whether the EJ concerns for these groups were exacerbated during those 5 days in February 2021, when DOE authorized the emergency use of power generation under Section 202(c) of the Federal Power Act. However, analyzing the *baseline, business-as-usual* EJ concerns for the population around these power plants does indicate that a majority of the population living here are minority with limited socioeconomic opportunities and that they are also vulnerable to higher levels of pollution under those baseline conditions.

3 References

U.S. Environmental Protection Agency. 1972. *Mixing Heights, Wind Speeds, and Potential for the Urban Air Pollution Throughout the Contiguous Unites States*. Prepared by George Holzworth. Research Triangle Park, NC: Office of Air Program, AP-101.

Appendix – Generators

Generator Name	Fuel Type	Resource Owner Name	County	Unit Code
East Water Plant	Distillate Fuel Oil	NRG Energy Services	Harris	CL_EWP_30UNITS
Lynchburg Pump Station	Distillate Fuel Oil	NRG Energy Services	Harris	LH_LYN_30UNITS
Northeast Water Plant	Distillate Fuel Oil	NRG Energy Services	Harris	DSN_NEWP_10UNITS
Southeast Water Plant	Distillate Fuel Oil	NRG Energy Services	Harris	SOE_SEWP_10UNITS
Clear Lake City WWTP	Distillate Fuel Oil	NRG Energy Services	Harris	PHR_CLCWA_5UNITS
Texas City Power Plant	Natural Gas	Calpine Corporation	Galveston	TXCTY_CC1
Freestone Energy Center Block 1	Natural Gas	Calpine Corporation	Freestone	FREC_CC2
W. A. Parish G4	Natural Gas	NRG Energy Services	Fort Bend	WAP_WAP_G4
T. H. Wharton GT54	Natural Gas	NRG Energy Services	Harris	THW_THWGT54
T. H. Wharton GT56	Natural Gas	NRG Energy Services	Harris	THW_THWGT56
Deer Park Energy Center	Natural Gas	Calpine Corporation	Harris	DDPEC_CC1
Texas City Power Plant	Natural Gas	Calpine Corporation	Galveston	TXCTY_CC1
Freestone Energy Center Block 2	Natural Gas	Calpine Corporation	Bosque	FREC_CC2
Bosque Energy Center Block 1	Natural Gas	Calpine Corporation	Bosque	BOSQUESW_CC1
Bosque Energy Center Block 2	Natural Gas	Calpine Corporation	Bosque	BOSQUESW_CC2
Chamon CT1	Natural Gas	Chamon Power LLC	Harris	CHAMON_CTG_0101
Chamon CT2	Natural Gas	Port Comfort Power LLC	Harris	CHAMON_CTG_0301
Port Comfort CT1	Natural Gas	Chamon Power LLC	Calhoun	CALHOUN_UNIT1
Port Comfort CT2	Natural Gas	Port Comfort Power LLC	Calhoun	CALHOUN_UNIT2
Friendswood Energy Genco	Natural Gas	Friendswood Energy Genco LLC	Harris	FEGC_UNIT1

Source: “ERCOT_DOE_202(c)_Exhibit_A_2-17-2021_2100,” ERCOT.

U.S. Department of Energy

National Environmental Policy Act (NEPA)

Implementing Procedures

July 13, 2026

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1.0 Introduction

All offices[1] of the Department of Energy (DOE) will use the procedures included herein to comply with the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4331, *et seq*.). These procedures are designed to inform agency decision makers during the decision making process. When DOE is considering a proposed action that is subject to NEPA, these procedures ensure that DOE decision makers are informed, in a timely manner, about the reasonably foreseeable environmental effects of the proposed actions and reasonable alternatives. These procedures recognize that NEPA is a purely procedural statute – it does not dictate DOE's decision – and that DOE has discretion to determine the issues to be considered consistent with the statute.

These procedures describe the process by which DOE determines what actions are subject to NEPA's procedural requirements and the level of required NEPA review; interpret certain key terms used in NEPA; ensure that relevant environmental information is identified and considered early in the process in order to inform decision-making; reduce unnecessary burdens and delays; and implement NEPA's mandates regarding lead and cooperating agency roles, page and time limits, and applicant preparation of environmental documents.

DOE consulted with the Council on Environmental Quality (CEQ) in the development of these procedures for the implementation of NEPA in accord with 42 U.S.C. § 4332(B). DOE will in future consult with CEQ when revising these procedures.

This document provides guidance on DOE's NEPA implementation. This document is not a regulation. Nothing contained in these procedures is intended or should be construed to limit DOE's other authorities or legal responsibilities. These procedures do not, nor are they intended to, confer legal rights, impose legally binding requirements, or impose legal obligations upon DOE, States, federally recognized Indian Tribes, or any member of the public. The sections of these procedures are separate and severable from one another. If any section or portion therein is stayed or determined to be invalid, or the applicability of any section to any person or entity is held invalid, it is DOE's intention that the validity of the remainder of these procedures will not be affected and will continue in effect, along with all applications thereof. DOE retains the discretion to adopt approaches on a case-by-case basis that differ from those described in these procedures where appropriate.

These procedures are consistent with the Supreme Court's decision in *Seven County Infrastructure Coalition et al. v. Eagle County, Colorado*.[2] These procedures represent DOE's understanding that DOE has broad discretion when conducting its reasonable decision making. At a high level, DOE understands that *Seven County* was about the

[1] As used in this document, "DOE offices" refers to all DOE Departmental Elements listed at https://www.directives.doe.gov/references/doe_departmental_elements.

[2] *Seven County Infrastructure Coalition v. Eagle Cnty., Colo.* ("*Seven County*"), 145 S. Ct. 1497 (2025).

separation of powers where agencies may weigh environmental consequences as they reasonably see fit under their governing statute. As made clear in *Seven County*, the central principle of judicial review in NEPA cases is substantial deference to agencies.[3] In addition, NEPA imposes no substantive constraints on any agency's ultimate decision to build, fund, or approve a proposed project. As the Court explained, brevity in a NEPA document should not be mistaken for a lack of detail. Put differently, length is not a prerequisite for a NEPA document to be "detailed" within the meaning of that term as used in the statute or to otherwise be in compliance with NEPA. As the Court additionally explained, Congress in 2023 incorporated deadlines and page limits into the statute which now "strictly prohibit[]" NEPA analysis "from going on endlessly."[4] The review of a NEPA document does not bind DOE's ultimate determination concerning a proposed project. Instead, NEPA documents ensure that agency decision makers are fully informed as to the environmental effects of the proposed action. Ordinarily, DOE NEPA analysis should not consider environmental effects of separate projects, especially those over which DOE does not exercise regulatory authority.

These DOE NEPA implementing procedures, and related guidance and resources, are available on DOE's website at energy.gov/nepa. Questions regarding these procedures and requests to revise these procedures, including to adopt categorical exclusions from another agency, should be addressed to the Office of the General Counsel.

[3] *Id.* at 1511-12.
[4] *Id.* at 1512 n.3.

2.0 Planning and Decision Making

As soon as practical after DOE has identified that it has a proposal, DOE should determine whether compliance with NEPA is required and, if it is, the required level of NEPA review. DOE should integrate the NEPA process with other planning and authorization processes at the earliest reasonable time to avoid delays later in the process, to head off potential conflicts, and to ensure that DOE considers environmental effects in its planning and decisions.

2.1 Determining whether NEPA applies

As an initial matter and serving as an overriding principle, NEPA does not require the agency to weigh environmental consequences in any particular way. The goal of NEPA is to inform an agency decision, not to paralyze it. *See Seven County*, *supra*.

(a) DOE will determine whether NEPA applies to a proposal in accordance with the procedures included in this section. DOE will make this determination on a case-by-case basis.

(b) In determining whether NEPA applies to a proposal, DOE will consider only the action or project at hand.

(c) DOE has determined that the following non-exhaustive list of activities are not subject to NEPA.

(1) NEPA does not apply to response actions taken under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 U.S.C. 9601 *et seq*.) because there is a functional equivalency between NEPA and CERCLA.

(2) NEPA does not apply to applications to authorize—
   (i) The import of natural gas; or
   (ii) The export of natural gas to countries with which the United States has a free trade agreement requiring national treatment for trade in natural gas.

   For both types of applications, section 3(c) of the Natural Gas Act (15 U.S.C. 717b) leaves DOE with no discretion whether to approve the application.

(3) NEPA does not apply to applications for a Presidential permit authorizing the construction, connection, operation, or maintenance of facilities for transmission of electric energy between the United States and a foreign country under Executive Order (E.O.) 10485 (18 FR 5397; September 3, 1953), as amended by E.O. 12038 (43 FR 4957; February 7, 1978). DOE's issuance of a Presidential permit is not agency action, but rather delegated Presidential action. Presidential actions are not subject to NEPA or review under the Administrative Procedure Act.

(4) NEPA does not apply to hydroelectric incentive payments made to qualified hydroelectric facilities under section 242 of the Energy Policy Act of 2005 (42 U.S.C 15881). DOE has no discretion in whether to provide payments to a qualified hydroelectric facility, and the payments do not satisfy the definition of major Federal action.

(5) NEPA does not apply to actions that are solely administrative and routine that are undertaken to support the normal conduct of DOE business. While such activities are Federal actions, they are not "major" and therefore not subject to NEPA. These actions were formerly identified as categorical exclusions in appendix A in DOE's regulations. They now represent actions that are excepted from NEPA based on the definition of "major Federal action" in Section 110(10). They have been retained as appendix A for ease of reference and to avoid confusion.

(6) NEPA does not apply to DOE's issuance of emergency Orders pursuant to section 202(c) of the Federal Power Act (16 U.S.C. 824a(c)) because preparing an environmental document under NEPA's generally applicable provisions would clearly and fundamentally conflict with the emergency provisions in the Federal Power Act. As stated at the beginning of this section, NEPA is to inform DOE's decision-making, which is inconsistent with the language and intent of section 202(c), adding further conflict with the statute.

(7) NEPA does not apply to funding DOE provides to local governments, states or Tribes under the Energy Efficiency and Conservation Block Grant Program (42 U.S.C. 17151-58), to funding DOE provides to states under the State Energy Conservation Plan Program (now known as the State Energy Program) (42 U.S.C. 6321-26), or to funding DOE provides to states under the Energy Efficiency Revolving Loan Fund Capitalization Grants Program (42 U.S.C. 18791-92). Under these programs, DOE does not exercise sufficient control and responsibility over the subsequent use of the financial assistance or the effect of the actions due to the statutory restrictions on the recipients' use of DOE's financial assistance. Therefore, DOE's provision of financial assistance under these programs is not a major Federal action subject to NEPA.

(8) NEPA does not apply to rulemaking actions proposed by the Secretary pursuant to section 403(a) of the DOE Act (42 U.S.C. 7173) because such proposals are not final agency action. Section 403(b) specifies that FERC takes "final action" on any rulemaking proposals initiated by the Secretary. NEPA only applies to final agency actions. See 42 U.S.C. 4336(a)(1).

(d) In making a case-by-case determination whether NEPA applies to a program (e.g., implementation of a financial assistance program authorized by Congress) or a particular proposal (e.g., whether to provide financial assistance for a specific project), DOE shall follow criteria included in NEPA and listed below. NEPA does not apply if:

(1) The proposed agency action is not a final agency action within the meaning of such term in chapter 5 of title 5, United States Code (42 U.S.C. 4336(a)(1)) or other relevant statute that also includes a finality requirement. Also see 5 U.S.C. § 704;

(2) The proposed activity or decision is exempted from NEPA by law;

(3) Compliance with NEPA would conflict with the requirements of another provision of law (42 U.S.C. 4336(a)(3));

(4) When Congress has afforded the DOE no discretion over the proposed action.

(5) The proposed action is not a "major Federal action." The terms "major" and "Federal action" each have independent force. NEPA applies only when both of these two criteria are met.

(i) NEPA does not apply to non-Federal actions (I) with no or minimal Federal funding, or (II) with no or minimal Federal involvement where a Federal agency cannot control the outcome of the project (42 U.S.C. § 4336e(10)(B)(i)). In such circumstances, there is no legal requirement nor any practical reason for DOE to conduct a NEPA analysis because DOE could not influence the outcome of its action to address the environmental effects of the proposal. For example, this might include situations where Federal funding constitutes a small percentage of an infrastructure projects overall funding that is provided only to help design an infrastructure project that is otherwise funded from non-Federal sources, because in such situations DOE cannot control the environmental effects of the completed non-Federal action;[5]

(ii) NEPA does not apply to funding assistance solely in the form of general revenue sharing funds which do not provide Federal agency compliance or enforcement responsibility over the subsequent use of such funds (42 U.S.C. § 4336e(10)(B)(ii));

(iii) NEPA does not apply to loans, loan guarantees, or other forms of financial assistance where a Federal agency does not exercise sufficient control and responsibility over the subsequent use of such financial assistance or the effect of the action (42 U.S.C. § 4336e(10)(B)(iii)). For example, financial assistance for non-Federal activities or projects where all physical work has been completed before the applicant seeks funds or reimbursement from DOE (e.g. incentive payments

[5] "The touchstone of major [F]ederal activity constitutes a [F]ederal agency's authority to influence nonfederal activity. 'The [F]ederal agency must possess actual power to control the nonfederal activity.'" *United States v. S. Fla. Water Mgmt. Dist.*, 28 F.3d 1563, 1572 (11th Cir. 1994). A but-for causal relationship is insufficient to make an agency responsible for a particular action under NEPA. See *Dep't of Transp. v. Pub. Citizen*, 541 U.S. 752, 767 (2004). For instance, minimal Federal funding or involvement, which may in a causal sense be a but-for cause of an action, does not by itself convert that action into a Federal action within the meaning of NEPA.

made by DOE to owners or operators of qualified hydroelectric facilities whose project was complete at the time of application to DOE under 42 U.S.C. §15883 (Section 247)) because DOE does not exercise sufficient control and responsibility over the subsequent use of such financial assistance or the effect of the action;

(iv) NEPA does not apply to business loan guarantees provided by the Small Business Administration pursuant to section 7(a) or (b) of the Small Business Act (15 U.S.C. 636(a), (b)), or title V of the Small Business Investment Act of 1958 (15 U.S.C. 695 *et seq*.) (42 U.S.C. § 4336e(10)(B)(iv));

(v) NEPA does not apply to bringing judicial or administrative civil or criminal enforcement actions (42 U.S.C. § 4336e(10)(B)(v)); or

(vi) NEPA does not apply to extraterritorial activities or decisions, which means agency activities or decisions with effects located entirely outside of the jurisdiction of the United States (42 U.S.C. § 4336e(10)(B)(vi)).

(6) The issuance or update of DOE's NEPA procedures is not subject to NEPA review.

2.2 Determining the required level of NEPA review

(a) If DOE determines, as described in section 2.1, that NEPA applies to a proposal, DOE will then determine the required level of NEPA review following the procedures described in this section. DOE will make this determination as soon as practicable after identifying that it has a proposal requiring NEPA review. At all steps in the following process, DOE will consider the proposed action or project at hand and *its* effects.

(b) If DOE has established a categorical exclusion (appendix B) or adopted under section 109 of NEPA another agency's categorical exclusion listed in the other agency's NEPA procedures (42 U.S.C. § 4336(c)) (appendix C), DOE will apply the categorical exclusion(s), following the procedures in chapter 5.

(1) If another agency has already established a categorical exclusion that would apply to the proposed action, DOE will consider whether to rely on that categorical exclusion pursuant to NEPA and the procedures described in section 5.5 so that it can be applied to the proposed action at issue, and to future proposals of that type.

(2) If no relevant categorical exclusion is otherwise available, DOE will consider whether to establish a new categorical exclusion, or revise an existing categorical exclusion, according to the procedures described in section 5.1. If DOE establishes or revises a categorical exclusion, DOE shall then apply the categorical exclusion to the proposed action according to the procedures described in section 5.4.

(c) If DOE cannot apply a categorical exclusion to the proposed action, DOE will evaluate significance of the proposed action's reasonably foreseeable effects consistent with section 3.2, and then will:

(1) If the proposed action is evaluated in a prior NEPA document prepared by DOE or another agency, DOE will consider relying on the existing document, or any pertinent part thereof, and supplementing that document as needed.

(2) If the proposed action is not likely to have a reasonably foreseeable significant effect on the quality of the human environment, or if the significance of the effects of the proposed action is unknown, DOE will prepare an environmental assessment, as described in chapter 6; or

(3) If the proposed action is likely to have a reasonably foreseeable significant effect on the quality of the human environment, DOE will prepare an environmental impact statement, as described in in chapter 7.

(d) DOE may use an early scoping process to help determine the required level of NEPA review. In such a process, DOE should be driven by the need to begin the required NEPA review promptly and should avoid steps that do not demonstrably improve the efficiency of the process. DOE also should remain aware that the schedule for the environmental assessment or environmental impact statement begins once DOE has determined the required level of NEPA review (sections 6.4 and 7.7). DOE should engage any applicant and other parties, as will be beneficial, in the early scoping process. An early scoping process may include, as appropriate to the proposal, steps such as:

(1) Preliminarily identifying the Federal agencies and other parties that will be involved and that have decisions to make related to the proposal; the range of reasonable alternatives and rationale for excluding certain alternatives from detailed analysis; the scope of environmental effects to be analyzed and rationale for excluding certain environmental effects from analysis; and the schedule.

