U.S. DEPARTMENT OF ENERGY

National Transmission Needs Study: Supplemental Material

Draft for Consultation and Public Comment
July 2026

United States Department of Energy
Washington, DC 20585

Executive Summary

This material supplements the United States Department of Energy's *2026 National Transmission Needs Study Consultation and Public Comment Draft* (Needs Study or Needs Study Public Draft). Material here provides additional context, methodology, and data associated with information in the Needs Study. This document is organized to match the section numbers and headers of the Needs Study when appropriate; section numbering is therefore not sequential.

Acronyms and Abbreviations

Abbreviation	Term
Btu	British thermal unit
CAISO	California Independent System Operator
CC	combined-cycle
CT	combustion turbine
DOE	U.S. Department of Energy
EIA	Energy Information Administration
ERCOT	Electric Reliability Council of Texas
FRCC	Florida Reliability Coordinating Council
GRIP	Grid Resilience and Innovation Partnership
GW	gigawatt
ISO	independent system operator
ISO-NE	ISO New England
ITCS	Interregional Transfer Capability Study
JTIQ	Joint Targeted Interconnection Queue
kV	kilovolt
kWh	kilowatt-hour
LBNL	Lawrence Berkeley National Laboratory
MMBtu	million British thermal unit
MW	megawatt
MWh	megawatt-hour
MRO	Midwest Reliability Organization
Needs Study/Needs Study Public Draft	2026 National Transmission Needs Study: Consultation and Public Comment Draft
NERC	North American Electric Reliability Corporation
NLR	National Laboratory of the Rockies
NREL	National Renewable Energy Laboratory
NYISO	New York Independent System Operator
PJM	PJM Interconnection
ReEDS	Regional Energy Deployment System
RFC	Reliability First Corporation
RTO	regional transmission organization
SERC	SERC Corporation
SERTP	Southeastern Regional Transmission Planning
SPP	Southwest Power Pool
Texas RE	Texas Reliability Entity
U.S.	United States
WECC	Western Electricity Coordinating Council

NATIONAL TRANSMISSION NEEDS STUDY: SUPPLEMENTAL MATERIAL

Table of Contents

Tables

Figures

Section IV. Historical Transmission Investment

The United States (U.S.) Department of Energy (DOE) subscribed to Yes Energy's Infrastructure Insights: Electric Transmission & Distribution Project Database (Yes Energy, 2025) to access data on historical transmission builds DOE staff exported data from the database in January 2025 to inform the analysis contained in the *2026 National Transmission Needs Study* (Needs Study) Public Draft; therefore, it is possible the underlying data has been updated since this analysis was conducted.

Yes Energy's database tracks key project elements from early ideation through maturation for both historical and anticipated electric transmission projects in North America. The database includes information about terminated, active, proposed, and conceptual transmission lines rated 69 kilovolts (kV) or higher. Additionally, the Yes Energy database includes information about each transmission project's sponsor, regional reliability entity, regional transmission organization/independent system operator (RTO/ISO), terminal locations, electrical data, cost data, voltage, and project status. DOE staff converted all project cost data to 2024 U.S. dollars using the annual average consumer price index retroactive series from the U.S. Bureau of Labor Statistics (Census, 2025).

In most cases, transmission data were assigned to a transmission planning subregion grouping depicted in 2026 Needs Study Public Draft Figure III-4 depending on the relevant state(s), RTO/ISO, and North American Electric Reliability Corporation (NERC) reliability entity (if applicable) in which its two termination points are located. If a line terminated in two different regions, or nations, then it was classified as an "interregional" project. The predominant states, RTOs/ISOs, and NERC reliability entities within each transmission planning subregion are listed in Table S-1.

DOE staff sorted transmission data using Table S-1 in the following manner:

1. If the RTO/ISO and NERC region cells were blank, staff then assumed the entire state in the first column belongs to the 2026 Needs Study Public Draft transmission planning subregion in the last column. Blank RTO/ISO or NERC region fields in this map do not mean that no RTO/ISO or NERC Region is assigned, but rather that the mapping is done solely by a preceding data field.
2. If multiple rows for a single state were listed, differences between RTO/ISOs were used to assign a Needs Study transmission planning subregion. A blank value in the RTO/ISO field means all other locations in that state, aside from the RTO/ISO locations listed in other rows for that state, places transmission data in the appropriate transmission planning subregion.
3. If multiple states and RTO/ISO regions were listed, DOE staff used differences in NERC regional entities to assign the appropriate transmission planning subregion.

Table S-1. Transmission projects were organized into different regions according to terminating states, RTOs/ISOs, and NERC reliability entities. Refer to Needs Study Figures III-1 through III-4 to understand the geographic regions and different power sector entities within each.