(2) Requesting input from state and local agencies, Tribal governments, industry groups, and the public.

2.3 Applicant and contractor preparation of documents

DOE or an applicant may prepare an environmental assessment or environmental impact statement, including related supplements and supplement analyses, and either may engage a contractor to help prepare such document. An agency-directed contractor is a contractor whose work is supervised and directed by DOE. DOE either hires the agency-directed contractor directly or engages them as part of a third-party contracting arrangement. Under the third-party contracting arrangement, an applicant pays for the

contractor but has no role in directing the work of the contractor. Rather, DOE supervises and directs the contractor's work throughout document preparation.

An applicant-directed contractor is hired and supervised directly by the applicant. DOE provides guidance and direction at particular points throughout document preparation.

2.3.1 DOE responsibilities

DOE is responsible for complying with NEPA and certain requirements in other statutes and regulations (e.g., Endangered Species Act). Certain decisions and actions involved in preparing a NEPA document cannot be delegated to an applicant or contractor. DOE will:

(a) Determine the required level of NEPA review;

(b) Ensure that the scope of analysis and procedural steps are compliant with NEPA and other applicable requirements;

(c) Conduct any government-to-government consultation with Tribal governments and any required consultation with other Federal agencies;

(d) Independently evaluate and take responsibility for the document's contents;

(e) Ensure that the document satisfies all requirements of NEPA and these procedures, including those for page limits and schedule, and determine whether to issue the document, and include a statement in the document confirming that DOE has independently reviewed the document; and

(f) Prepare and issue any finding of no significant impact, record of decision, determination whether additional NEPA review is required, or other decision.

2.3.2 Applicant responsibilities

The applicant for a proposal being analyzed in a NEPA review will:

(a) Provide all information requested by DOE, necessary for the NEPA review, in a timely manner to support the schedule for completing the NEPA review;

(b) Initiate any request to DOE to prepare the NEPA review (as provided by 42 U.S.C. § 4336a(f)) with the application or during the early scoping period prior to DOE's determination of the required level of NEPA review;

(c) Include a statement in the document that it was prepared by the applicant or a contractor paid by the applicant.

(d) DOE may request from an applicant environmental information used to prepare or evaluate the environmental assessment or environmental impact statement. This may include any factual, scientific, or technical information used, developed, or considered by the applicant or applicant-hired contractor in the course of preparing the environmental assessment or environmental impact statement, including any correspondence with DOE or with other parties.

(e) If DOE determines that the applicant-prepared document is likely to be insufficient, DOE may request that the applicant replace its applicant-directed contractor or may take control of completion of the document.

(f) Develop a consolidated administrative record of the information assembled and used to prepare the NEPA document and provide that record to DOE within two weeks of DOE's request.

2.3.3 DOE and applicant coordination during NEPA review

(a) DOE will work with the applicant to define the purpose and need and identify alternatives for detailed analysis that meet the purpose and need.

(b) DOE also will work with the applicant to identify other Federal agencies, state agencies, and Tribes that may have an interest in the proposal and will work with the applicant to identify an appropriate list for notifications and distribution of the document.

(c) DOE will assist applicants and applicant-directed contractors by providing guidance and outlining the types of information required for the preparation of the environmental assessment or environmental impact statement. DOE also may assist in document preparation.

(d) DOE shall develop and modify, as appropriate, a schedule for preparation of the environmental assessment or environmental impact statement that meets the requirements in NEPA and these procedures. The schedule shall provide sufficient time for DOE to review the environmental assessment or environmental impact statement and determine its sufficiency. Major changes to the schedule or related matters will be documented through written correspondence.

2.4 NEPA and rulemaking

(a) Where the proposed action is the promulgation of a rule or regulation, procedures and documentation pursuant to other statutory or Executive Order requirements may satisfy one or more requirements of these procedures. In such circumstances, DOE may substitute the procedures and documentation pursuant to other statutory or Executive Order requirements for the corresponding requirements in these DOE NEPA implementing procedures and need not carry out duplicative procedures or documentation. DOE will

identify which corresponding requirements in these procedures are satisfied and consult with CEQ to confirm such determinations.

(b) Where DOE decides to issue a separate NEPA document in connection with a rulemaking, the NEPA document will normally accompany the proposed rule.

2.5 Lead and cooperating agencies

In many instances, a proposed activity or decision is undertaken in the context which entails activities or decisions undertaken by other Federal agencies (e.g., where multiple Federal authorizations are required with respect to a project sponsor's overall purpose and goal). In such instances, NEPA directs the multiple agencies involved shall determine which of them will be the lead agency pursuant to the criteria identified in NEPA § 107(a)(1)(A), 42 U.S.C. § 4336a(a)(1)(A). When serving as the lead agency, DOE is ultimately responsible for completing the NEPA process. When a joint lead relationship is established pursuant to NEPA § 107(a)(1)(B), 42 U.S.C. § 4336a(a)(1)(B), DOE and the other joint lead agency or agencies are collectively responsible for completing the NEPA process.

3.0 Implementing NEPA Efficiently

DOE will use all available means to improve the efficiency of its implementation of NEPA. DOE will make maximum use of existing analyses to avoid repeating work completed for previous environmental documents or other purposes. DOE also will coordinate with other agencies to make environmental reviews more efficient for all agencies with a decision to make or action to take regarding a proposal. Nothing in this section extends the statutory page limits (sections 6.3 and 7.6) or schedule deadlines (sections 6.4 and 7.7).

3.1 Identifying reasonably foreseeable environmental effects

DOE is responsible under NEPA for analyzing reasonably foreseeable environmental effects (42 U.S.C. 4332(C)(i)) of the proposed action and alternatives. DOE should consider the following factors and the definition of "effects" (chapter 8.0) when identifying reasonably foreseeable effects that require analysis:

(a) DOE shall analyze only those reasonably foreseeable environmental effects that have a reasonably close causal relationship to the proposed agency action and alternatives.

(b) "[W]hen the effects of an agency action arise from a separate project—for example, a possible future project or one that is geographically distinct from the project at hand—NEPA does not require the agency to evaluate the effects of that separate project."[6] In addition, an agency is not required to analyze the effects of projects over which it does not exercise regulatory authority.[7]

3.2 Evaluating significance

Determining whether an environmental effect is significant is a critical part of the NEPA process. Whether an impact rises to the level of "significant" is a matter of DOE's expert judgment. DOE must determine whether environmental effects of a class of actions normally are significant when establishing or revising a categorical exclusion and, in the use of a categorical exclusion whether extraordinary circumstances create significant effects (chapter 5). When a categorical exclusion does not apply to a proposal, DOE

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[6] *Seven County*, 145 S. Ct. at 1515. The Supreme Court provided the following explanation: "[I]f the project at issue might lead to the construction or increased use of a *separate project*—for example, a housing development that might someday be built near a highway—the agency need not consider the environmental effects *of that separate project*. . . . [T]he separate project breaks the chain of proximate causation between the project at hand and the environmental effects of the separate project." *Id.* at 1515-16 (citing *Public Citizen v. Dep't of Transp.*, 541 U. S. 752, 767 (2004) and *Metropolitan Edison Co. v. People Against Nuclear Energy*, 460 U. S. 766, 774, n. 7 (1983)). "The effects from a separate project may be factually foreseeable, but that does not mean that those effects are relevant to the agency's decisionmaking process or that it is reasonable to hold the agency responsible for those effects. . . . In those circumstances, 'the causal chain is too attenuated.'" *Id.* at 1517 (citing, *inter alia*, *Public Citizen*, 541 U. S. at 766–767 and quoting *Metropolitan Edison*, 460 U. S. at 774). "In other words, there is no 'reasonably close causal relationship' between the project at hand and the environmental effects of those other projects." *Id.* at 1516 (citing *Public Citizen*, 541 U. S. at 767)."

[7] *Id*. at 1516.

considers whether environmental effects are likely to be significant as the central question in deciding whether to prepare an environmental assessment or environmental impact statement (section 2.2). DOE again considers the significance of environmental effects when evaluating changes to a proposed action or new information related to the environmental effects of a proposal (section 3.9). DOE also considers the significance of effects in determining the level of detail to include in an environmental assessment or environmental impact statement.

(a) The analysis of environmental effects should be tailored to the particular proposal including the location. In all cases, DOE's analysis should be "reasonable and reasonably explained,"[8] and the analysis need not run longer than necessary to provide that reasoned explanation.[9] The remainder of this section describes criteria that might factor into DOE's analysis of environmental effects.

(b) DOE may use any reliable data source, and DOE need not undertake new research unless it is essential to a reasoned choice among alternatives and the overall costs and time frame of preparing new information are not unreasonable. (42 U.S.C. 4336(b)(3)) When DOE is evaluating an action's reasonably foreseeable effects on the human environment, and there is incomplete or unavailable information that cannot be obtained at a reasonable cost or the means to obtain it are unknown, DOE should make clear in the relevant environmental document that such information is lacking.

(c) The significance of effects is evaluated in the context of the affected environment (local, regional, or national) and its resources, as appropriate for the specific action and the mechanism or pathway by which the action can result in an environmental effect. Consequently, the environmental document needs a description of the affected environment that is sufficient to support a reasoned explanation of DOE's conclusion regarding the significance of effects. This may be in a standalone section or chapter on the affected environment or integrated into the discussion of environmental effects. In any case, the discussion of the affected environment should not be encyclopedic and need not extend beyond areas associated with reasonably foreseeable environmental effects that have a close causal relationship to the proposed action and alternatives.

(d) In considering whether effects are significant, DOE should consider the following, as appropriate to the specific resource area:

(1) Both short- and long-term effects.

(2) Both beneficial and adverse effects.

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[8] *Id*. at 1511.

[9] *Id*. at 1512 ("Brevity should not be mistaken for lack of detail. A relatively brief agency explanation can be reasoned and detailed; an EIS need not meander on for hundreds or thousands of pages.").

(3) Effects on public health and safety.

(4) Economic effects.

(5) Effects on the quality of life of the American people.

(e) DOE should evaluate environmental effects in context. In considering short-term effects, for example, DOE should acknowledge that certain adverse effects that occur during construction may be reversible through revegetation or other actions that return the environment to its original condition or to a functioning ecosystem. Such effects are not significant over the long-term, though other effects of construction activities might be. For another example, DOE should acknowledge that facility construction and operation will not be authorized without compliance with applicable laws and other requirements (e.g., DOE orders and technical standards).

3.3 Relying on existing environmental documents

(a) DOE may rely on an environmental assessment, environmental impact statement, or portion thereof, issued by any Federal agency that meets the standards under NEPA and these procedures. (The use of "rely on" is the same concept as "adopt" in prior NEPA practice for environmental assessments and environmental impact statements.) The nature of DOE's reliance on an existing document depends on the relationship of the existing document to DOE's NEPA review of a new or modified proposal.

(1) If the actions analyzed in the original environmental assessment or environmental impact statement and DOE's proposed action are substantially the same, and the analysis in the original document remains sufficient, DOE may republish the relied upon environmental assessment or environmental impact statement to satisfy its responsibilities under NEPA. DOE will add to the republished document a statement that it has confirmed that the original document satisfies DOE's NEPA responsibilities for the new or modified proposal.

(2) If the existing environmental assessment, environmental impact statement, or portion thereof, is only relevant to part of DOE's proposed action, DOE should cite, briefly describe the content and relevance to the environmental document being prepared, and may supplement or make modifications that are necessary to render the relied-upon document, or portion thereof, fit for fulfilling NEPA's analytic requirements for the action at hand.

(3) There is no statutory requirement or otherwise to post a draft EIS for public comment.

3.4 Incorporation by reference

(a) DOE may incorporate material, such as planning studies, technical analyses, or other relevant information, into environmental documents by reference when the effect will be to

cut down on bulk without impeding DOE and public review of the environmental effects of the proposed action or alternatives. When incorporating material by reference, DOE will cite, briefly describe the content and relevance to the environmental document, and make the materials reasonably available by potentially interested parties. If DOE provides an opportunity for public review of the environmental document, DOE also will make any materials incorporated by reference publicly available at the same time. DOE will not use incorporation by reference as a means to evade the statutory page limits (sections 6.3 and 7.6).

(b) Although NEPA itself does not require cost-benefit analysis, DOE may prepare a cost-benefit analysis for a particular proposal. To the extent that this cost-benefit analysis is relevant to any alternatives analysis that DOE is conducting pursuant to NEPA, DOE will incorporate the cost-benefit analysis or append it to the statement to avoid duplication in evaluating the environmental effects. In such cases, the environmental document will discuss the relationship between that analysis and any analyses of unquantified environmental effects, values, and amenities.

3.5 Combining documents

DOE will combine, to the fullest extent practicable, any environmental document with any other agency document to reduce duplication and paperwork. Combining documents does not extend page limits for environmental assessments and environmental impact statements unless another statute applies (sections 6.3 and 7.6).

3.6 Integrating NEPA with other environmental requirements

(a) To the fullest extent possible, DOE will prepare environmental documents concurrently with and integrated with analyses and related surveys and studies required by other Federal statutes.

(b) DOE will combine an environmental document prepared in compliance with NEPA with any other agency document to reduce duplication and paperwork. Thus, DOE may combine an environmental document with related plans, rules, or amendments as a single consolidated document.

(c) If comments on a notice of intent or other aspects of a scoping process identify consultations, permits, or licenses necessary under other environmental laws, the environmental document should contain a section or appendix briefly listing the applicable requirements and how DOE has or will meet them (e.g., permits applied for or received, consultations initiated or concluded).

3.7 Elimination of duplication with State, Tribal, and local procedures

(a) DOE will cooperate with State, Tribal, and local agencies that have a decision or action to make relevant to the environmental effects of the proposal, including laws comparable with NEPA.

(b) To the fullest extent practicable unless specifically prohibited by law, DOE will cooperate with State, Tribal, and local agencies to reduce duplication between NEPA and State, Tribal, and local requirements, including through use by DOE of studies, analysis, and decisions developed by State, Tribal, or local agencies. Such cooperation may include:

(1) Joint planning processes;

(2) Joint environmental research and studies;

(3) Joint public meetings or hearings; and

(4) Joint environmental documents.

3.8 Programmatic environmental documents and tiering

(a) DOE may prepare environmental documents for programmatic Federal actions, such as the adoption of new agency programs. DOE may evaluate the proposal(s) in one of the following ways:

(1) Geographically, including actions occurring in the same general location, such as a DOE site, body of water, region, or metropolitan area.

(2) Generically, including actions that have relevant similarities, such as common timing, effects, alternatives, methods of implementation, media, or subject matter.

(3) By stage of technological development.

(b) Consistent with NEPA § 108, 42 U.S.C. § 4336b, after completing a programmatic environmental assessment or environmental impact statement, DOE may rely on that document for 5 years if there are not substantial new circumstances or information about the significance of adverse effects that bear on the analysis. After 5 years, as long as DOE reevaluates the analysis in the programmatic environmental document and any underlying assumption to ensure reliance on the analysis remains valid and briefly documents its reevaluation and explains why the analysis remains valid considering any new and substantial information or circumstances, DOE may continue to rely on the document.

(c) DOE may, but is not required to, prepare a programmatic environmental document when it does not have a programmatic decision to make. When a programmatic

environmental document is not required, DOE should consider whether a technical report or study would improve the efficiency of future NEPA reviews by providing information on a technology, region, or other subject that can be referenced in future environmental documents.

3.9 Supplements to environmental documents and supplement analyses

(a) DOE is required to prepare supplements to environmental documents only if a major Federal action remains to occur, and:

(1) DOE makes substantial changes to the proposed action that are relevant to environmental concerns; or

(2) DOE decides, in its discretion, that there are substantial new circumstances or information about the significance of the adverse effects that bearing on the proposed action or its effects.

(b) When it is unclear whether or not a supplement to an environmental document is required, DOE may prepare a supplement analysis.

(1) The supplement analysis should discuss the circumstances that are pertinent to deciding whether to prepare a supplement to an environmental document.

(2) The supplement analysis should be brief and need only contain sufficient information for DOE to determine whether:

(i) An existing environmental document should be supplemented;

(ii) A new environmental document should be prepared; or

(iii) No further NEPA documentation is required.

(3) DOE will make the determination and the related supplement analysis available to the public for information.

4.0 General

4.1 Classified, confidential, and otherwise exempt information

(a) Notwithstanding other sections of this part, DOE shall not disclose classified, confidential, or other information that DOE otherwise would not disclose pursuant to the Freedom of Information Act (FOIA) (5 U.S.C. 552) and DOE's regulations implementing the FOIA (10 CFR 1004.10(b)).

(b) To the fullest extent possible, DOE will segregate any information that is exempt from disclosure requirements into an appendix to allow public review of the remainder of the NEPA document.

(c) If exempt information cannot be segregated, or if segregation would leave essentially meaningless material, DOE will withhold the entire NEPA document from the public; however, DOE will prepare the NEPA document and use it in DOE decision-making.

4.2 Appendices

If DOE prepares an appendix, DOE will publish it with the NEPA document. Appendices are to be used for voluminous materials, such as scientific tables, collections of data, statistical calculations, and the like, which substantiate the analysis provided in the environmental assessment. Appendices are not to be used to provide additional substantive analysis, because that would circumvent the congressionally mandated page limits.

Materials may include:

(a) Material prepared in connection with the NEPA document (as distinct from material that is not so prepared and is incorporated by reference (section 3.4)).

(b) Data, brief descriptions of methodology, and other material substantiating any analysis fundamental to the NEPA document, but not analysis. Analysis of environmental effects will be included in the body of the NEPA document.

(c) Comments (or summaries thereof where the response has been exceptionally voluminous) received during the NEPA process and DOE's response to those comments.

4.3 Unique identification numbers

For all environmental documents, DOE will provide a unique identification number for tracking purposes, which DOE will reference on all associated environmental review documents prepared for the proposed agency action and in any database or tracking system for such documents. DOE will coordinate with the CEQ and other Federal agencies to ensure compatibility of such identification numbers across Federal agencies.

4.4 Emergencies

Where emergency circumstances make it necessary to take an action with reasonably foreseeable significant environmental effects without observing the provisions of these procedures, DOE will consult with CEQ about alternative arrangements for compliance with NEPA. In other emergency circumstances, DOE will determine how best to comply with NEPA, including any necessary variance from these DOE NEPA implementing procedures, and notify CEQ about the emergency circumstances and DOE's plan for NEPA compliance.

5.0 Establishing, Adopting, and Applying Categorical Exclusions

Categorical exclusions provide a mechanism to identify types of Federal actions that normally do not have significant environmental effects and for which neither an environmental assessment nor environmental impact statement is normally required. This ensures that resources are not expended conducting environmental analysis of proposals that do not present potential for significant environmental impacts. Categorical exclusions established or adopted by DOE are listed in appendices B–C of these procedures.

(a) All categorical exclusions may be applied by any DOE office. The sectional divisions in appendix B are solely for purposes of organization of that appendix and are not intended to be limiting.

(b) A class of actions includes activities foreseeably necessary to proposals encompassed within the class of actions (such as award of implementing grants and contracts, site preparation, purchase and installation of equipment, and associated transportation activities).

5.1 Establishing and revising categorical exclusions

(a) To establish or revise a categorical exclusion, DOE must determine that the category of actions normally does not significantly affect the quality of the human environment (42 U.S.C. § 4336e(1)). In making this determination, DOE shall:

(1) Develop a written record containing information to substantiate its determination;

(2) Consult with CEQ on its proposed new or revised categorical exclusion, including the written record, for a period not to exceed 30 days prior to providing public notice as described in subparagraph (3); and

(3) Provide public notice in the *Federal Register* of DOE's establishment or revision of any categorical exclusion, including the address of the website where the written record is available (energy.gov/nepa).

(b) If DOE becomes aware of substantial new information about the environmental effects of actions included in an existing categorical exclusion, DOE will determine whether to retain, revise, or remove that categorical exclusion.

(c) DOE will look for opportunities to forego a 30-day consultation process when, consistent with its statutory authority and because of the substantial deference courts give DOE under the *Seven County* decision when doing so is deemed a well-reasoned decision.

5.2 Adopting another agency's categorical exclusion

(a) Consistent with NEPA (42 U.S.C. § 4336c), DOE may adopt a categorical exclusion listed in another agency's NEPA procedures. Once adopted, the categorical exclusion is available for use by all DOE offices. When adopting a categorical exclusion, DOE shall:

(1) Identify the categorical exclusion listed in another agency's NEPA procedures that covers DOE's category of proposed or related actions;

(2) Consult with the agency that established the categorical exclusion to ensure that the proposed adoption of the categorical exclusion is appropriate;

(3) Provide public notification of the categorical exclusion that DOE is adopting, including a brief description of the proposed action or category of proposed actions to which DOE intends to apply the adopted categorical exclusion. DOE shall publish a notice of its adoption on DOE's website at energy.gov/nepa. This notice should explain how DOE intends to use the adopted categorical exclusion (e.g., types of projects, process for considering extraordinary circumstances, and public notice of categorical exclusion determinations), and a brief description of the agencies' consultation; and

(4) DOE will list adopted categorical exclusions in appendix C of these procedures.

(b) If the establishing agency revises a categorical exclusion that DOE has adopted, DOE will determine whether to retain the categorical exclusion as adopted, or to remove the adopted categorical exclusion and adopt the revised categorical exclusion.

(c) After adoption of another agency's categorical exclusion, DOE may decide to follow the process described in section 5.1 to establish it as a DOE categorical exclusion. This could allow, for example, DOE to modify the text of the categorical exclusion to better fit DOE's programs and activities. Otherwise, the categorical exclusion remains as written by the establishing agency.

5.3 Removing a categorical exclusion

(a) To remove a categorical exclusion from DOE's NEPA procedures, DOE will:

(1) Develop a written justification for the removal;

(2) Consult with CEQ on its proposed removal of the categorical exclusion, including the written justification for the removal, for a period not to exceed 30 days prior to providing public notice as described in subparagraph (3); and

(3) Provide public notice of DOE's removal of the categorical exclusion in the *Federal Register* and include the written justification or a link to where that justification is available on DOE's website.

5.4 Applying one or more categorical exclusions to a proposal

(a) Proposed recurring activities to be undertaken during a specified time period, such as routine maintenance activities for a year, may be addressed in a single categorical exclusion determination after considering the potential aggregated impacts.

(b) The following clarifications are provided to assist in the appropriate application of categorical exclusions that employ these terms or phrases:

(1) "Previously disturbed or developed" refers to land that has been changed such that its functioning ecological processes have been and remain altered by human activity. The phrase encompasses areas that have been transformed from natural cover to non-native species or a managed state, including, but not limited to, utility and electric power transmission corridors and rights-of-way, and other areas where active utilities and currently used roads are readily available.

(2) DOE considers terms such as "small" and "small-scale" in the context of the particular proposal, including its proposed location. In assessing whether a proposed action is small, in addition to the actual magnitude of the proposal, DOE considers factors such as industry norms, the relationship of the proposed action to similar types of development in the vicinity of the proposed action, and expected outputs of emissions or waste. When considering the physical size of a proposed facility, for example, DOE would review the surrounding land uses, the scale of the proposed facility relative to existing development, and the capacity of existing roads and other infrastructure to support the proposed action.

(c) To find that a proposal is categorically excluded, DOE shall affirmatively determine the factors listed below. When applying more than one categorical exclusion to a proposal, DOE shall consider these factors for the full scope of the proposal and the collective scope of the categorical exclusions.

(1) The proposal fits within one or more classes of actions listed in appendices B–C of these procedures;

(2) The proposal has not been segmented to meet the definition of a categorical exclusion. Segmentation can occur when a proposal is broken down into small parts in order to avoid the appearance of significance of the total action. However, segmentation does not include proposals that are developed and potentially implemented over multiple phases where each phase results in a decision whether to proceed to the subsequent phase.

(3) There are no extraordinary circumstances related to the proposal that indicate a normally excluded agency action is likely to have a reasonably foreseeable significant adverse effect. It is not the presence of an extraordinary circumstance that precludes application of a categorical exclusion, but rather application of a categorical exclusion is not possible only when DOE concludes that the extraordinary circumstance is likely to cause a reasonably foreseeable significant adverse effect or that DOE does not know the environmental effect of the extraordinary circumstance. DOE or an applicant may modify the proposal to avoid reasonably foreseeable adverse significant effects such that the categorical exclusion would apply. Extraordinary circumstances are unique situations presented by specific proposals, including, but not limited to, uncertain effects or effects involving unique or unknown risks.

(d) DOE will document its determination that one or more categorical exclusions applies to a proposed agency action for any application of a categorical exclusion included in appendices B or C of these procedures.

(e) Categorical exclusion determinations for actions listed in appendix B shall be documented and made available to the public by posting online, generally within two weeks of the determination, unless additional time is needed in order to review and protect classified information, "confidential business information," or other information that DOE would not disclose pursuant to the Freedom of Information Act (FOIA) (5 U.S.C. 552). Posted categorical exclusion determinations shall not disclose classified information, "confidential business information," or other information that DOE would not disclose pursuant to FOIA. (See also section 4.1)

(f) If DOE determines that it cannot apply one or more categorical exclusions to the proposed action, DOE shall prepare an environmental assessment or environmental impact statement, as required (section 2.2(c)).

5.5 Relying on another agency's categorical exclusion determination

DOE may rely on another agency's determination that a categorical exclusion applies to a particular proposed agency action if the agency action covered by that determination and DOE's proposed action are substantially the same.

(a) DOE will coordinate with the agency that made the categorical exclusion determination to ensure that the agency is aware of DOE's intended reliance on its categorical exclusion determination and has had an opportunity to provide input to DOE.

(b) DOE should confirm that reliance on the categorical exclusion determination does not conflict with DOE's NEPA implementing procedures. This would entail consideration of DOE's extraordinary circumstances (section 5.4), integral elements (appendix B), and any relevant categorical exclusions listed in appendix B of these procedures.

(c) DOE will document its reliance on another agency's categorical exclusion determination and post that documentation on DOE's website. That documentation should include the other agency's categorical exclusion determination and a brief explanation of how DOE's proposed action is substantially the same as that of the agency that made the categorical exclusion determination.

6.0 Preparing an Environmental Assessment

If an action is subject to NEPA (section 2.1) and an environmental assessment is the required level of NEPA review (section 2.2), DOE shall prepare an environmental assessment with respect to the proposed agency action following NEPA and the procedures described herein.

6.1 Public engagement in preparation of an environmental assessment

(a) DOE may publish a notice of intent to prepare an environmental assessment or other public notice to request scoping comments on the environmental assessment.

6.2 Contents of an environmental assessment

(a) The scope and level of detail shall be consistent with the narrow purpose of an environmental assessment, i.e., to determine whether any reasonably foreseeable effects of the proposal are likely to be significant and set forth the basis of DOE's finding of no significant impact or determination that an environmental impact statement is required. In preparing the environmental assessment, DOE will focus its analysis on whether the environmental effects of the action or project at hand are significant. As appropriate, DOE will document in the environmental assessment where and how it drew a reasonable and manageable line relating to its consideration of any environmental effects from the action. NEPA directs that environmental assessments are to be "concise" and conform to the page limits (42 U.S.C. § 4336(b)(2) and §4336a(e)(2)) and time limits (42 U.S.C. 4336a(g)) established in the law.

(b) DOE shall include in an environmental assessment a brief discussion of the following topics:

(1) Purpose and need for the proposed action based on DOE's statutory authority. When the proposed action involves a response to an applicant's proposal, the purpose and need shall be informed by the goals of the applicant;

(2) The proposed action, a reasonable number of alternatives to the extent required by NEPA (42 U.S.C. § 4332(2)(F) and 4332(2)(H)), and no action alternative (which may be encompassed within the discussion of the affected environment);

(3) An explanation why particular environmental effects would not result in significant impact and, thus, are not further analyzed in the environmental assessment (section 3.2); and

(4) The reasonably foreseeable effects of the proposed agency action and the alternatives evaluated sufficiently to determine whether any of the effects are likely to be significant and whether any significant effects can be made non-significant through mitigation.

6.3 Page limits

(a) DOE shall conform to page limits established in NEPA (42 U.S.C. § 4336(e)(2)) and as described in this section.

(1) The text of an environmental assessment is strictly prohibited from exceeding 75 pages, not including citations or appendices. NEPA does not provide agencies with the authority or a mechanism to exceed this page limit.

(2) Appendices are to be used for voluminous materials, such as scientific tables, collections of data, statistical calculations, and the like, which substantiate the analysis provided in the environmental assessment. Appendices are not to be used to provide additional substantive analysis, because that would circumvent the congressionally mandated page limits.

(3) Environmental assessments shall be formatted for an 8.5”x11” page with one-inch margins using a 12-point proportionally spaced font, single spaced. Footnotes may be in 10-point font. Such size restrictions do not apply to explanatory maps, diagrams, graphs, tables, and other means of graphically displaying quantitative or geospatial information. When an item of graphical material is larger than 8.5”x11”, each such item shall count as one page.

(4) Certification Related to Page Limits. The breadth and depth of analysis in an environmental assessment shall be tailored to ensure that the environmental analysis does not exceed this 75-page limit. As part of the finalization of the environmental assessment, a responsible official shall certify (and the certification shall be incorporated into the environmental assessment) that DOE has considered the factors mandated by NEPA; that the environmental assessment represents DOE’s good-faith effort to prioritize documentation of the most important considerations required by the statute within the Congressionally mandated page limits; that this prioritization reflects DOE’s expert judgment; and that any considerations addressed briefly or left unaddressed were, in DOE’s judgment, comparatively not of a substantive nature that meaningfully informed the consideration of environmental effects and the resulting decision.

(5) DOE recognizes that NEPA imposes no substantive environmental obligations or restrictions because it is a purely procedural statute that requires an agency to prepare a report, as stated in the *Seven County* decision, *supra*. DOE is encouraged to maximize its substantial discretion to not only stay within the page limits but also to limit lengthy appendices.

6.4 Deadlines

(a) As the Supreme Court has repeatedly held, NEPA is governed by a "rule of reason." Congress supplied the measure of that reason in the 2003 revision of NEPA by setting the deadlines in NEPA 107(g), 42 U.S.C. 4336a(g). These deadlines indicate Congress's determination that an agency has presumptively spent a reasonable amount of time on analysis and the document should issue, absent very unusual circumstances. In such circumstances, an extension will be given only for such time as is *necessary* to complete the analysis.

To effectively support decision making for proposals initiated within DOE and for proposals brought to DOE by applicants for financial assistance or other authorization, NEPA must be implemented through predictable and reasonable timelines.[10] Thus, NEPA directs that Federal agencies will complete each environmental assessment not later than the date that is one year after the sooner of:

(1) The date on which DOE determines that NEPA requires the preparation of an environmental assessment with respect to the proposal;

(2) The date on which DOE notifies the applicant that the application to establish a right-of-way for the proposal is complete; and

(3) The date on which DOE issues a notice of intent to prepare the environmental assessment for the proposal. (42 U.S.C. § 4336a(g)(1)(B))

(b) DOE should document the start date of each environmental assessment in writing and approved by the DOE official responsible for completing the environmental assessment on schedule. This documentation will assist DOE in tracking the schedule and preparing the report to congressional committees required by NEPA (42 U.S.C. 4336a(h)). The start date normally will be the date that DOE determines that preparation of an environmental assessment is required (option (a)(1) above). DOE does not receive applications to establish a right-of-way (though this option might be relevant in circumstances when DOE is participating with another Federal agency). If DOE were to issue a notice of intent to prepare an environmental assessment, that normally would follow DOE's determination that an environmental assessment is required.

(c) If DOE determines it is not able to meet the one-year deadline, it must consult with the applicant, if any (42 U.S.C. § 4336a(g)(2)). After such consultation, if needed, DOE may establish a new deadline that provides only so much additional time as is necessary to complete the environmental assessment. The deadline extension should be approved, in

[10] "Time and resources are simply too limited for us to believe that Congress intended" consideration under NEPA to extend indefinitely. *Metro. Edison Co. v. People Against Nuclear Energy*, 460 U.S. 766, 776 (1983) (citing Vermont *Yankee Nuclear Power Corp. v. NRDC*, 435 U.S. 519, 551 (1978)).

writing, by the DOE official responsible for completing the environmental assessment on schedule. This documentation will assist DOE in tracking the schedule and preparing the report to congressional committees required by NEPA (42 U.S.C. 4336a(h)).

Cause for setting a new deadline is only established if the EA is not sufficiently researched and written to support a FONSI or NOI to prepare an EIS. The announcement of the new deadline shall specify the reason why the environmental assessment was not able to be completed under the statutory deadline.

(d) DOE shall calculate environmental assessment schedules from the applicable start date to issuance of the environmental assessment.

(e) DOE should publish the environmental assessment, at the latest, on the day the deadline elapses, in as substantially complete form as is possible.

(f) Certification Related to Deadline. When the environmental assessment is published, a responsible DOE official should certify (and the certification will be incorporated into the environmental assessment) that the resulting environmental assessment represents DOE's good-faith effort to fulfill NEPA's requirements within the Congressional timeline; that such effort is substantially complete; that, in DOE's expert opinion, the analysis contained therein is adequate to inform and reasonably explain DOE's final decision regarding the proposed action.

6.5 Findings of no significant impact

(a) DOE shall prepare a finding of no significant impact if DOE determines, based on the environmental assessment, not to prepare an environmental impact statement because the proposed action or project at hand will not have significant effects. The finding of no significant impact shall:

(1) Include the environmental assessment or incorporate it by reference;

(2) Document the reasons why DOE has determined that the selected alternative will not have a significant effect on the quality of the human environment;

(3) State the authority for any mitigation that DOE has adopted and any applicable monitoring or enforcement provisions. If DOE finds no significant effects based on mitigation, the mitigated finding of no significant impact shall state any mitigation requirements enforceable by the agency (e.g., through conditions on awards or contractor requirements) or voluntary mitigation commitments that will be undertaken to avoid significant effects;

(4) Identify any other documents related to the finding of no significant impact; and

(5) State that an environmental impact statement will not be prepared, concluding the NEPA process for that action.

(b) DOE shall make each environmental assessment and finding of no significant impact available to the public by posting on its website.