State	RTO or ISO (FERC Planning)	NERC Regional Entity	2026 Needs Study Transmission Planning Subregion
AK			Alaska
AL			SERTP
AR	Southwest Power Pool		SPP South
AR			MISO South
AZ			WestConnect South
CA	Northern Grid		NorthernGrid South
CA			CAISO
CO			WestConnect North
CT			ISO-NE
DC			PJM East
DE			PJM East
FL		FRCC	FRCC
FL			SERTP
GA			SERTP
HI			Hawaii
IA			MISO North
ID			NorthernGrid East
IL	PJM Interconnection		PJM West
IL			MISO Central
IN			MISO Central
KS			SPP South
KY	PJM Interconnection		PJM East
KY	Midcontinent ISO		MISO Central
KY			SERTP
LA			MISO South
MA			ISO-NE

State	RTO or ISO (FERC Planning)	NERC Regional Entity	2026 Needs Study Transmission Planning Subregion
MD			PJM East
ME			ISO-NE
MI	PJM Interconnection		PJM East
MI	Midcontinent ISO	RFC	MISO Central
MI			MISO North
MN			MISO North
MO	Southwest Power Pool		SPP South
MO			MISO Central
MS	Midcontinent ISO		MISO South
MS			SERTP
MT		MRO	SPP North
MT			NorthernGrid East
NC			SERTP
ND	Midcontinent ISO		MISO North
ND			SPP North
NE			SPP North
NH			ISO-NE
NJ			PJM East
NM	Southwest Power Pool		SPP South
NM			WestConnect South
NV			NorthernGrid South
NY			NYISO
OH			PJM East
OK			SPP South
OR			NorthernGrid West
PA			PJM East
RI			ISO-NE
SC			SERTP
SD		WECC	WestConnect North

State	RTO or ISO (FERC Planning)	NERC Regional Entity	2026 Needs Study Transmission Planning Subregion
SD			SPP North
TN			SERTP
TX		TRE	ERCOT
TX		WECC	WestConnect South
TX		SERC	MISO South
TX			SPP South
UT			NorthernGrid South
VA			PJM East
VT			ISO-NE
WA			NorthernGrid West
WI			MISO North
WV			PJM East
WY	Northern Grid		NorthernGrid East
WY			WestConnect South

The Yes Energy database project data captured in this study are linked to one of eight primary drivers. Primary driver definitions are as follows:

- **Aging Infrastructure:** projects built in response to infrastructure that is reaching its end of service, which can cause a decline in condition and/or require modernization upgrades
- **Economic Congestion:** projects that reduce production costs and lower transmission system congestion or are associated with non-incumbent developers to lease transmission capacity to utilities
- **Generation:** projects that are installed for the transmission of electricity from new or modified generation facilities
- **Hardening/Security:** projects that are installed to bolster physical and/or cybersecurity, as well as storm and/or fire hardening
- **Load Growth:** projects responding to system capacity requirements and accommodating an increase in electrical demand
- **Public Policy:** projects driven by government policies, targets, or goals
- **Reliability:** projects driven by the need to ensure that a system can meet certain reliability performance standards for a given period
- **Unknown/Other:** projects with unknown drivers or drivers that were not captured in the above metrics

Load-weighted figures were developed using load data from multiple sources. Regional load data for all regions except Hawaii and Alaska were obtained from National Renewable Energy Laboratory *2023 Standard Scenarios Report* (NREL, 2024). The data retrieved from the *2023 Standard Scenarios Report* are end-use load for 2024 from the Mid-case Current Policies scenario. Alaska and Hawaii load data were obtained from Energy Information Administration (EIA) State Electricity Profiles (EIA, 2025). As 2024 electricity demand data for Alaska and Hawaii were not yet available at the time of analysis, DOE assumed 2024 demand is equal to 2023 demand. Total annual retail sales, measured in MWh (megawatt-hours), were used as annual load, which is the net energy consumed by each state and does not include any energy generated behind-the-meter, such as distributed rooftop solar. These energy values more accurately reflect the energy that must be delivered across the transmission system to end-use customers. Load data were aggregated into the 20 different regions using the transmission planning subregion boundaries shown in Needs Study Figure III-4.

Section V. Reliability and Resilience

Section V.a. National and Interregional System Congestion and Transfer Capabilities

Visibility into Southeast Transmission Value *(Forthcoming LBNL-NLR Report)*

Because the publication of Lawrence Berkeley National Laboratory (LBNL)'s and National Laboratory of the Rockies (NLR)'s recent study assessing the value of transmission in the Southeast is forthcoming, additional details on study methods and additional results are provided.