7.0 Preparing an Environmental Impact Statement

If an action is subject to NEPA (section 2.1) and an environmental impact statement is the required level of NEPA review (section 2.2), DOE shall prepare an environmental impact statement with respect to the proposed agency action following NEPA and the procedures described herein.

7.1 Notice of intent and scoping

(a) As a preliminary step to determining whether, in connection with a proposal that is not excluded pursuant to a categorical exclusion, DOE will prepare an environmental assessment or an environmental impact, DOE will determine and document the scope of the project at hand.

(b) DOE should publish a concise notice of intent to prepare an environmental impact statement as soon as practicable after determining that an environmental impact statement is required for a proposed agency action. This is important to ensure timely decision making and because the two-year deadline for completing the environmental impact statement will typically be measured from the date that DOE determined that an environmental impact statement is required (section 7.7).

(c) The notice of intent shall include a request for public comment on alternatives or effects and on relevant information, studies, or analyses with respect to the proposed agency action (42 U.S.C. § 4336a(c)). The notice of intent also should include information to inform the public in preparing comments, such as:

(1) The purpose and need for the proposed action (section 7.2);

(2) A preliminary description of the proposed action and reasonable alternatives expected to be analyzed;

(3) A brief summary of environmental effects that DOE expects to analyze and identification of those environmental effects that DOE anticipates are not likely to be significant and, therefore, not analyzed in detail;

(4) Anticipated permits and other authorizations required for the proposed action and reasonable alternatives to proceed (e.g., connected actions);

(5) A schedule for the decision-making process that is consistent with the deadlines for an environmental impact statement established in NEPA. There is no statutory requirement or otherwise to post a draft EIS for public comment;

(6) A description of planned opportunities for engagement by Tribes, the public, and other parties, including any scoping meeting(s), the end date for the public comment period,

and whether DOE anticipates releasing a draft environmental impact statement or related materials;

(7) Identification of any cooperating and participating agencies, and any information that such agencies require in the notice to facilitate their decisions or authorizations; and

(8) Contact information for a person within DOE who can answer questions about the proposed action and the environmental impact statement.

7.2 Purpose and need

DOE shall include in the environmental impact statement a brief summary of the underlying of purpose and need for the proposed agency action based on DOE's statutory authority. (42 U.S.C. 4336(d)) When the proposed agency action concerns DOE's duty to act on an application for authorization of financial assistance or other purposes, the purpose and need for the proposed agency action should be informed by the goals of the applicant.

7.3 Alternatives in an environmental impact statement

(a) NEPA requires that an environmental impact statement include "a reasonable range of alternatives to the proposed agency action, including an analysis of any negative environmental impacts of not implementing the proposed agency action in the case of a no action alternative, that are technically and economically feasible, and meet the purpose and need of the proposal." (42 U.S.C. 4332(C)(iii)) Accordingly, in all environmental impact statements, DOE shall analyze:

(1) the proposed action;

(2) a reasonable range of technically and economically feasible alternatives that meet the purpose and need of the proposal and, where applicable, meet the goals of the applicant; and

(3) no action, which may be limited to an analysis of negative environmental effects of not implementing the proposed action.

(b) DOE shall identify the reasonable range of alternatives on a project-by-project basis. To be included within the reasonable range of alternatives, the evaluation of that alternative should contribute to DOE's decision making.

(c) For any alternative that DOE considered but determined not to analyze in detail, DOE will provide a brief explanation of why the alternative was not included among the reasonable range of alternatives in the environmental impact statement. DOE should include this explanation in the environmental impact statement.

7.4 Contents of an environmental impact statement

(a) An environmental impact statement shall demonstrate DOE's consideration of:

(1) reasonably foreseeable environmental effects of the proposed agency action;

(2) any reasonably foreseeable adverse environmental effects which cannot be avoided should the proposal be implemented;

(3) a reasonable range of alternatives to the proposed agency action, including an analysis of any adverse environmental impacts of not implementing the proposed agency action in the case of a no action alternative, that are technically and economically feasible, and meet the purpose and need of the proposal;

(4) the relationship between local short-term impacts on the human environment and the maintenance and enhancement of long-term productivity;

(5) any irreversible and irretrievable commitments of Federal resources which would be involved in the proposed agency action should it be implemented; and

(6) any means identified to mitigate adverse environmental effects of the proposed action. DOE is mindful that in this respect NEPA itself does not require or authorize DOE to impose any mitigation measures.

(b) In preparing the environmental impact statement, DOE will focus its analysis on whether the environmental effects of the action or project at hand are significant. DOE will document in the environmental impact statement where and how it drew a reasonable and manageable line relating to its consideration of any environmental effects from the action or project at hand that extend outside the geographical territory of the project or might materialize later in time.

(c) Environmental impact statements should discuss effects in proportion to their significance. With respect to issues that are not substantive and do not meaningfully inform the consideration of environmental effects and the resulting decision on how to proceed, there should be no more than the briefest possible discussion to explain why those issues are not substantive and therefore not amenable to further analysis. Environmental impact statements should be analytic, concise, and no longer than necessary to comply with NEPA in light of the congressionally mandated page limits and deadlines.

7.5 Receipt of comments

During the process of preparing an environmental impact statement, DOE will seek the comments of any Federal agency that has jurisdiction by law or special expertise with respect to any environmental impact involved. As appropriate, DOE will seek the

comments of State, Tribal, and local agencies that may be affected by the proposed action. In addition, DOE may seek comments if it believes such comments will aid in discharging its duties under NEPA.

7.6 Page limits

(a) The text of an environmental impact statement shall not exceed 150 pages, not including citations or appendices, unless the proposal is of extraordinary complexity, in which case the text is strictly prohibited from exceeding 300 pages, not including any citations or appendices (42 U.S.C. 4336(e)(1)). NEPA provides no method for an agency to extend the latter page limit.

(b) Environmental impact statements should be formatted for an 8.5”x11” page with one-inch margins using a word processor with 12-point proportionally spaced font, single spaced. Footnotes may be in 10-point font. Such size restrictions do not apply to explanatory maps, diagrams, graphs, tables, and other means of graphically displaying quantitative or geospatial information, although pages containing such material do count towards the page limit. When an item of graphical material is larger than 8.5”x11,” each such item shall count as one page.

(c) Certification Related to Page Limits. The breadth and depth of analysis in an environmental impact statement shall be tailored to ensure that the environmental impact statement does not exceed these page limits. In this regard, as part of the finalization of the environmental impact statement, a responsible official should certify that DOE has considered the factors mandated by NEPA; that the environmental impact statement represents DOE’s good-faith effort to prioritize documentation of the most important considerations required by the statute within the Congressionally mandated page limits; that this prioritization reflects DOE’s expert judgment; and that any considerations addressed briefly or left unaddressed were, in DOE’s judgment, comparatively unimportant or frivolous.

7.7 Deadlines

(a) As the Supreme Court has repeatedly held, NEPA is governed by a “rule of reason.” Congress supplied the measure of that reason in the 2023 revision of NEPA by setting the deadlines in NEPA 107(6), 42 U.S.C. 4336a(g). These deadlines indicate Congress’s determination that an agency, working within Congress’s allocation of resources, has presumptively spent a reasonable amount of time on analysis and the document should issue, absent very unusual circumstances. In such circumstances, an extension will be given only for such time as is necessary to complete the analysis.

To effectively support decision making for proposals initiated within DOE and for proposals brought to DOE by applicants for financial assistance or other authorization, NEPA must be

implemented through a predictable and reasonable schedule.[11] Thus, NEPA directs that Federal agencies will complete each environmental impact statement not later than the date that is two years after the earlier of:

(1) The date on which DOE determines that NEPA requires the preparation of an environmental impact statement with respect to the proposal;

(2) The date on which DOE notifies the applicant that the application to establish a right-of-way for the proposal is complete; and

(3) The date on which DOE issues a notice of intent to prepare the environmental impact statement for the proposal. (42 U.S.C. § 4336a(g)(1)(A))

(b) DOE should document the start date of each environmental impact statement in writing and approved by the DOE official responsible for completing the environmental impact statement on schedule. This documentation will assist DOE in tracking the schedule and preparing the report to congressional committees required by NEPA (42 U.S.C. 4336a(h)). The start date normally will be the date that DOE determines that preparation of an environmental impact statement is required (option (a)(1) above). DOE does not receive applications to establish a right-of-way (though this option might be relevant in circumstances when DOE is participating with another Federal agency). If DOE were to issue a notice of intent to prepare an environmental impact statement, that normally would follow DOE's determination that an environmental impact statement is required.

(c) DOE shall calculate environmental impact statement schedules from the applicable start date to the date of publication by the U.S. Environmental Protection Agency in the *Federal Register* of a notice of availability of the environmental impact statement as the end date. Where DOE has prepared an environmental assessment that results in a decision to prepare an EIS, DOE will use the start date for the environmental assessment as the start date for the EIS unless it exercises its discretion to determine otherwise by direction of DOE leadership.

(d) DOE will strive to publish the EIS, complete, as soon as possible. DOE should publish the environmental impact statement, at the latest, on the day the deadline elapses, in as substantially complete form as is possible.

(e) If DOE determines it is not able to meet the two-year deadline, it must consult with the applicant, if any (42 U.S.C. § 4336a(g)(2)). After such consultation, if needed, DOE may establish a new deadline that provides only so much additional time as is necessary to complete the environmental impact statement. The deadline extension should be

[11] "Time and resources are simply too limited for us to believe that Congress intended" consideration under NEPA to extend indefinitely. *Metro. Edison Co. v. People Against Nuclear Energy*, 460 U.S. 766, 776 (1983) (citing Vermont *Yankee Nuclear Power Corp. v. NRDC*, 435 U.S. 519, 551 (1978)).

approved, in writing, by the DOE official responsible for completing the environmental impact statement on schedule. This documentation will assist DOE in tracking the schedule and preparing the report to congressional committees required by NEPA (42 U.S.C. 4336a(h)).

Cause for setting a new deadline is only established if the environmental impact statement is not sufficiently developed to support a Record of Decision. The announcement of the new deadline shall specify the reason why the environmental impact statement was not able to be completed under the statutory deadline.

(f) Certification Related to Deadlines. When the environmental impact statement is published, a responsible DOE official should certify (and the certification will be incorporated into the environmental impact statement) that the resulting environmental impact statement represents DOE's good faith effort to fulfill NEPA's requirements within the Congressional timeline; that such effort is substantially complete; and that, in DOE's expert opinion, it has thoroughly considered the factors mandated by NEPA; and that in DOE's judgement the analysis contained therein is adequate to inform and reasonably explain DOE's final decision regarding the proposed Federal action.

7.8 Publication of an environmental impact statement

It is the policy of DOE to undertake no obligation beyond those required by NEPA. in the creation and publication of an EIS. NEPA should not unnecessarily obstruct projects, create inefficiencies, or add costs that are not mandated by statute.

(a) DOE shall file each environmental impact statement together with comments and responses it solicited with the U.S. Environmental Protection Agency (EPA), Office of Federal Activities, following EPA's filing guidance (https://www.epa.gov/nepa/environmental-impact-statement-filing-guidance). EPA will include the EIS in its weekly notice of availability published in the *Federal Register*.

(b) DOE shall publish the entire environmental impact statement, including any appendices, and DOE's decision by posting it on DOE's website consistent with NEPA (42 U.S.C. 4332(c)). During the process of preparing the environmental impact statement, DOE also may publish on its website or a website developed by a contractor such draft materials as in DOE's judgment may assist in fulfilling its responsibilities under NEPA and these procedures.

7.9 Decision

(a) DOE's decision shall come from analyzed alternatives.

(b) DOE's decision may be described in a record of decision or incorporated into a separate decision document (e.g., a DOE order).

(c) DOE's decision may be made concurrently with or at any time after the environmental impact statement is made publicly available.

8.0 Definitions

As used in these implementing procedures, terms have the meanings provided in NEPA § 111, 42 U.S.C. § 4336e. In addition:

Appendix means additional matter placed at the end of a NEPA document or in a separate volume that provides support for analysis in the NEPA document but does not include analysis of environmental effects.

Applicant means a non-Federal entity requesting financial assistance or other authorization from DOE. This has the same meaning as "project sponsor" as used in NEPA.

Authorization means any license, permit, approval, finding, determination, or other administrative decision issued by an agency that is required or authorized under Federal law in order to implement a proposed action.

CEQ means the Council on Environmental Quality.

CERCLA-excluded petroleum and natural gas products means petroleum, including crude oil or any fraction thereof, that is not otherwise specifically listed or designated as a hazardous substance under section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 U.S.C. 9601.101(14)) and natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel or of pipeline quality (or mixtures of natural gas and such synthetic gas).

Connected action means a separate Federal action within the authority of DOE that is closely related to the proposed agency action and should be addressed in a single environmental document because the proposed agency action::

(i) Automatically triggers the separate Federal action, which independently would require the preparation of additional environmental documents;

(ii) Cannot proceed unless the separate Federal action is taken previously or simultaneously; or

(iii) Is an interdependent part of a larger Federal action that includes a separate Federal action, which mutually depend on the larger Federal action for their justification.

Contaminant means a substance identified within the definition of contaminant in section 101(33) of CERCLA (42 U.S.C. 9601.101(33)).

Day means a calendar day.

DOE means the U.S. Department of Energy.

Early scoping means the period after identifying that a proposal requires NEPA review (section 2.1) and prior to DOE determining the required level of NEPA review (section 2.2). DOE may conduct this process internally and may involve external parties at its discretion.

Effects or *impacts* means changes to the human environment from the proposed action or alternatives that are reasonably foreseeable and have a reasonably close causal relationship to the proposed action or alternatives. The terms *effects* and *impacts* are used interchangeably.

(1) Effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic (such as the effects on employment), social, or health effects. Effects appropriate for analysis under NEPA may be either beneficial or adverse, or both, with respect to these values.

(2) A "but for" causal relationship is insufficient to make an agency responsible for a particular effect under NEPA. Effects should generally not be considered if they are remote in time, geographically remote, or the product of a lengthy causal chain. Effects do not include those effects that the agency has no ability to prevent due to the limits of its regulatory authority, or that would occur regardless of the proposed action, or that would need to be initiated by a third party.

Hazardous substance means a substance identified within the definition of hazardous substances in section 101(14) of CERCLA (42 U.S.C. 9601.101(14)). Radionuclides are hazardous substances through their listing under section 112 of the Clean Air Act (42 U.S.C. 7412) (40 CFR part 61, subpart H).

Human environment means comprehensively the natural and physical environment and the relationship of present and future generations of Americans with that environment.

Interim action means an action concerning a proposal that is the subject of an ongoing NEPA review and that DOE proposes to take before that NEPA review is complete, and that is permissible under NEPA.

Jurisdiction by law means agency authority to approve, veto, or finance all or part of the proposal.

Mitigation means measures that avoid, minimize, or compensate for effects caused by a proposed action or alternatives as described in an environmental document or record of decision and that have a nexus to those effects. NEPA does not mandate the form or adoption of any mitigation. Mitigation includes:

(1) Avoiding the impact altogether by not taking a certain action or parts of an action.

(2) Minimizing effects by limiting the degree or magnitude of the action and its implementation.

(3) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

(4) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

(5) Compensating for the impact by replacing or providing substitute resources or environments.

NEPA means the National Environmental Policy Act, as amended (42 U.S.C. § 4321, *et seq*.).

NEPA document means a DOE notice of intent (NOI), environmental impact statement (EIS), record of decision (ROD), environmental assessment (EA), finding of no significant impact (FONSI), supplement analysis (SA), categorical exclusion (CX) determination, or any other document prepared pursuant to a requirement of NEPA or these procedures.

NEPA process or *NEPA review* means all measures necessary for compliance with the requirements of NEPA.

Notice of Availability means a formal notice, published by EPA in the *Federal Register*, that announces the issuance and public availability of a draft or final EIS. A DOE Notice of Availability is an optional notice used to provide information to the public that may be published in the *Federal Register* or otherwise made publicly available.

Notice of early scoping means an optional public notice that DOE has identified a proposed action and is soliciting input to help DOE determine the scope of analysis and appropriate type of NEPA review.

Notice of intent means a public notice that an agency will prepare and consider an environmental document.

Pollutant means a substance identified within the definition of pollutant in section 101(33) of CERCLA (42 U.S.C.9601.101(33)).

Program means a sequence of connected or related DOE actions or projects.

Project means a specific DOE undertaking including actions approved by permit or other regulatory decision as well as Federal and federally assisted activities, which may include design, construction, and operation of an individual facility; research, development, demonstration, and testing for a process or product; financial assistance or funding for a facility, process, or product; or similar activities.

Proposed agency action or *proposed action* means the decision to be made by DOE or another Federal agency. For example, in common usage, an applicant's proposal might be to construct and operate a facility, and DOE's proposed action might be to provide financial assistance to the applicant for that proposal.

Publish and *publication* mean methods used by DOE to efficiently and effectively make environmental documents and information available for review by interested persons, including electronic publication.

Reasonable alternatives means a reasonable range of alternatives that are technically and economically feasible, meet the purpose and need for the proposed action, and, where applicable, meet the goals of the applicant.

Reasonably foreseeable means sufficiently likely to occur such that a person of ordinary prudence would take it into account in reaching a decision.