Methods

The analysis applies interconnection-level production cost modeling to assess interregional transmission in the southeastern U.S. for the near-term (modeling based on recent years). It uses the commercially available PLEXOS software (Energy Exemplar, 2025), which conducts cost-optimal unit commitment and dispatch of the modeling footprint, as shown in Figure S-1. The model includes a zonal representation of the transmission system, in which each balancing region (shown in light gray and dark gray boundaries) is represented by a single node. The zonal transmission topology as well as the generation fleet were initially populated by NLR's Regional Energy Deployment System (ReEDS) for the year 2023.[1] As the study focuses on a retrospective simulation with no future scenarios, ReEDS served only as a starting point to create a zonal production cost model dataset for PLEXOS using the tool R2X.[2] Given this dataset, PLEXOS conducts a chronological simulation each day of a given time horizon with hourly resolution. It has information about marginal generation costs (including fuel cost, heat rate, and variable operating and maintenance costs) and generator start-up costs. It balances hourly generation and electricity demand given the constraints of each generator (ramp rates, maximum and minimum generation levels, maximum and minimum up and down times) and the constraints of the transmission system. Hourly profiles for load, wind, and solar are derived from NLR's Renewable Energy Potential (reV) model.[3] In addition, PLEXOS ensures provision of sufficient operating reserves, which means allowing for sufficient available generator capacity to provide for continency events, maintain system frequency, and address forecast errors. The PLEXOS simulations use version 9.2000R06 of the software and version 10.0.1 of the Gurobi solver.

Initially, the study team conducted a benchmarking exercise to examine historical generation and flow data from the EIA. Following this benchmarking, manual adjustments were made to the model to match overall generation mix and general transmission flows. Figure S-2

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[1] ReEDS is an open-source model used for long-term capacity expansion planning studies, and can be found at https://github.com/NatLabRockies/ReEDS-2.0.

[2] R2X is a model translation framework that is released under a Berkeley Software Distribution (BSD) 3-Clause License under software record SWR-24-91 through the NLR, and can be found at https://github.com/NatLabRockies/R2X and https://www.osti.gov/doecode/biblio/143956.

[3] The reV model is also open source and can be found at https://github.com/NatLabRockies/reV.

shows the final comparison of the overall generation capacity mix (right) and dispatch (left) for the Southeast against the 2023 historical year. The overall total generation is slightly higher (4%) as modeled because of mismatches in the geographic region footprint compared for benchmarking.

The approach for this study was to layer modeling complexities on a simplified base case and observe the effect on transmission metrics. These modeling complexities included: (1) time-varying natural gas prices, (2) detailed generator heat rates, (3) day-ahead load forecast error, (4) interannual variability caused by weather conditions and fuel prices, and (5) temperature-correlated outages. The methods and data sources for each of these complexities are detailed below.