Related action means an action undertaken by an agency, *e.g.*, a permitting action, some other type of authorization action, an analysis required by statute, or the like, that bears a relationship to other actions undertaken by other agencies relevant to NEPA, *e.g.*, that a set of related actions are all related to one overarching project.

ROD means a Record of Decision.

Scope consists of the range of actions, alternatives, and effects to be considered in an environmental document. The scope of an individual statement may depend on its relationships to other statements.

Scoping means the process, whether internal or public, to identify the scope of the NEPA review.

Site-wide NEPA document means a broad-scope environmental impact statement or environmental assessment that identifies and assesses the impacts of ongoing and reasonably foreseeable future actions at a DOE site; it may also refer to an associated NEPA document, such as a notice of intent, record of decision, or finding of no significant impact.

Special expertise means statutory responsibility, agency mission, or related program experience. (42 U.S.C. § 4336e(13))

Substantially the same means that DOE and another agency are proposing actions related to the same project. For example, one agency has permitting authority and the other agency proposes to provide financial support for the same project. For another example, an agency has requested DOE assistance to work on a site, facility, or land managed by or under the jurisdiction of the requesting agency.

Supplement Analysis means a DOE document used to determine whether a supplemental EIS should be prepared (section 3.9), or to support a decision to prepare a new EIS.

Supplemental EIS means an EIS prepared to supplement a prior EIS (section 3.9).

The Secretary means the Secretary of Energy.

Tiering refers to the coverage of general matters in broader environmental impact statements or environmental assessments (such as national program or policy statements) with subsequent narrower statements or environmental analyses (such as regional or basin-wide program statements or ultimately site-specific statements) incorporating by reference the general discussions and concentrating solely on the issues specific to the statement subsequently prepared.

Appendix A: Administrative and Routine Actions Excepted from NEPA Review

[These actions were formerly identified as categorical exclusions in appendix A of subpart D in DOE's regulations. They now represent actions that are excepted from NEPA based on the definition of "major Federal action" in Section 110(10). They have been retained as appendix A for ease of reference and to avoid confusion.]

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A1 Routine DOE business actions

Routine actions necessary to support the normal conduct of DOE business limited to administrative, financial, and personnel actions.

A2 Clarifying or administrative contract actions

Contract interpretations, amendments, and modifications that are clarifying or administrative in nature.

A3 Certain actions by Office of Hearings and Appeals

Adjustments, exceptions, exemptions, appeals and stays, modifications, or rescissions of orders issued by the Office of Hearings and Appeals.

A4 Interpretations and rulings for existing regulations

Interpretations and rulings with respect to existing regulations, or modifications or rescissions of such interpretations and rulings.

A5 Interpretive rulemakings with no change in environmental effect

Rulemakings interpreting or amending an existing rule or regulation that does not change the environmental effect of the rule or regulation being amended.

A6 Procedural rulemakings

Rulemakings that are strictly procedural, including, but not limited to, rulemaking (under 48 CFR chapter 9) establishing procedures for technical and pricing proposals and establishing contract clauses and contracting practices for the purchase of goods and services, and rulemaking (under 10 CFR part 600) establishing application and review procedures for, and administration, audit, and closeout of, grants and cooperative agreements.

A7 [Reserved]

A8 Awards of certain contracts

Awards of contracts for technical support services, management and operation of a government-owned facility, and personal services.

A9 Information gathering, analysis, and dissemination

Information gathering (including, but not limited to, literature surveys, inventories, site visits, and audits), data analysis (including, but not limited to, computer modeling), document preparation (including, but not limited to, conceptual design, feasibility studies, and analytical energy supply and demand studies), and information dissemination (including, but not limited to, document publication and distribution, and classroom training and informational programs), but not including site characterization or environmental monitoring. (See also B3.1 of appendix B to these procedures.)

A10 Reports and recommendations on non-DOE legislation

Reports and recommendations on legislation or rulemaking that are not proposed by DOE.

A11 Technical advice and assistance to organizations

Technical advice and planning assistance to international, national, state, and local organizations.

A12 Emergency preparedness planning

Emergency preparedness planning activities, including, but not limited to, the designation of onsite evacuation routes.

A13 Procedural documents

Administrative, organizational, or procedural Policies, Orders, Notices, Manuals, and Guides.

A14 Approval of technical exchange arrangements

Approval of technical exchange arrangements for information, data, or personnel with other countries or international organizations (including, but not limited to, assistance in identifying and analyzing another country's energy resources, needs and options).

A15 International agreements for energy research and development

Approval of DOE participation in international “umbrella” agreements for cooperation in energy research and development activities that would not commit the U.S. to any specific projects or activities.

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B. Conditions That Are Integral Elements of the Classes of Actions in Appendix B

The classes of actions listed below include the following conditions as integral elements of the classes of actions. To fit within the classes of actions listed below, a proposal must be one that would not:

(1) Threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders;

(2) Require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities;

(3) Disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases;

(4) Have the potential to cause significant impacts on environmentally sensitive resources. An environmentally sensitive resource is typically a resource that has been identified as needing protection through Executive Order, statute, or regulation by Federal, state, or local government, or a Federally recognized Indian tribe. An action may be categorically excluded if, although sensitive resources are present, the action would not have the potential to cause significant impacts on those resources (such as construction of a building with its foundation well above a sole-source aquifer or upland surface soil removal on a site that has wetlands). Environmentally sensitive resources include, but are not limited to:

(i) Property (such as sites, buildings, structures, and objects) of historic, archeological, or architectural significance designated by a Federal, state, or local government, Federally recognized Indian tribe, or Native Hawaiian organization, or property determined to be eligible for listing on the National Register of Historic Places;

(ii) Federally-listed threatened or endangered species or their habitat (including critical habitat) or Federally-proposed or candidate species or their habitat (Endangered Species Act); state-listed or state-proposed endangered or threatened species or their habitat; Federally-protected marine mammals and Essential Fish Habitat (Marine Mammal Protection Act; Magnuson-Stevens Fishery Conservation and Management Act); and otherwise Federally-protected species (such as the Bald and Golden Eagle Protection Act or the Migratory Bird Treaty Act);

(iii) Floodplains and wetlands (as defined in 10 CFR 1022.4, "Compliance with Floodplain and Wetland Environmental Review Requirements: Definitions," or its successor);

(iv) Areas having a special designation such as Federally- and state-designated wilderness areas, national parks, national monuments, national natural landmarks, wild and scenic rivers, state and Federal wildlife refuges, scenic areas (such as National Scenic and Historic Trails or National Scenic Areas), and marine sanctuaries;

(v) Prime or unique farmland, or other farmland of statewide or local importance, as defined at 7 CFR 658.2(a), "Farmland Protection Policy Act: Definitions," or its successor;

(vi) Special sources of water (such as sole-source aquifers, wellhead protection areas, and other water sources that are vital in a region); and

(vii) Tundra, coral reefs, or rain forests; or

(5) Involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those of the Department of Agriculture, the Environmental Protection Agency, and the National Institutes of Health.

B1. Categorical Exclusions Applicable to Facility Operation

B1.1 Changing rates and prices

Changing rates for services or prices for products marketed by parts of DOE other than Power Marketing Administrations, and approval of rate or price changes for non-DOE entities, that are consistent with the change in the implicit price deflator for the Gross Domestic Product published by the Department of Commerce, during the period since the last rate or price change.

B1.2 Training exercises and simulations

Training exercises and simulations (including, but not limited to, firing-range training, small-scale and short-duration force-on-force exercises, emergency response training, fire fighter and rescue training, and decontamination and spill cleanup training) conducted under appropriately controlled conditions and in accordance with applicable requirements.

B1.3 Routine maintenance

Routine maintenance activities and custodial services for buildings, structures, rights-of-way, infrastructures (including, but not limited to, pathways, roads, and railroads), vehicles and equipment, and localized vegetation and pest control, during which operations may be suspended and resumed, provided that the activities would be conducted in a manner in accordance with applicable requirements. Custodial services are activities to preserve facility appearance, working conditions, and sanitation (such as cleaning, window washing, lawn mowing, trash collection, painting, and snow removal). Routine maintenance activities, corrective (that is, repair), preventive, and predictive, are required to maintain and preserve buildings, structures, infrastructures, and equipment in a condition suitable for a facility to be used for its designated purpose. Such maintenance may occur as a result of severe weather (such as hurricanes, floods, and tornados), wildfires, and other such events. Routine maintenance may result in replacement to the extent that replacement is in-kind and is not a substantial upgrade or improvement. In-kind replacement includes installation of new components to replace outmoded components, provided that the replacement does not result in a significant change in the expected useful life, design capacity, or function of the facility. Routine maintenance does not include replacement of a major component that significantly extends the originally intended useful life of a facility (for example, it does not include the replacement of a reactor vessel near the end of its useful life). Routine maintenance activities include, but are not limited to:

(a) Repair or replacement of facility equipment, such as lathes, mills, pumps, and presses;

(b) Door and window repair or replacement;

(c) Wall, ceiling, or floor repair or replacement;

(d) Reroofing;

(e) Plumbing, electrical utility, lighting, and telephone service repair or replacement;

(f) Routine replacement of high-efficiency particulate air filters;

(g) Inspection and/or treatment of currently installed utility poles;

(h) Repair of road embankments;

(i) Repair or replacement of fire protection sprinkler systems;

(j) Road and parking area resurfacing, including construction of temporary access to facilitate resurfacing, and scraping and grading of unpaved surfaces;

(k) Erosion control and soil stabilization measures (such as reseeding, gabions, grading, and revegetation);

(l) Surveillance and maintenance of surplus facilities in accordance with DOE Order 435.1, "Radioactive Waste Management," or its successor;

(m) Repair and maintenance of transmission facilities, such as replacement of conductors of the same nominal voltage, poles, circuit breakers, transformers, capacitors, crossarms, insulators, and downed powerlines, in accordance, where appropriate, with 40 CFR part 761 (Polychlorinated Biphenyls Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions) or its successor;

(n) Routine testing and calibration of facility components, subsystems, or portable equipment (such as control valves, in-core monitoring devices, transformers, capacitors, monitoring wells, lysimeters, weather stations, and flumes);

(o) Routine decontamination of the surfaces of equipment, rooms, hot cells, or other interior surfaces of buildings (by such activities as wiping with rags, using strippable latex, and minor vacuuming), and removal of contaminated intact equipment and other material (not including spent nuclear fuel or special nuclear material in nuclear reactors); and

(p) Removal of debris.

B1.4 Air conditioning systems for existing equipment

Installation or modification of air conditioning systems required for temperature control for operation of existing equipment.

B1.5 Existing steam plants and cooling water systems

Minor improvements to existing steam plants and cooling water systems (including, but not limited to, modifications of existing cooling towers and ponds), provided that the improvements would not: (1) Create new sources of water or involve new receiving waters; (2) have the potential to significantly alter water withdrawal rates; (3) exceed the permitted temperature of discharged water; or (4) increase introductions of, or involve new introductions of, hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products.

B1.6 Tanks and equipment to control runoff and spills

Installation or modification of retention tanks or small (normally under one acre) basins and associated piping and pumps for existing operations to control runoff or spills (such as under 40 CFR part 112). Modifications include, but are not limited to, installing liners or covers. (See also B1.33 of this appendix.)

B1.7 Electronic equipment

Acquisition, installation, operation, modification, and removal of electricity transmission control and monitoring devices for grid demand and response, communication systems, data processing equipment, and similar electronic equipment.

B1.8 Screened water intake and outflow structures

Modifications to screened water intake and outflow structures such that intake velocities and volumes and water effluent quality and volumes are consistent with existing permit limits.

B1.9 Airway safety markings and painting

Placement of airway safety markings on, painting of, and repair and in-kind replacement of lighting on powerlines and antenna structures, wind turbines, and similar structures in accordance with applicable requirements (such as Federal Aviation Administration standards).

B1.10 Onsite storage of activated material

Routine, onsite storage at an existing facility of activated equipment and material (including, but not limited to, lead) used at that facility, to allow reuse after decay of radioisotopes with short half-lives.

B1.11 Fencing

Installation of fencing, including, but not limited to border marking, that would not have the potential to significantly impede wildlife population movement (including migration) or surface water flow.

B1.12 Detonation or burning of explosives or propellants after testing

Outdoor detonation or burning of explosives or propellants that failed (duds), were damaged (such as by fracturing), or were otherwise not consumed in testing. Outdoor detonation or burning would be in areas designated and routinely used for those purposes under existing applicable permits issued by Federal, state, and local authorities (such as a permit for a RCRA miscellaneous unit (40 CFR part 264, subpart X)).

B1.13 Pathways, short access roads, and rail lines

Construction, acquisition, and relocation, consistent with applicable right-of-way conditions and approved land use or transportation improvement plans, of pedestrian walkways and trails, bicycle paths, small outdoor fitness areas, and short access roads and rail lines (such as branch and spur lines).

B1.14 Refueling of nuclear reactors

Refueling of operating nuclear reactors, during which operations may be suspended and then resumed.

B1.15 Support buildings

Siting, construction or modification, and operation of support buildings and support structures (including, but not limited to, trailers and prefabricated and modular buildings) within or contiguous to an already developed area (where active utilities and currently used roads are readily accessible). Covered support buildings and structures include, but are not limited to, those for office purposes; parking; cafeteria services; education and training; visitor reception; computer and data processing services; health services or recreation activities; routine maintenance activities; storage of supplies and equipment for administrative services and routine maintenance activities; security (such as security posts); fire protection; small-scale fabrication (such as machine shop activities), assembly, and testing of non- nuclear equipment or components; and similar support purposes, but exclude facilities for nuclear weapons activities and waste storage activities, such as activities covered in B1.10, B1.29, B1.35, B2.6, B6.2, B6.4, B6.5, B6.6, and B6.10 of this appendix.

B1.16 Asbestos removal

Removal of asbestos-containing materials from buildings in accordance with applicable requirements (such as 40 CFR part 61, “National Emission Standards for Hazardous Air Pollutants”; 40 CFR part 763, “Asbestos”; 29 CFR part 1910, subpart I, “Personal Protective Equipment”; and 29 CFR part 1926, “Safety and Health Regulations for Construction”; and appropriate state and local requirements, including certification of removal contractors and technicians).

B1.17 Polychlorinated biphenyl removal

Removal of polychlorinated biphenyl (PCB)-containing items (including, but not limited to, transformers and capacitors), PCB-containing oils flushed from transformers, PCB-flushing solutions, and PCB- containing spill materials from buildings or other aboveground locations in accordance with applicable requirements (such as 40 CFR part 761).

B1.18 Water supply wells

Siting, construction, and operation of additional water supply wells (or replacement wells) within an existing well field, or modification of an existing water supply well to restore production, provided that there would be no drawdown other than in the immediate vicinity of the pumping well, and the covered actions would not have the potential to cause significant long-term decline of the water table, and would not have the potential to cause significant degradation of the aquifer from the new or replacement well.

B1.19 Microwave, meteorological, and radio towers

Siting, construction, modification, operation, and removal of microwave, radio communication, and meteorological towers and associated facilities, provided that the towers and associated facilities would not be in a governmentally designated scenic area (see B(4)(iv) of this appendix) unless otherwise authorized by the appropriate governmental entity.

B1.20 Protection of cultural resources, fish and wildlife habitat

Small-scale activities undertaken to protect cultural resources (such as fencing, labeling, and flagging) or to protect, restore, or improve fish and wildlife habitat, fish passage facilities (such as fish ladders and minor diversion channels), or fisheries. Such activities would be conducted in accordance with an existing natural or cultural resource plan, if any.

B1.21 Noise abatement

Noise abatement measures (including, but not limited to, construction of noise barriers and installation of noise control materials).

B1.22 Relocation of buildings

Relocation of buildings (including, but not limited to, trailers and prefabricated buildings) to an already developed area (where active utilities and currently used roads are readily accessible).

B1.23 Demolition and disposal of buildings

Demolition and subsequent disposal of buildings, equipment, and support structures (including, but not limited to, smoke stacks and parking lot surfaces), provided that there would be no potential for release of substances at a level, or in a form, that could pose a threat to public health or the environment.

B1.24 Property transfers

Transfer, lease, disposition, or acquisition of interests in personal property (including, but not limited to, equipment and materials) or real property (including, but not limited to, permanent structures and land), provided that under reasonably foreseeable uses (1) there would be no potential for release of substances at a level, or in a form, that could pose a threat to public health or the environment and (2) the covered actions would not have the potential to cause a significant change in impacts from before the transfer, lease, disposition, or acquisition of interests.

B1.25 Real property transfers for cultural resources protection, habitat preservation, and wildlife management

Transfer, lease, disposition, or acquisition of interests in land and associated buildings for cultural resources protection, habitat preservation, or fish and wildlife management, provided that there would be no potential for release of substances at a level, or in a form, that could pose a threat to public health or the environment.

B1.26 Small water treatment facilities

Siting, construction, expansion, modification, replacement, operation, and decommissioning of small (total capacity less than approximately 250,000 gallons per day) wastewater and surface water treatment facilities whose liquid discharges are externally regulated, and small potable water and sewage treatment facilities.

B1.27 Disconnection of utilities

Activities that are required for the disconnection of utility services (including, but not limited to, water, steam, telecommunications, and electrical power) after it has been determined that the continued operation of these systems is not needed for safety.