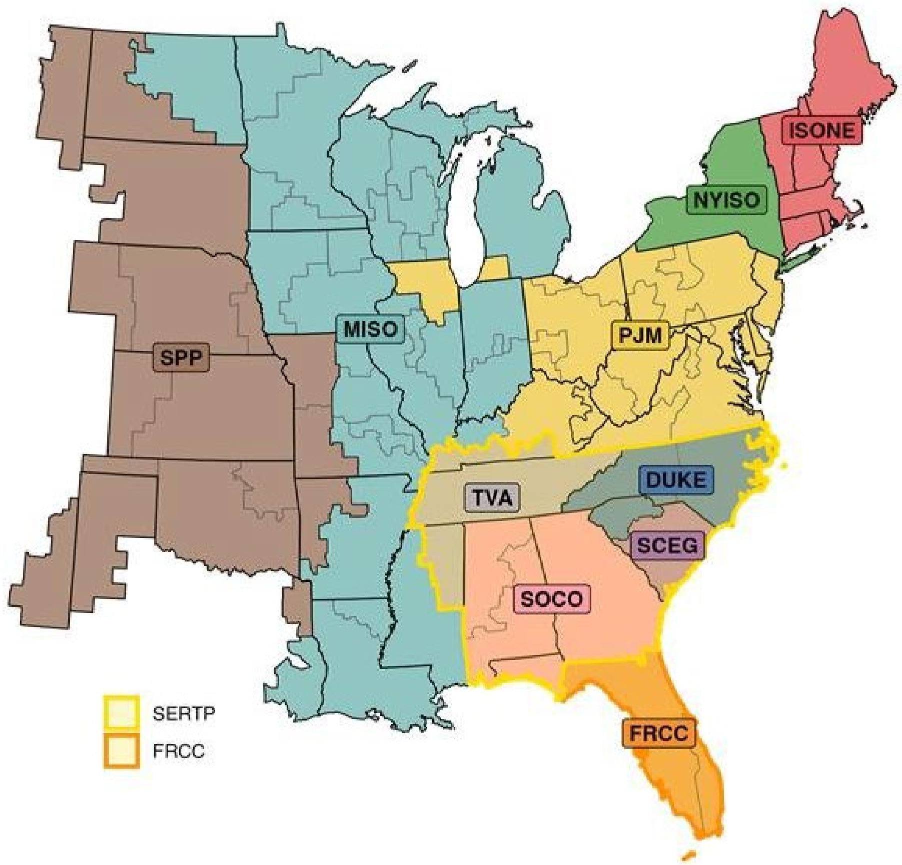

Figure S-1. The modeling footprint includes the entire U.S. portion of the Eastern Interconnection, focusing on the two Southeast regions, Southeastern Regional Transmission Planning (SERTP) and Florida Reliability Coordinating Council (FRCC).

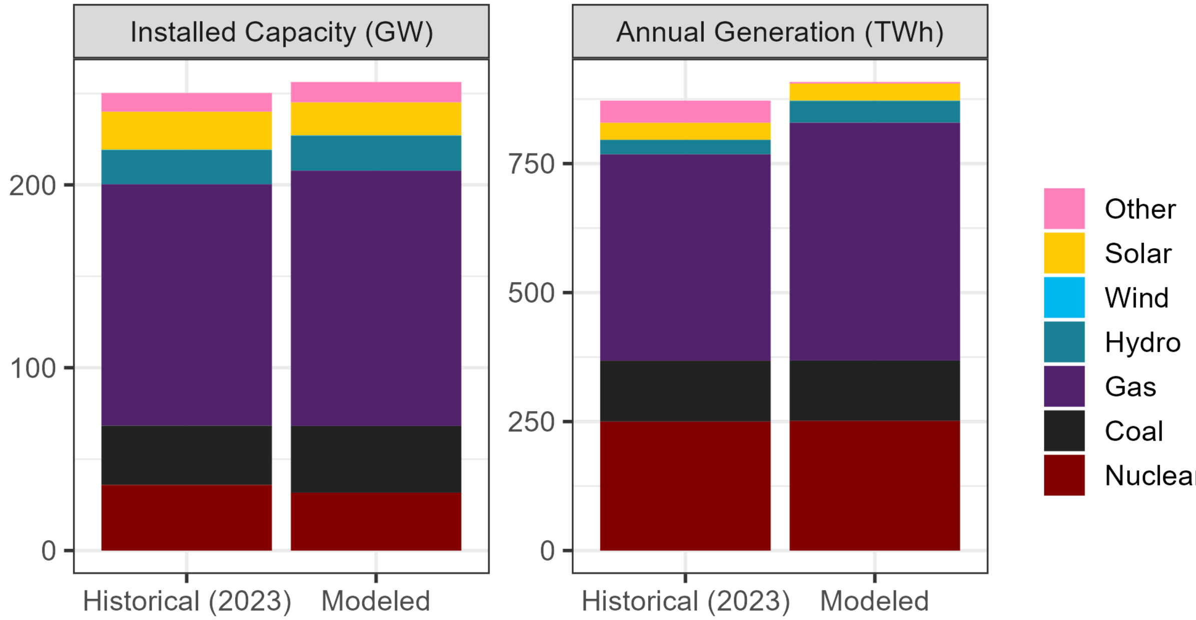

Figure S-2. Comparison of historical capacity and generation for 2023 to the modeled system for the southeastern United States.

Natural gas prices can affect electricity prices. In many regions and hours of the year, natural gas generators (combined-cycle or combustion turbines) are the generators on the margin of the system (meaning that if demand increased by a fractional amount, they would increase their output to meet that demand) and thus set the locational marginal prices. Having one representative price for a full year can hide time-varying price dynamics. Baseline natural gas prices are derived from the EIA's Annual Energy Outlook projections and input to PLEXOS through the ReEDS database. These Annual Energy Outlook projections are provided for U.S. census divisions at annual resolution, with seasonal multipliers to reflect winter and summer price differences. For the more detailed approach, daily gas prices are calculated from hourly spot prices using Velocity Suite data (Hitachi, 2025). The resulting daily gas prices, averaged over the full Eastern Interconnection, are shown in Figure S-3 for the years 2016–2023.

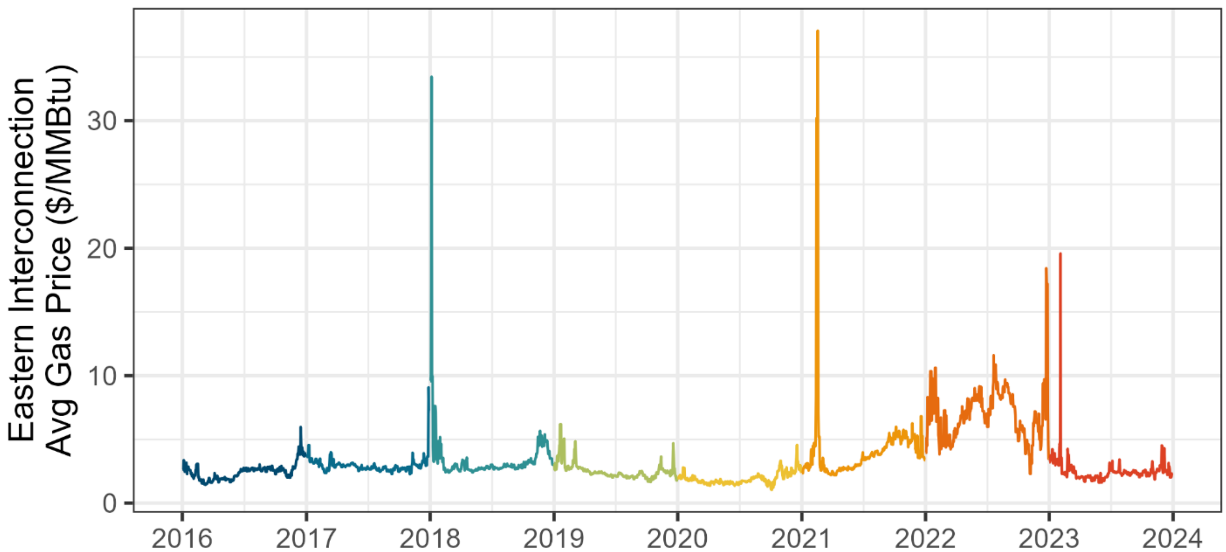

Figure S-3. Average daily natural gas price in nominal $/MMBtu for the Eastern Interconnection, 2016 through 2023.

ReEDS (and thus the system translated with R2X as discussed above) simplifies the representation of the existing generation fleet by binning plants with common performance characteristics, with heat rate being the primary factor considered for binning. This simplification helps reduce run time and is less important for considering long-term investments compared with day-to-day operations. Binning is performed using a k-means clustering algorithm for each region and technology category (e.g., natural gas combined-cycles). Plants can be categorized in separate bins if the difference in their heat rates is above a minimum deviation, typically set at 50 BTU/kWh. Users can specify the maximum number of bins, with the default being set at six bins as is used here. Plants in each bin are assigned the capacity-weighted average heat rate for that bin. A description of the binning procedure used in ReEDS can be found in the model documentation.[4] For a more detailed heat rate analysis, unit-specific heat rates were applied using data purchased from Velocity Suite (Hitachi, 2025). A comparison of this unit-specific data to the original dataset (labeled as R2X) is shown in Figure S-4. Although Figure S-4 indicates similar average fleet heat rates (as indicated by the vertical black lines), there is generally more spread and variation in the Velocity Suite data. For instance, the R2X dataset contains nearly 600 natural gas combined-cycle generators with an identical heat rate, whereas the Velocity Suite indicates more spread in that category.

[4] ReEDS documentation can be found on GitHub at https://github.com/NatLabRockies/ReEDS-2.0.