B1.28 Placing a facility in an environmentally safe condition

Minor activities that are required to place a facility in an environmentally safe condition where there is no proposed use for the facility. These activities would include, but are not limited to, reducing surface contamination, and removing materials, equipment or waste (such as final defueling of a reactor, where there are adequate existing facilities for the treatment, storage, or disposal of the materials, equipment or waste). These activities would not include conditioning, treatment, or processing of spent nuclear fuel, high-level waste, or special nuclear materials.

B1.29 Disposal facilities for construction and demolition waste

Siting, construction, expansion, modification, operation, and decommissioning of small (less than approximately 10 acres) solid waste disposal facilities for construction and demolition waste, in accordance with applicable requirements (such as 40 CFR part 257,

"Criteria for Classification of Solid Waste Disposal Facilities and Practices," and 40 CFR part 61, "National Emission Standards for Hazardous Air Pollutants") that would not release substances at a level, or in a form, that could pose a threat to public health or the environment.

B1.30 Transfer actions

Transfer actions, in which the predominant activity is transportation, provided that (1) the receipt and storage capacity and management capability for the amount and type of materials, equipment, or waste to be moved already exists at the receiving site and (2) all necessary facilities and operations at the receiving site are already permitted, licensed, or approved, as appropriate. Such transfers are not regularly scheduled as part of ongoing routine operations.

B1.31 Installation or relocation of machinery and equipment

Installation or relocation and operation of machinery and equipment (including, but not limited to, laboratory equipment, electronic hardware, manufacturing machinery, maintenance equipment, and health and safety equipment), provided that uses of the installed or relocated items are consistent with the general missions of the receiving structure. Covered actions include modifications to an existing building, within or contiguous to a previously disturbed or developed area, that are necessary for equipment installation and relocation. Such modifications would not appreciably increase the footprint or height of the existing building or have the potential to cause significant changes to the type and magnitude of environmental impacts.

B1.32 Traffic flow adjustments

Traffic flow adjustments to existing roads (including, but not limited to, stop sign or traffic light installation, adjusting direction of traffic flow, and adding turning lanes), and road adjustments (including, but not limited to, widening and realignment) that are within an existing right-of-way and consistent with approved land use or transportation improvement plans.

B1.33 Stormwater runoff control

Design, construction, and operation of control practices to reduce stormwater runoff and maintain natural hydrology. Activities include, but are not limited to, those that reduce impervious surfaces (such as vegetative practices and use of porous pavements), best management practices (such as silt fences, straw wattles, and fiber rolls), and use of green infrastructure or other low impact development practices (such as cisterns and green roofs).

B1.34 Lead-based paint containment, removal, and disposal

Containment, removal, and disposal of lead-based paint in accordance with applicable requirements (such as provisions relating to the certification of removal contractors and technicians at 40 CFR part 745, "Lead-Based Paint Poisoning Prevention In Certain Residential Structures").

B1.35 Drop-off, collection, and transfer facilities for recyclable materials

Siting, construction, modification, and operation of recycling or compostable material drop-off, collection, and transfer stations on or contiguous to a previously disturbed or developed area and in an area where such a facility would be consistent with existing zoning requirements. The stations would have appropriate facilities and procedures established in accordance with applicable requirements for the handling of recyclable or compostable materials and household hazardous waste (such as paint and pesticides). Except as specified above, the collection of hazardous waste for disposal and the processing of recyclable or compostable materials are not included in this class of actions.

B1.36 Determinations of excess real property

Determinations that real property is excess to the needs of DOE and, in the case of acquired real property, the subsequent reporting of such determinations to the General Services Administration or, in the case of lands withdrawn or otherwise reserved from the public domain, the subsequent filing of a notice of intent to relinquish with the Bureau of Land Management, Department of the Interior. Covered actions would not include disposal of real property.

B2. Categorical Exclusions Applicable to Safety and Health

B2.1 Workplace enhancements

Modifications within or contiguous to an existing structure, in a previously disturbed or developed area, to enhance workplace habitability (including, but not limited to, installation or improvements to lighting, radiation shielding, or heating/ventilating/air conditioning and its instrumentation, and noise reduction).

B2.2 Building and equipment instrumentation

Installation of, or improvements to, building and equipment instrumentation (including, but not limited to, remote control panels, remote monitoring capability, alarm and surveillance systems, control systems to provide automatic shutdown, fire detection and protection systems, water consumption monitors and flow control systems, announcement and emergency warning systems, criticality and radiation monitors and alarms, and safeguards and security equipment).

B2.3 Personnel safety and health equipment

Installation of, or improvements to, equipment for personnel safety and health (including, but not limited to, eye washes, safety showers, radiation monitoring devices, fumehoods, and associated collection and exhaust systems), provided that the covered actions would not have the potential to cause a significant increase in emissions.

B2.4 Equipment qualification

Activities undertaken to (1) qualify equipment for use or improve systems reliability or (2) augment information on safety-related system components. These activities include, but are not limited to, transportation container qualification testing, crane and lift-gear certification or recertification testing, high efficiency particulate air filter testing and certification, stress tests (such as "burn-in" testing of electrical components and leak testing), and calibration of sensors or diagnostic equipment.

B2.5 Facility safety and environmental improvements

Safety and environmental improvements of a facility (including, but not limited to, replacement and upgrade of facility components) that do not result in a significant change in the expected useful life, design capacity, or function of the facility and during which operations may be suspended and then resumed. Improvements include, but are not limited to, replacement/upgrade of control valves, in-core monitoring devices, facility air filtration systems, or substation transformers or capacitors; addition of structural bracing to meet earthquake standards and/or sustain high wind loading; and replacement of aboveground or belowground tanks and related piping, provided that there is no evidence of leakage, based on testing in accordance with applicable requirements (such as 40 CFR part 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities" and 40 CFR part 280, "Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks"). These actions do not include rebuilding or modifying substantial portions of a facility (such as replacing a reactor vessel).

B2.6 Recovery of radioactive sealed sources

Recovery of radioactive sealed sources and sealed source-containing devices from domestic or foreign locations provided that (1) the recovered items are transported and stored in compliant containers, and (2) the receiving site has sufficient existing storage capacity and all required licenses, permits, and approvals.

B3. Categorical Exclusions Applicable to Site Characterization, Monitoring, and General Research

B3.1 Site characterization and environmental monitoring

Site characterization and environmental monitoring (including, but not limited to, siting, construction, modification, operation, and dismantlement and removal or otherwise proper closure (such as of a well) of characterization and monitoring devices, and siting, construction, and associated operation of a small-scale laboratory building or renovation of a room in an existing building for sample analysis). Such activities would be designed in conformance with applicable requirements and use best management practices to limit the potential effects of any resultant ground disturbance. Covered activities include, but are not limited to, site characterization and environmental monitoring under CERCLA and RCRA. (This class of actions excludes activities in aquatic environments. See B3.16 of this appendix for such activities.) Specific activities include, but are not limited to:

(a) Geological, geophysical (such as gravity, magnetic, electrical, seismic, radar, and temperature gradient), geochemical, and engineering surveys and mapping, and the establishment of survey marks. Seismic techniques would not include large-scale reflection or refraction testing;

(b) Installation and operation of field instruments (such as stream-gauging stations or flow-measuring devices, telemetry systems, geochemical monitoring tools, and geophysical exploration tools);

(c) Drilling of wells for sampling or monitoring of groundwater or the vadose (unsaturated) zone, well logging, and installation of water-level recording devices in wells;

(d) Aquifer and underground reservoir response testing;

(e) Installation and operation of ambient air monitoring equipment;

(f) Sampling and characterization of water, soil, rock, or contaminants (such as drilling using truck- or mobile- scale equipment, and modification, use, and plugging of boreholes);

(g) Sampling and characterization of water effluents, air emissions, or solid waste streams;

(h) Installation and operation of meteorological towers and associated activities (such as assessment of potential wind energy resources);

(i) Sampling of flora or fauna; and

(j) Archeological, historic, and cultural resource identification in compliance with 36 CFR part 800 and 43 CFR part 7.

B3.2 Aviation activities

Aviation activities for survey, monitoring, or security purposes that comply with Federal

Aviation Administration regulations.

B3.3 Research related to conservation of fish, wildlife, and cultural resources

Field and laboratory research, inventory, and information collection activities that are directly related to the conservation of fish and wildlife resources or to the protection of cultural resources, provided that such activities would not have the potential to cause significant impacts on fish and wildlife habitat or populations or to cultural resources.

B3.4 Transport packaging tests for radioactive or hazardous material

Drop, puncture, water-immersion, thermal, and fire tests of transport packaging for radioactive or hazardous materials to certify that designs meet the applicable requirements (such as 49 CFR 173.411 and 173.412 and 10 CFR 71.73).

B3.5 Tank car tests

Tank car tests under 49 CFR part 179 (including, but not limited to, tests of safety relief devices, pressure regulators, and thermal protection systems).

B3.6 Small-scale research and development, laboratory operations, and pilot projects

Siting, construction, modification, operation, and decommissioning of facilities for small-scale research and development projects; conventional laboratory operations (such as preparation of chemical standards and sample analysis); and small-scale pilot projects (generally less than 2 years) frequently conducted to verify a concept before demonstration actions, provided that construction or modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Not included in this category are demonstration actions, meaning actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial deployment.

B3.7 New terrestrial infill exploratory and experimental wells

Siting, construction, and operation of new terrestrial infill exploratory and experimental (test) wells, for either extraction or injection use, in a locally characterized geological formation in a field that contains existing operating wells, properly abandoned wells, or unminable coal seams containing natural gas, provided that the site characterization has verified a low potential for seismicity, subsidence, and contamination of freshwater aquifers, and the actions are otherwise consistent with applicable best practices and DOE protocols, including those that protect against uncontrolled releases of harmful materials. Such wells may include those for brine, carbon dioxide, coalbed methane, gas hydrate, geothermal, natural gas, and oil. Uses for carbon sequestration wells include, but are not limited to, the study of saline formations, enhanced oil recovery, and enhanced coalbed

methane extraction.

B3.8 Outdoor terrestrial ecological and environmental research

Outdoor terrestrial ecological and environmental research in a small area (generally less than 5 acres), including, but not limited to, siting, construction, and operation of a small-scale laboratory building or renovation of a room in an existing building for associated analysis. Such activities would be designed in conformance with applicable requirements and use best management practices to limit the potential effects of any resultant ground disturbance.

B3.9 Projects to reduce emissions and waste generation

Projects to reduce emissions and waste generation at existing fossil or alternative fuel combustion or utilization facilities, provided that these projects would not have the potential to cause a significant increase in the quantity or rate of air emissions. For this category of actions, "fuel" includes, but is not limited to, coal, oil, natural gas, hydrogen, syngas, and biomass; but "fuel" does not include nuclear fuel. Covered actions include, but are not limited to:

(a) Test treatment of the throughput product (solid, liquid, or gas) generated at an existing and fully operational fuel combustion or utilization facility;

(b) Addition or replacement of equipment for reduction or control of sulfur dioxide, oxides of nitrogen, or other regulated substances that requires only minor modification to the existing structures at an existing fuel combustion or utilization facility, for which the existing use remains essentially unchanged;

(c) Addition or replacement of equipment for reduction or control of sulfur dioxide, oxides of nitrogen, or other regulated substances that involves no permanent change in the quantity or quality of fuel burned or used and involves no permanent change in the capacity factor of the fuel combustion or utilization facility; and

(d) Addition or modification of equipment for capture and control of carbon dioxide or other regulated substances, provided that adequate infrastructure is in place to manage such substances.

B3.10 Particle accelerators

Siting, construction, modification, operation, and decommissioning of particle accelerators, including electron beam accelerators, with primary beam energy less than approximately 100 million electron volts (MeV) and average beam power less than approximately 250 kilowatts (kW), and associated beamlines, storage rings, colliders, and detectors, for research and medical purposes (such as proton therapy), and isotope

production, within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible), or internal modification of any accelerator facility regardless of energy, that does not increase primary beam energy or current. In cases where the beam energy exceeds 100 MeV, the average beam power must be less than 250 kW, so as not to exceed an average current of 2.5 milliamperes (mA).

B3.11 Outdoor tests and experiments on materials and equipment components

Outdoor tests and experiments for the development, quality assurance, or reliability of materials and equipment (including, but not limited to, weapon system components) under controlled conditions. Covered actions include, but are not limited to, burn tests (such as tests of electric cable fire resistance or the combustion characteristics of fuels), impact tests (such as pneumatic ejector tests using earthen embankments or concrete slabs designated and routinely used for that purpose), or drop, puncture, water-immersion, or thermal tests. Covered actions would not involve source, special nuclear, or byproduct materials, except encapsulated sources manufactured to applicable standards that contain source, special nuclear, or byproduct materials may be used for nondestructive actions such as detector/sensor development and testing and first responder field training.

B3.12 Microbiological and biomedical facilities

Siting, construction, modification, operation, and decommissioning of microbiological and biomedical diagnostic, treatment and research facilities (excluding Biosafety Level-3 and Biosafety Level-4), in accordance with applicable requirements and best practices (such as Biosafety in Microbiological and Biomedical Laboratories, 5th Edition, Dec. 2009, U.S. Department of Health and Human Services) including, but not limited to, laboratories, treatment areas, offices, and storage areas, within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Operation may include the purchase, installation, and operation of biomedical equipment (such as commercially available cyclotrons that are used to generate radioisotopes and radiopharmaceuticals, and commercially available biomedical imaging and spectroscopy instrumentation).

B3.13 Magnetic fusion experiments

Performing magnetic fusion experiments that do not use tritium as fuel, within existing facilities (including, but not limited to, necessary modifications).

B3.14 Small-scale educational facilities

Siting, construction, modification, operation, and decommissioning of small-scale educational facilities (including, but not limited to, conventional teaching laboratories, libraries, classroom facilities, auditoriums, museums, visitor centers, exhibits, and

associated offices) within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Operation may include, but is not limited to, purchase, installation, and operation of equipment (such as audio/visual and laboratory equipment) commensurate with the educational purpose of the facility.

B3.15 Small-scale indoor research and development projects using nanoscale materials

Siting, construction, modification, operation, and decommissioning of facilities for indoor small-scale research and development projects and small-scale pilot projects using nanoscale materials in accordance with applicable requirements (such as engineering, worker safety, procedural, and administrative regulations) necessary to ensure the containment of any hazardous materials. Construction and modification activities would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible).

B3.16 Research activities in aquatic environments

Small-scale, temporary surveying, site characterization, and research activities in aquatic environments, limited to:

(a) Acquisition of rights-of-way, easements, and temporary use permits;

(b) Installation, operation, and removal of passive scientific measurement devices, including, but not limited to, antennae, tide gauges, flow testing equipment for existing wells, weighted hydrophones, salinity measurement devices, and water quality measurement devices;

(c) Natural resource inventories, data and sample collection, environmental monitoring, and basic and applied research, excluding

(1) large-scale vibratory coring techniques and

(2) seismic activities other than passive techniques; and

(d) Surveying and mapping.

These activities would be conducted in accordance with, where applicable, an approved spill prevention, control, and response plan and would incorporate appropriate control technologies and best management practices. None of the activities listed above would occur within the boundary of an established marine sanctuary or wildlife refuge, a governmentally proposed marine sanctuary or wildlife refuge, or a governmentally recognized area of high biological sensitivity, unless authorized by the agency responsible

for such refuge, sanctuary, or area (or after consultation with the responsible agency, if no authorization is required). If the proposed activities would occur outside such refuge, sanctuary, or area and if the activities would have the potential to cause impacts within such refuge, sanctuary, or area, then the responsible agency shall be consulted in order to determine whether authorization is required and whether such activities would have the potential to cause significant impacts on such refuge, sanctuary, or area. Areas of high biological sensitivity include, but are not limited to, areas of known ecological importance, whale and marine mammal mating and calving/pupping areas, and fish and invertebrate spawning and nursery areas recognized as being limited or unique and vulnerable to perturbation; these areas can occur in bays, estuaries, near shore, and far offshore, and may vary seasonally. No permanent facilities or devices would be constructed or installed. Covered actions do not include drilling of resource exploration or extraction wells.

B4. Categorical Exclusions Applicable to Electrical Power and Transmission

B4.1 Contracts, policies, and marketing and allocation plans for electric power

Establishment and implementation of contracts, policies, and marketing and allocation plans related to electric power acquisition that involve only the use of the existing transmission system and existing generation resources operating within their normal operating limits.

B4.2 Export of electric energy

Export of electric energy as provided by Section 202(e) of the Federal Power Act over existing transmission systems or using transmission system changes that are themselves categorically excluded.

B4.3 Electric power marketing rate changes

Rate changes for electric power, power transmission, and other products or services provided by a Power Marketing Administration that are based on a change in revenue requirements if the operations of generation projects would remain within normal operating limits.

B4.4 Power marketing services and activities

Power marketing services and power management activities (including, but not limited to, storage, load shaping and balancing, seasonal exchanges, and other similar activities), provided that the operations of generating projects would remain within normal operating limits. (*See* B4.14 of this appendix for energy storage systems.)

B4.5 Temporary adjustments to river operations

Temporary adjustments to river operations to accommodate day-to-day river fluctuations, power demand changes, fish and wildlife conservation program requirements, and other external events, provided that the adjustments would occur within the existing operating constraints of the particular hydrosystem operation.