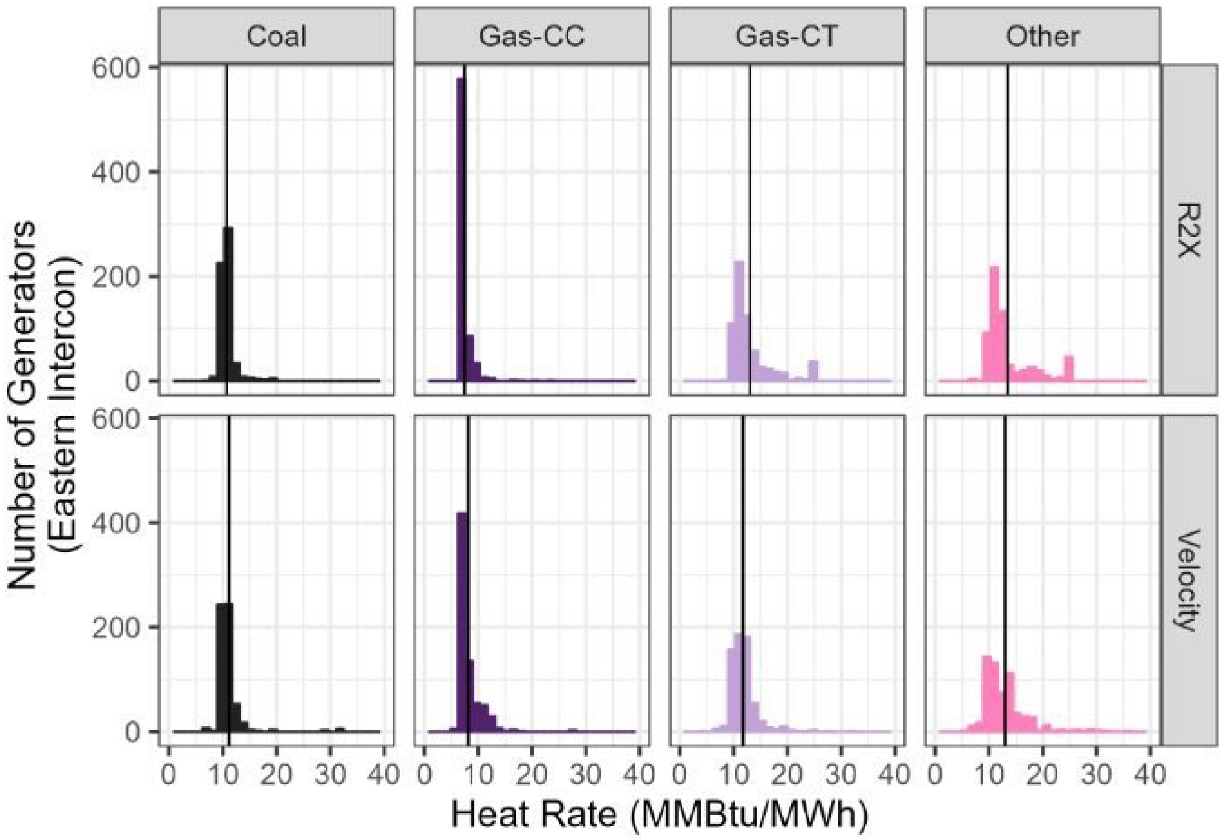

Figure S-4. Heat rate histogram for individual generator types in the Eastern Interconnection. Although the simplified dataset (R2X) and unit-specific dataset show similar mean heat rates in each category, the efficiencies are more spread out in the Velocity dataset.

Considering only a singular weather year or historical year can miss interannual variation that can be affected by weather, market dynamics, and geopolitics (through natural gas prices). To compare variation across a longer timeframe, the study was extended to examine 2016 through 2023. The generation mix or transmission capacity was not changed to match the mix and capacity from those historical years, but load, wind generation, and solar generation profiles were incorporated to capture the weather impacts across the study period. The historical daily-varying gas price was also incorporated into the multiyear modeling effort (Figure S-3). Figure S-5 shows the annual summary of load, wind generation, solar generation, and annual average gas fuel price across the years.

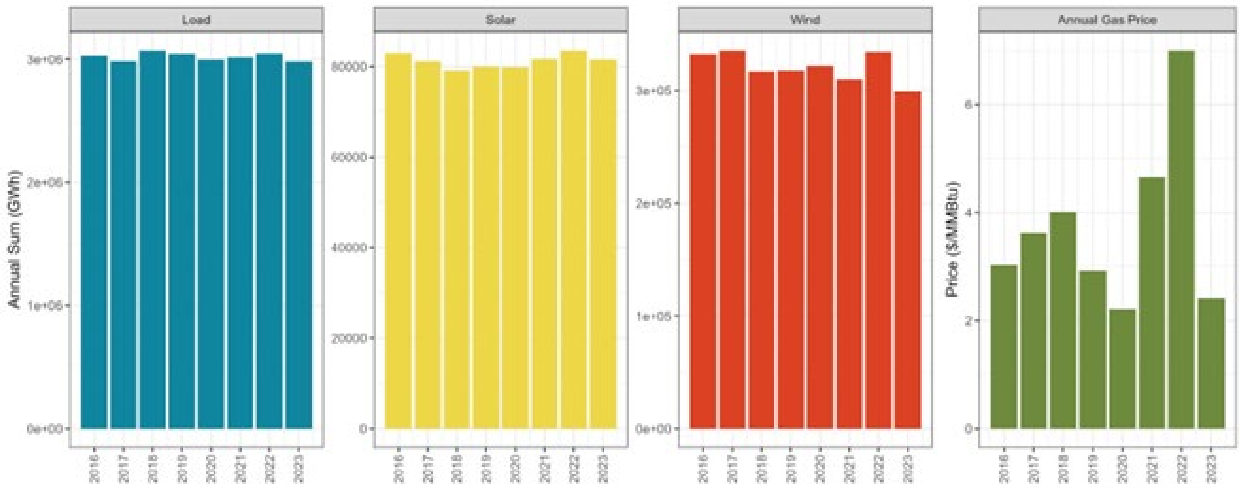

Figure S-5. Comparison of weather years 2016 through 2023 for the Eastern Interconnection.