B4.6 Additions and modifications to transmission facilities

Additions or modifications to electric power transmission facilities within a previously disturbed or developed facility area. Covered activities include, but are not limited to, switchyard rock grounding upgrades, secondary containment projects, paving projects, seismic upgrading, tower modifications, load shaping projects (such as reducing energy use during periods of peak demand), changing insulators, and replacement of poles, circuit breakers, conductors, transformers, and crossarms. (See B4.14 of this appendix for energy storage systems.)

B4.7 Fiber optic cable

Adding fiber optic cables to transmission facilities or burying fiber optic cable in existing powerline or pipeline rights-of-way. Covered actions may include associated vaults and pulling and tensioning sites outside of rights-of- way in nearby previously disturbed or developed areas.

B4.8 Electricity transmission agreements

New electricity transmission agreements, and modifications to existing transmission arrangements, to use a transmission facility of one system to transfer power of and for another system, provided that no new generation projects would be involved and no physical changes in the transmission system would be made beyond the previously disturbed or developed facility area.

B4.9 Multiple use of powerline rights-of-way

Granting or denying requests for multiple uses of a transmission facility's rights-of-way (including, but not limited to, grazing permits and crossing agreements for electric lines, water lines, natural gas pipelines, communications cables, roads, and drainage culverts).

B4.10 Removal of electric transmission facilities

Deactivation, dismantling, and removal of electric transmission facilities (including, but not limited to, electric powerlines, substations, and switching stations) and abandonment and restoration of rights-of-way (including, but not limited to, associated access roads).

B4.11 Electric power substations and interconnection facilities

Construction or modification of electric power substations or interconnection facilities (including, but not limited to, switching stations and support facilities).

B4.12 Construction of powerlines

Construction of electric powerlines approximately 10 miles in length or less, or approximately 20 miles in length or less within previously disturbed or developed powerline or pipeline rights-of-way.

B4.13 Upgrading and rebuilding existing powerlines

Upgrading or rebuilding existing electric powerlines, which may involve relocations of small segments of the powerlines within an existing powerline right-of-way or within otherwise previously disturbed or developed lands (as discussed at section 5.4(b)(1)). Upgrading or rebuilding existing electric powerlines also may involve widening an existing powerline right-of-way to meet current electrical standards if the widening remains within previously disturbed or developed lands and only extends into a small area beyond such lands as needed to comply with applicable electrical standards. Covered actions would be in accordance with applicable requirements, including the integral elements listed at the start of this appendix; and would incorporate appropriate design and construction standards, control technologies, and best management practices. This categorical exclusion does not apply to underwater powerlines. As used in this categorical exclusion, "small" has the meaning discussed at section 5.4(b)(2)).

B4.14 Construction and operation of electrochemical-battery or flywheel energy storage systems

Construction, operation, upgrade, or decommissioning of an electrochemical-battery or flywheel energy storage system within a previously disturbed or developed area or within a small (as discussed at section 5.4(b)(2)) area contiguous to a previously disturbed or developed area. Covered actions would be in accordance with applicable requirements (such as land use and zoning requirements) in the proposed project area and the integral elements listed at the start of this appendix, and would incorporate appropriate safety standards (including the current National Fire Protection Association 855, Standard for the Installation of Stationary Energy Storage Systems), design and construction standards, control technologies, and best management practices.

B5. Categorical Exclusions Applicable to Conservation, Fossil, and Renewable Energy Activities

B5.1 Actions to conserve energy or water

(a) Actions to conserve energy or water, demonstrate potential energy or water conservation, and promote energy efficiency that would not have the potential to cause

significant changes in the indoor or outdoor concentrations of potentially harmful substances. These actions may involve financial and technical assistance to individuals (such as builders, owners, consultants, manufacturers, and designers), organizations (such as utilities), and governments (such as state, local, and tribal). Covered actions include, but are not limited to weatherization (such as insulation and replacing windows and doors); programmed lowering of thermostat settings; placement of timers on hot water heaters; installation or replacement of energy efficient lighting, low-flow plumbing fixtures (such as faucets, toilets, and showerheads), heating, ventilation, and air conditioning systems, and appliances; installation of drip- irrigation systems; improvements in generator efficiency and appliance efficiency ratings; efficiency improvements for vehicles and transportation (such as fleet changeout); transportation management systems (such as traffic signal control systems, car navigation, speed cameras, and automatic plate number recognition); development of energy-efficient manufacturing, industrial, or building practices; and small-scale energy efficiency and conservation research and development and small-scale pilot projects. Covered actions include building renovations or new structures, provided that they occur in a previously disturbed or developed area. Covered actions could involve commercial, residential, agricultural, academic, institutional, or industrial sectors. Covered actions do not include rulemakings, standard- settings, or proposed DOE legislation, except for those actions listed in B5.1(b) of this appendix.

(b) Covered actions include rulemakings that establish energy conservation standards for consumer products and industrial equipment, provided that the actions would not:

(1) Have the potential to cause a significant change in manufacturing infrastructure (such as construction of new manufacturing plants with considerable associated ground disturbance);

(2) involve significant unresolved conflicts concerning alternative uses of available resources (such as rare or limited raw materials);

(3) have the potential to result in a significant increase in the disposal of materials posing significant risks to human health and the environment (such as RCRA hazardous wastes); or

(4) have the potential to cause a significant increase in energy consumption in a state or region.

B5.2 Modifications to pumps and piping

Modifications to existing pump and piping configurations (including, but not limited to, manifolds, metering systems, and other instrumentation on such configurations conveying materials such as air, brine, carbon dioxide, geothermal system fluids, hydrogen gas, natural gas, nitrogen gas, oil, produced water, steam, and water). Covered modifications

would not have the potential to cause significant changes to design process flow rates or permitted air emissions.

B5.3 Modification or abandonment of wells

Modification (but not expansion) or plugging and abandonment of wells, provided that site characterization has verified a low potential for seismicity, subsidence, and contamination of freshwater aquifers, and the actions are otherwise consistent with best practices and DOE protocols, including those that protect against uncontrolled releases of harmful materials. Such wells may include, but are not limited to, storage and injection wells for brine, carbon dioxide, coalbed methane, gas hydrate, geothermal, natural gas, and oil. Covered modifications would not be part of site closure.

B5.4 Repair or replacement of pipelines

Repair, replacement, upgrading, rebuilding, or minor relocation of pipelines within existing rights-of- way, provided that the actions are in accordance with applicable requirements (such as Army Corps of Engineers permits under section 404 of the Clean Water Act). Pipelines may convey materials including, but not limited to, air, brine, carbon dioxide, geothermal system fluids, hydrogen gas, natural gas, nitrogen gas, oil, produced water, steam, and water.

B5.5 Short pipeline segments

Construction and subsequent operation of short (generally less than 20 miles in length) pipeline segments conveying materials (such as air, brine, carbon dioxide, geothermal system fluids, hydrogen gas, natural gas, nitrogen gas, oil, produced water, steam, and water) between existing source facilities and existing receiving facilities (such as facilities for use, reuse, transportation, storage, and refining), provided that the pipeline segments are within previously disturbed or developed rights-of-way.

B5.6 Oil spill cleanup

Removal of oil and contaminated materials recovered in oil spill cleanup operations and disposal of these materials in accordance with applicable requirements (such as the National Oil and Hazardous Substances Pollution Contingency Plan).

B5.7 Export of natural gas and associated transportation by marine vessel

Approvals or disapprovals of new authorizations or amendments of existing authorizations to export natural gas under section 3 of the Natural Gas Act and any associated transportation of natural gas by marine vessel.

B5.8 [Reserved]

B5.9 Temporary exemptions for electric powerplants

Grants or denials of temporary exemptions under the Powerplant and Industrial Fuel Use Act of 1978, as amended, for electric powerplants.

B5.10 Certain permanent exemptions for existing electric powerplants

For existing electric powerplants, grants or denials of permanent exemptions under the Powerplant and Industrial Fuel Use Act of 1978, as amended, other than exemptions under section 312(c) relating to cogeneration and section 312(b) relating to certain state or local requirements.

B5.11 Permanent exemptions allowing mixed natural gas and petroleum

For new electric powerplants, grants or denials of permanent exemptions from the prohibitions of Title II of the Powerplant and Industrial Fuel Use Act of 1978, as amended, to permit the use of certain fuel mixtures containing natural gas or petroleum.

B5.12 Workover of existing wells

Workover (operations to restore production, such as deepening, plugging back, pulling and resetting lines, and squeeze cementing) of existing wells (including, but not limited to, activities associated with brine, carbon dioxide, coalbed methane, gas hydrate, geothermal, natural gas, and oil) to restore functionality, provided that workover operations are restricted to the existing wellpad and do not involve any new site preparation or earthwork that would have the potential to cause significant impacts on nearby habitat; that site characterization has verified a low potential for seismicity, subsidence, and contamination of freshwater aquifers; and the actions are otherwise consistent with best practices and DOE protocols, including those that protect against uncontrolled releases of harmful materials.

B5.13 Experimental wells for injection of small quantities of carbon dioxide

Siting, construction, operation, plugging, and abandonment of experimental wells for the injection of small quantities of carbon dioxide (and other incidentally co-captured gases) in locally characterized, geologically secure storage formations at or near existing carbon dioxide sources to determine the suitability of the formations for large-scale sequestration, provided that (1) The characterization has verified a low potential for seismicity, subsidence, and contamination of freshwater aquifers; (2) the wells are otherwise in accordance with applicable requirements, best practices, and DOE protocols, including those that protect against uncontrolled releases of harmful materials; and (3) the wells and associated drilling activities are sufficiently remote so that they would not have the potential to cause significant impacts related to noise and other vibrations. Wells may be used for enhanced oil or natural gas recovery or for secure

storage of carbon dioxide in saline formations or other secure formations. Over the duration of a project, the wells would be used to inject, in aggregate, less than 500,000 tons of carbon dioxide into the geologic formation. Covered actions exclude activities in aquatic environments. (See B3.16 of this appendix for activities in aquatic environments.)

B5.14 Combined heat and power or cogeneration systems

Conversion to, replacement of, or modification of combined heat and power or cogeneration systems (the sequential or simultaneous production of multiple forms of energy, such as thermal and electrical energy, in a single integrated system) at existing facilities, provided that the conversion, replacement, or modification would not have the potential to cause a significant increase in the quantity or rate of air emissions and would not have the potential to cause significant impacts to water resources.

B5.15 Small-scale renewable energy research and development and pilot projects

Small-scale renewable energy research and development projects and small-scale pilot projects, provided that the projects are located within a previously disturbed or developed area. Covered actions would be in accordance with applicable requirements (such as local land use and zoning requirements) in the proposed project area and would incorporate appropriate control technologies and best management practices.

B5.16 Solar photovoltaic systems

(a) The installation, modification, operation, or decommissioning of commercially available solar photovoltaic systems:

(1) Located on a building or other structure (such as rooftop, parking lot or facility, or mounted to signage, lighting, gates, or fences); or

(2) Located within a previously disturbed or developed area.

(b) Covered actions would be in accordance with applicable requirements (such as land use and zoning requirements) in the proposed project area and the integral elements listed at the start of this appendix, and would be consistent with applicable plans for the management of wildlife and habitat, including plans to maintain habitat connectivity, and incorporate appropriate control technologies and best management practices.

B5.17 Solar thermal systems

The installation, modification, operation, and removal of commercially available small-scale solar thermal systems (including, but not limited to, solar hot water systems) located on or contiguous to a building, and if located on land, generally comprising less than 10 acres within a previously disturbed or developed area. Covered actions would be in

accordance with applicable requirements (such as local land use and zoning requirements) in the proposed project area and would incorporate appropriate control technologies and best management practices.

B5.18 Wind turbines

The installation, modification, operation, and removal of a small number (generally not more than 2) of commercially available wind turbines, with a total height generally less than 200 feet (measured from the ground to the maximum height of blade rotation) that (1) Are located within a previously disturbed or developed area; (2) are located more than 10 nautical miles (about 11.5 miles) from an airport or aviation navigation aid; (3) are located more than 1.5 nautical miles (about 1.7 miles) from National Weather Service or Federal Aviation Administration Doppler weather radar; (4) would not have the potential to cause significant impacts on bird or bat populations; and (5) are sited or designed such that the project would not have the potential to cause significant impacts to persons (such as from shadow flicker and other visual effects, and noise). Covered actions would be in accordance with applicable requirements (such as local land use and zoning requirements) in the proposed project area and would incorporate appropriate control technologies and best management practices. Covered actions include only those related to wind turbines to be installed on land.

B5.19 Ground source heat pumps

The installation, modification, operation, and removal of commercially available small-scale ground source heat pumps to support operations in single facilities (such as a school or community center) or contiguous facilities (such as an office complex) (1) Only where (a) major associated activities (such as drilling and discharge) are regulated, and (b) appropriate leakage and contaminant control measures would be in place (including for cross- contamination between aquifers); (2) that would not have the potential to cause significant changes in subsurface temperature; and (3) would be located within a previously disturbed or developed area. Covered actions would be in accordance with applicable requirements (such as local land use and zoning requirements) in the proposed project area and would incorporate appropriate control technologies and best management practices.

B5.20 Biomass power plants

The installation, modification, operation, and removal of small-scale biomass power plants (generally less than 10 megawatts), using commercially available technology (1) Intended primarily to support operations in single facilities (such as a school and community center) or contiguous facilities (such as an office complex); (2) that would not affect the air quality attainment status of the area and would not have the potential to cause a significant increase in the quantity or rate of air emissions and would not have the potential to cause significant impacts to water resources; and (3) would be located within

a previously disturbed or developed area. Covered actions would be in accordance with applicable requirements (such as local land use and zoning requirements) in the proposed project area and would incorporate appropriate control technologies and best management practices.

B5.21 Methane gas recovery and utilization systems

The installation, modification, operation, and removal of commercially available methane gas recovery and utilization systems installed within a previously disturbed or developed area on or contiguous to an existing landfill or wastewater treatment plant that would not have the potential to cause a significant increase in the quantity or rate of air emissions. Covered actions would be in accordance with applicable requirements (such as local land use and zoning requirements) in the proposed project area and would incorporate appropriate control technologies and best management practices.

B5.22 Alternative fuel vehicle fueling stations

The installation, modification, operation, and removal of alternative fuel vehicle fueling stations (such as for compressed natural gas, hydrogen, ethanol and other commercially available biofuels) on the site of a current or former fueling station, or within a previously disturbed or developed area within the boundaries of a facility managed by the owners of a vehicle fleet. Covered actions would be in accordance with applicable requirements (such as local land use and zoning requirements) in the proposed project area and would incorporate appropriate control technologies and best management practices.

B5.23 Electric vehicle charging stations

The installation, modification, operation, and removal of electric vehicle charging stations, using commercially available technology, within a previously disturbed or developed area. Covered actions are limited to areas where access and parking are in accordance with applicable requirements (such as local land use and zoning requirements) in the proposed project area and would incorporate appropriate control technologies and best management practices.

B5.24 Drop-in hydroelectric systems

The installation, modification, operation, and removal of commercially available small-scale, drop-in, run-of-the-river hydroelectric systems that would (1) Involve no water storage or water diversion from the stream or river channel where the system is installed and (2) not have the potential to cause significant impacts on water quality, temperature, flow, or volume. Covered systems would be located up-gradient of an existing anadromous fish barrier that is not planned for removal and where fish passage retrofit is not planned and where there would not be the potential for significant impacts to threatened or endangered species or other species of concern (as identified in B(4)(ii) of this appendix).

Covered actions would involve no major construction or modification of stream or river channels, and the hydroelectric systems would be placed and secured in the channel without the use of heavy equipment. Covered actions would be in accordance with applicable requirements (such as local land use and zoning requirements) in the proposed project area and would incorporate appropriate control technologies and best management practices.

B5.25 Small-scale renewable energy research and development and pilot projects in aquatic environments

Small-scale renewable energy research and development projects and small-scale pilot projects located in aquatic environments. Activities would be in accordance with, where applicable, an approved spill prevention, control, and response plan, and would incorporate appropriate control technologies and best management practices. Covered actions would not occur (1) Within areas of hazardous natural bottom conditions or (2) within the boundary of an established marine sanctuary or wildlife refuge, a governmentally proposed marine sanctuary or wildlife refuge, or a governmentally recognized area of high biological sensitivity, unless authorized by the agency responsible for such refuge, sanctuary, or area (or after consultation with the responsible agency, if no authorization is required). If the proposed activities would occur outside such refuge, sanctuary, or area and if the activities would have the potential to cause impacts within such refuge, sanctuary, or area, then the responsible agency shall be consulted in order to determine whether authorization is required and whether such activities would have the potential to cause significant impacts on such refuge, sanctuary, or area. Areas of high biological sensitivity include, but are not limited to, areas of known ecological importance, whale and marine mammal mating and calving/pupping areas, and fish and invertebrate spawning and nursery areas recognized as being limited or unique and vulnerable to perturbation; these areas can occur in bays, estuaries, near shore, and far offshore, and may vary seasonally. No permanent facilities or devices would be constructed or installed. Covered actions do not include drilling of resource exploration or extraction wells, use of large-scale vibratory coring techniques, or seismic activities other than passive techniques.

B5.26 Advanced nuclear reactors

Authorization, siting, construction, operation, reauthorization, and decommissioning of advanced nuclear reactors, provided DOE determines that:

(1) the project's attributes, including potential fission product inventory, fuel type, reactor design, and operational plans, reduce sufficiently the risk of adverse offsite consequences from the release of radioactive or hazardous materials, and

(2) the project demonstrates that any hazardous waste, radioactive waste, or spent nuclear fuel generated by the project can be managed in accordance with applicable

requirements.

For the purposes of this category, a project may include multiple reactors within a nuclear facility.

B6. Categorical Exclusions Applicable to Environmental Restoration and Waste Management Activities

B6.1 Cleanup actions

Small-scale, short-term cleanup actions, under RCRA, Atomic Energy Act, or other authorities, less than approximately 10 million dollars in cost (in 2011 dollars), to reduce risk to human health or the environment from the release or threat of release of a hazardous substance other than high-level radioactive waste and spent nuclear fuel, including treatment (such as incineration, encapsulation, physical or chemical separation, and compaction), recovery, storage, or disposal of wastes at existing facilities currently handling the type of waste involved in the action. These actions include, but are not limited to:

(a) Excavation or consolidation of contaminated soils or materials from drainage channels, retention basins, ponds, and spill areas that are not receiving contaminated surface water or wastewater, if surface water or groundwater would not collect and if such actions would reduce the spread of, or direct contact with, the contamination;

(b) Removal of bulk containers (such as drums and barrels) that contain or may contain hazardous substances, pollutants, contaminants, CERCLA-excluded petroleum or natural gas products, or hazardous wastes (designated in 40 CFR part 261 or applicable state requirements), if such actions would reduce the likelihood of spillage, leakage, fire, explosion, or exposure to humans, animals, or the food chain;

(c) Removal of an underground storage tank including its associated piping and underlying containment systems in accordance with applicable requirements (such as RCRA, subtitle I; 40 CFR part 265, subpart J; and 40 CFR part 280, subparts F and G) if such action would reduce the likelihood of spillage, leakage, or the spread of, or direct contact with, contamination;

(d) Repair or replacement of leaking containers;

(e) Capping or other containment of contaminated soils or sludges if the capping or containment would not unduly limit future groundwater remediation and if needed to reduce migration of hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products into soil, groundwater, surface water, or air;

(f) Drainage or closing of man-made surface impoundments if needed to maintain the integrity of the structures;

(g) Confinement or perimeter protection using dikes, trenches, ditches, or diversions, or installing underground barriers, if needed to reduce the spread of, or direct contact with, the contamination;

(h) Stabilization, but not expansion, of berms, dikes, impoundments, or caps if needed to maintain integrity of the structures;

(i) Drainage controls (such as run-off or run-on diversion) if needed to reduce offsite migration of hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum or natural gas products or to prevent precipitation or run-off from other sources from entering the release area from other areas;

(j) Segregation of wastes that may react with one another or form a mixture that could result in adverse environmental impacts;

(k) Use of chemicals and other materials to neutralize the pH of wastes;

(l) Use of chemicals and other materials to retard the spread of the release or to mitigate its effects if the use of such chemicals would reduce the spread of, or direct contact with, the contamination;

(m) Installation and operation of gas ventilation systems in soil to remove methane or petroleum vapors without any toxic or radioactive co-contaminants if appropriate filtration or gas treatment is in place;

(n) Installation of fences, warning signs, or other security or site control precautions if humans or animals have access to the release; and

(o) Provision of an alternative water supply that would not create new water sources if necessary immediately to reduce exposure to contaminated household or industrial use water and continuing until such time as local authorities can satisfy the need for a permanent remedy.

B6.2 Waste collection, treatment, stabilization, and containment facilities

The siting, construction, and operation of temporary (generally less than 2 years) pilot-scale waste collection and treatment facilities, and pilot-scale (generally less than 1 acre) waste stabilization and containment facilities (including siting, construction, and operation of a small-scale laboratory building or renovation of a room in an existing building for sample analysis), provided that the action (1) Supports remedial investigations/feasibility studies under CERCLA, or similar studies under RCRA (such as

RCRA facility investigations/corrective measure studies) or other authorities and (2) would not unduly limit the choice of reasonable remedial alternatives (such as by permanently altering substantial site area or by committing large amounts of funds relative to the scope of the remedial alternatives).

B6.3 Improvements to environmental control systems

Improvements to environmental monitoring and control systems of an existing building or structure (such as changes to scrubbers in air quality control systems or ion-exchange devices and other filtration processes in water treatment systems), provided that during subsequent operations (1) Any substance collected by the environmental control systems would be recycled, released, or disposed of within existing permitted facilities and (2) there are applicable statutory or regulatory requirements or permit conditions for disposal, release, or recycling of any hazardous substance or CERCLA-excluded petroleum or natural gas products that are collected or released in increased quantity or that were not previously collected or released.

B6.4 Facilities for storing packaged hazardous waste for 90 days or less

Siting, construction, modification, expansion, operation, and decommissioning of an onsite facility for storing packaged hazardous waste (as designated in 40 CFR part 261) for 90 days or less or for longer periods as provided in 40 CFR 262.34(d), (e), or (f) (such as accumulation or satellite areas).

B6.5 Facilities for characterizing and sorting packaged waste and overpacking waste

Siting, construction, modification, expansion, operation, and decommissioning of an onsite facility for characterizing and sorting previously packaged waste or for overpacking waste, other than high-level radioactive waste, provided that operations do not involve unpacking waste. These actions do not include waste storage (covered under B6.4, B6.6, B6.10 of this appendix) or the handling of spent nuclear fuel.

B6.6 Modification of facilities for storing, packaging, and repacking waste

Modification (excluding increases in capacity) of an existing structure used for storing, packaging, or repacking waste other than high-level radioactive waste or spent nuclear fuel, to handle the same class of waste as currently handled at that structure.

B6.7 [Reserved]

B6.8 Modifications for waste minimization and reuse of materials

Minor operational changes at an existing facility to minimize waste generation and for reuse of materials. These changes include, but are not limited to, adding filtration and

recycle piping to allow reuse of machining oil, setting up a sorting area to improve process efficiency, and segregating two waste streams previously mingled and assigning new identification codes to the two resulting wastes.

B6.9 Measures to reduce migration of contaminated groundwater

Small-scale temporary measures to reduce migration of contaminated groundwater, including the siting, construction, operation, and decommissioning of necessary facilities. These measures include, but are not limited to, pumping, treating, storing, and reinjecting water, by mobile units or facilities that are built and then removed at the end of the action.

B6.10 Upgraded or replacement waste storage facilities

Siting, construction, modification, expansion, operation, and decommissioning of a small upgraded or replacement facility (less than approximately 50,000 square feet in area) within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible) for storage of waste that is already at the site at the time the storage capacity is to be provided. These actions do not include the storage of high-level radioactive waste, spent nuclear fuel or any waste that requires special precautions to prevent nuclear criticality. (See also B6.4, B6.5, B6.6 of this appendix.)

B7. Categorical Exclusions Applicable to International Activities

B7.1 Emergency measures under the International Energy Program

Planning and implementation of emergency measures pursuant to the International Energy Program.

B7.2 Import and export of special nuclear or isotopic materials

Approval of import or export of small quantities of special nuclear materials or isotopic materials in accordance with applicable requirements (such as the Nuclear Non-Proliferation Act of 1978 and the “Procedures Established Pursuant to the Nuclear Non-Proliferation Act of 1978” (43 FR 25326, June 9, 1978)).

Appendix C: Categorical Exclusions Adopted Pursuant to NEPA Section 109

DOE has adopted the categorical exclusions listed below from other Federal agencies pursuant to section 109 of NEPA (42 U.S.C. 4336(c)). These categorical exclusions are available for use by all DOE offices pursuant to procedures contained in section 5.2. DOE's notices of adoption, cited below, may contain additional information relevant to the adoption and use of particular categorical exclusions. DOE maintains a webpage for adoptions of categorical exclusions pursuant to section 109 of NEPA, as amended (https://www.energy.gov/nepa/section-109-adopting-categorical-exclusions).

Strikeouts indicate an administrative change to the categorical exclusion text, as adopted, in alignment with Council on Environmental Quality (CEQ) guidance on categorical exclusions. CEQ's April 2026 guidance on "Establishing, Revising, Adopting, and Applying Categorical Exclusions Under the National Environmental Policy Act" provides for non-substantive changes when adopting another agency's categorical exclusion. Specifically, CEQ guidance states: "[i]f an agency needs to clarify that an adopted categorical exclusion applies to its proposed action despite non-substantive language in the categorical exclusion referencing the establishing agency, it may explain this in the public notice adopting the categorical exclusion."

U.S. Department of Agriculture Categorical Exclusions

USDA-24-1d-RD

Small-scale site-specific development. The following CEs apply to proposals where site development activities (including construction, expansion, repair, rehabilitation, or other improvements) for rural development purposes would impact not more than 10 acres of real property and would not cause a substantial increase in traffic. These CEs are identified in paragraphs (d)(24)(i)(A) through (J). This paragraph does not apply to new industrial proposals (such as ethanol and biodiesel production facilities).

. . . .

(D) Infrastructure to support utility systems such as water or wastewater facilities; headquarters, maintenance, equipment storage, or microwave facilities; and energy management systems.

(7 CFR 1b.4(d)(24)(i)(D))

DOE announced adoption of this categorical exclusion on June 16, 2026 (https://www.energy.gov/nepa/articles/doe-adoption-department-agriculture-cxs-june-16-2026).

USDA-24-3d-RD: Financial assistance for small-scale energy proposals.

. . . .

(B) Construction of electric power lines and associated facilities designed for or capable of operation at a nominal voltage of either:

(1) Less than 69 kilovolts (kV);

(2) Less than 230 kV if no more than 25 miles of line are involved; or

(3) 230 kV or greater involving no more than three miles of line, but not for the integration of major new generation resources into a bulk transmission system;

(7 CFR 1b.4(d)(24)(iii)(B))

DOE announced adoption of this categorical exclusion on June 16, 2026 (https://www.energy.gov/nepa/articles/doe-adoption-department-agriculture-cxs-june-16-2026).

USDA-34d-USFS

Post-fire rehabilitation activities, not to exceed 4,200 acres (such as tree planting, fence replacement, habitat restoration, heritage site restoration, repair of roads and trails, and repair of damage to minor facilities such as campgrounds), to repair or improve lands unlikely to recover to a management approved condition from wildland fire damage, or to repair or replace minor facilities damaged by fire. Such activities:

(i) Shall be conducted consistent with Agency and Departmental procedures and applicable land and resource management plans;

(ii) Shall not include the use of herbicides or pesticides or the construction of new permanent roads or other new permanent infrastructure; and

(iii) Shall be completed within 3 years following a wildland fire.

(7 CFR 1b.4(d)(34))

DOE announced adoption of this categorical exclusion (formerly U.S. Forest Service categorical exclusion (e)(11)) on July 23, 2024 (89 FR 59726).

USDA-35d-USFS

Harvest of live trees not to exceed 70 acres, requiring no more than 1/2 mile of temporary road construction. Do not use this category for even-aged regeneration harvest or vegetation type conversion. The proposed action may include incidental removal of trees for landings, skid trails, and road clearing. Examples include, but are not limited to:

(i) Removal of individual trees for sawlogs, specialty products, or fuelwood, and

(ii) Commercial thinning of overstocked stands to achieve the desired stocking level to increase health and vigor.

(7 CFR 1b.4(d)(35))

DOE announced adoption of this categorical exclusion on July 23, 2024 (formerly U.S. Forest Service categorical exclusion (e)(12)) (89 FR 59726).

USDA-36d-USFS

Salvage of dead and/or dying trees not to exceed 250 acres, requiring no more than 1⁄2 mile of temporary road construction. The proposed action may include incidental removal of live or dead trees for landings, skid trails, and road clearing. Examples include, but are not limited to:

(i) Harvest of a portion of a stand damaged by a wind or ice event and construction of a short temporary road to access the damaged trees, and

(ii) Harvest of fire-damaged trees.

(7 CFR 1b.4(d)(36))

DOE announced adoption of this categorical exclusion (formerly U.S. Forest Service categorical exclusion (e)(13)) on July 23, 2024 (89 FR 59726).

USDA-37d-USFS

Commercial and noncommercial sanitation harvest of trees to control insects or disease not to exceed 250 acres, requiring no more than 1/2 mile of temporary road construction, including removal of infested/infected trees and adjacent live uninfested/uninfected trees as determined necessary to control the spread of insects or disease. The proposed action may include incidental removal of live or dead trees for landings, skid trails, and road clearing. Examples include, but are not limited to:

(i) Felling and harvest of trees infested with southern pine beetles and immediately adjacent uninfested trees to control expanding spot infestations, and

(ii) Removal and/or destruction of infested trees affected by a new exotic insect or disease, such as emerald ash borer, Asian long horned beetle, and sudden oak death pathogen.

(7 CFR 1b.4(d)(37))

DOE announced adoption of this categorical exclusion (formerly U.S. Forest Service categorical exclusion (e)(14)) on July 23, 2024 (89 FR 59726).

USDA-40d-USFS

Restoring wetlands, streams, riparian areas or other water bodies by removing, replacing, or modifying water control structures such as, but not limited to, dams, levees, dikes, ditches, culverts, pipes, drainage tiles, valves, gates, and fencing, to allow waters to flow into natural channels and floodplains and restore natural flow regimes to the extent practicable where valid existing rights or special use authorizations are not unilaterally altered or canceled. Examples include but are not limited to:

(i) Repairing an existing water control structure that is no longer functioning properly with minimal dredging, excavation, or placement of fill, and does not involve releasing hazardous substances;

(ii) Installing a newly-designed structure that replaces an existing culvert to improve aquatic organism passage and prevent resource and property damage where the road or trail maintenance level does not change;

(iii) Removing a culvert and installing a bridge to improve aquatic and/or terrestrial organism passage or prevent resource or property damage where the road or trail maintenance level does not change; and

(iv) Removing a small earthen and rock fill dam with a low hazard potential classification that is no longer needed.

(7 CFR 1b.4(d)(40))

DOE announced adoption of this categorical exclusion (formerly U.S. Forest Service categorical exclusion (e)(18)) on July 23, 2024 (89 FR 59726).

USDA-41d-USFS

Removing and/or relocating debris and sediment following disturbance events (such as floods, hurricanes, tornados, mechanical/engineering failures, etc.) to restore uplands, wetlands, or riparian systems to pre-disturbance conditions, to the extent practicable, such that site conditions will not impede or negatively alter natural processes. Examples include but are not limited to:

(i) Removing an unstable debris jam on a river following a flood event and relocating it back in the floodplain and stream channel to restore water flow and local bank stability;

(ii) Clean-up and removal of infrastructure flood debris, such as, benches, tables, outhouses, concrete, culverts, and asphalt following a hurricane from a stream reach and adjacent wetland area; and

(iii) Stabilizing stream banks and associated stabilization structures to reduce erosion through bioengineering techniques following a flood event, including the use of living and nonliving plant materials in combination with natural and synthetic support materials, such as rocks, riprap, geo-textiles, for slope stabilization, erosion reduction, and vegetative establishment and establishment of appropriate plant communities (bank shaping and planting, brush mattresses, log, root wad, and boulder stabilization methods).

(7 CFR 1b.4(d)(41))

DOE announced adoption of this categorical exclusion (formerly U.S. Forest Service categorical exclusion (e)(19)) on July 23, 2024 (89 FR 59726).

USDA-42d-USFS

Activities that restore, rehabilitate, or stabilize lands occupied by roads and trails, including unauthorized roads and trails and National Forest System roads and National Forest System trails, to a more natural condition that may include removing, replacing, or modifying drainage structures and ditches, reestablishing vegetation, reshaping natural contours and slopes, reestablishing drainage-ways, or other activities that would restore site productivity and reduce environmental impacts. Examples include but are not limited to:

(i) Decommissioning a road to a more natural state by restoring natural contours and removing construction fills, loosening compacted soils, revegetating the roadbed and removing ditches and culverts to reestablish natural drainage patterns;

(ii) Restoring a trail to a natural state by reestablishing natural drainage patterns, stabilizing slopes, reestablishing vegetation, and installing water bars; and

(iii) Installing boulders, logs, and berms on a road segment to promote naturally regenerated grass, shrub, and tree growth.

(7 CFR 1b.4(d)(42))

DOE announced adoption of this categorical exclusion (formerly U.S. Forest Service categorical exclusion (e)(20)) on July 23, 2024 (89 FR 59726).

U.S. Department of Homeland Security, U.S. Coast Guard, Categorical Exclusion

L14

~~Coast Guard~~ [N]ew construction upon, or improvement of, land where all of the following conditions are met:

(a) The structure and proposed use are substantially in compliance with prevailing local planning and zoning standards.

(b) The site is on heavily developed property and/or located on a previously disturbed site in a developed area.

(c) The proposed use will not substantially increase the number of motor vehicles at the facility.

(d) The site and scale of construction are consistent with those of existing, adjacent, or nearby buildings.

(U.S. Department of Homeland Security Instruction Manual 023-01-001-01, Revision 01, Appendix A, Table 1)

DOE announced adoption of this categorical exclusion on July 13, 2026 (https://www.energy.gov/nepa/articles/doe-adoption-us-coast-guard-cx-l14-july-13-2026).