Another component of modeling focused on a realistic representation of load uncertainty. LBNL and NLR (2026) computed day-ahead load forecasts by applying balancing area-specific historical percentage forecast errors from EIA-930 data to our modeled data. In hours for which regions were missing historical forecast data, the authors assumed zero forecast error (perfect forecasts).

Figure S-6 shows a summary of the 2023 day-ahead forecast error for just the Southeast. The figure shows that in the Southeast, load forecast errors have a slight under-forecast bias, indicating that real-time load is larger than the forecasted load.

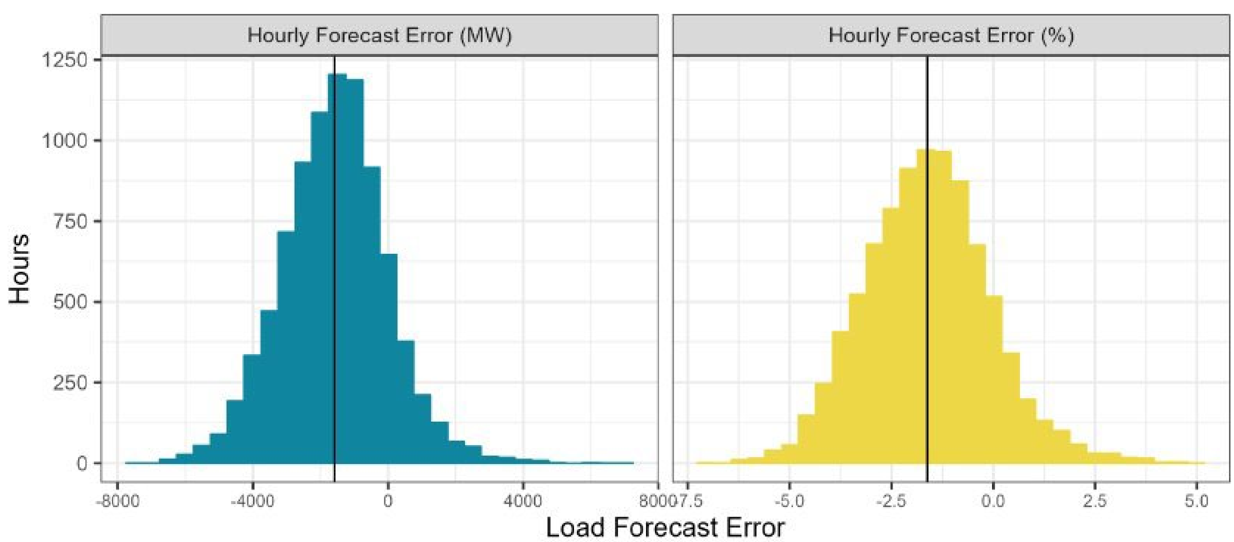

Figure S-6. Comparison of load forecast error for the Southeast region in percentage (right) and absolute amount (left).

The original simplified model contains simplified data on the forced outage rate (expressed as a flat percentage over the year, which varies slightly by generator type) and the mean time to repair. The model does a single deterministic draw of those random outages to determine when they will occur. This simplified representation does not account for the various ways in which these outages can be correlated with weather conditions. For instance, an analysis of PJM outages shows a clear relationship between thermal generator outage rate and temperature (Applied Energy, 2019). During both cold weather and extreme heat, generator outage failure rates increase. Therefore, a probabilistic resource adequacy tool[5] was used to simulate a "temperature-correlated" random draw as a function of temperature for each of the modeled years. Figure S-7 shows the results of the original "random" outage profile compared with the "correlated" outage for the years 2022 and 2023. The correlated outage profile indicates higher numbers of units out during the warmer summer months and during the coldest winter months (December and January) as well. Winter Storm Elliott, which occurred late in 2022, is also visible as a spike in generator outage.

[5] The Probabilistic Resource Adequacy Suite is an open-source collection of tools for analyzing the resource adequacy of bulk power systems (*see* https://www.nlr.gov/analysis/pras), and can be found on GitHub at https://github.com/NatLabRockies/PRAS.

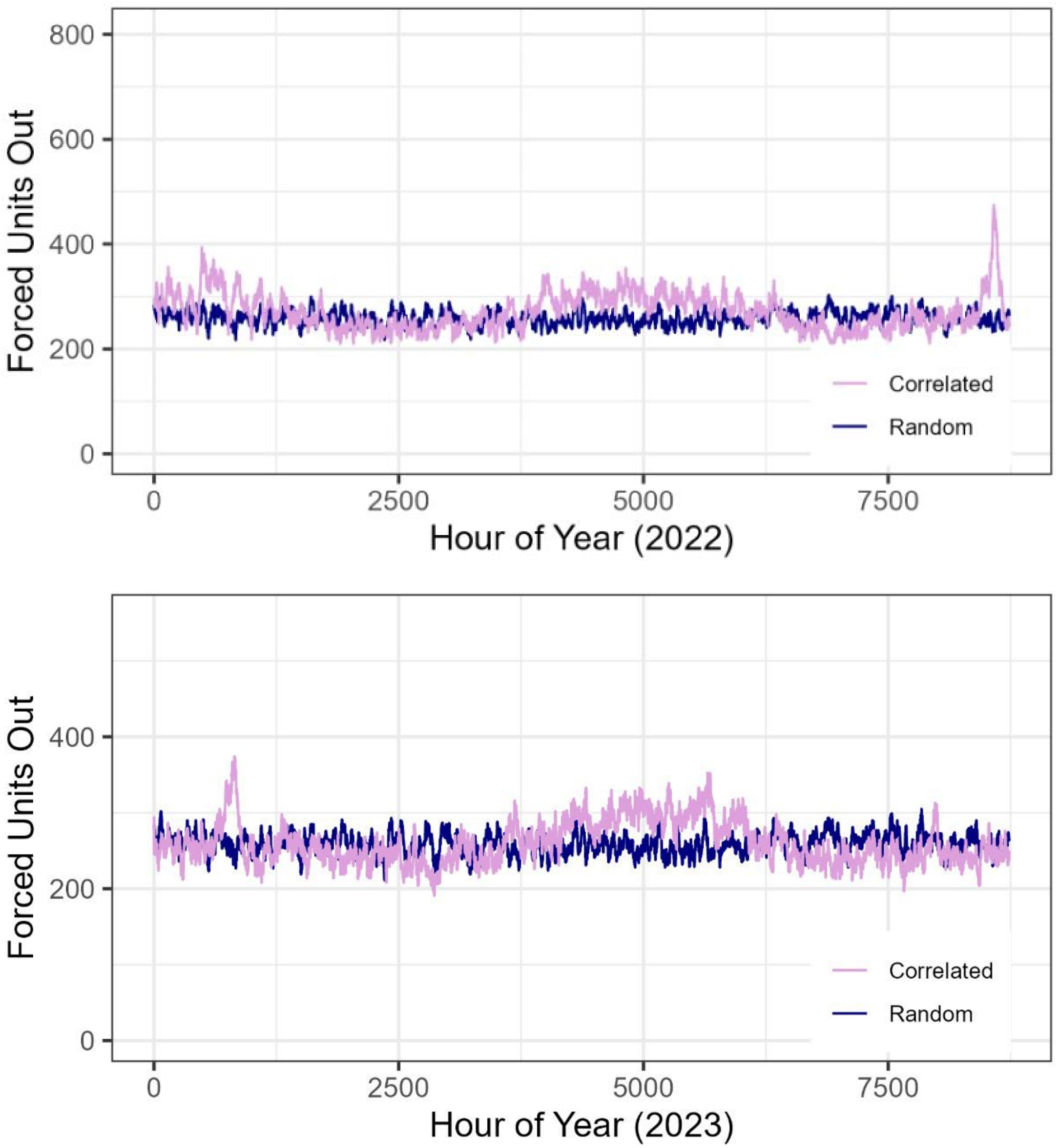

Figure S-7. Total number of units forced out (unplanned) for the whole Eastern Interconnection for 2022 (top) and 2023 (bottom). The random outages represent uniform probability throughout the year, whereas the correlated outages account for temperature changes.

Additional Results

The modeling team found that the transmission metrics were sensitive to the input assumptions and parameterizations used, especially related to the treatment of natural gas prices, generator outage parameterization, generator heat rate assumptions, and representation of multiple years. Additional results about outage parameterization compiled in this section provide insight into how these input variables were parameterized in the model. Additionally, the section includes details on the distribution of modeled prices, providing insight into the mechanisms that drive transmission value.

For more analysis of the temperature-correlated outages compared with the original random outages, Figure S-8 shows the simulated natural gas outages in the Southeast by temperature bin. The orange correlated boxes are five individual temperature-correlated draws. The figure indicates that including the influence of temperature on the probability of an outage shifts generator outages toward times with higher and lower temperatures (summer and winter, respectively). Note that there are fewer hours in the Southeast with very low (and very high) temperatures, leading to more variation in the extremes. This observation can be seen chronologically for 2021–2023 in Figure S-9. Figure S-9 indicates higher outages in the summer (July–August) associated with summer temperatures. Winter Storm Elliott (which occurred near the very end of 2022) is also visible as a spike in the orange. Note that this figure only shows the Southeast, whereas Figure S-7 shows the whole Eastern Interconnection. Generally, the Southeast experiences milder temperatures during the winter given the lower latitudes but can experience higher temperatures during the summer.

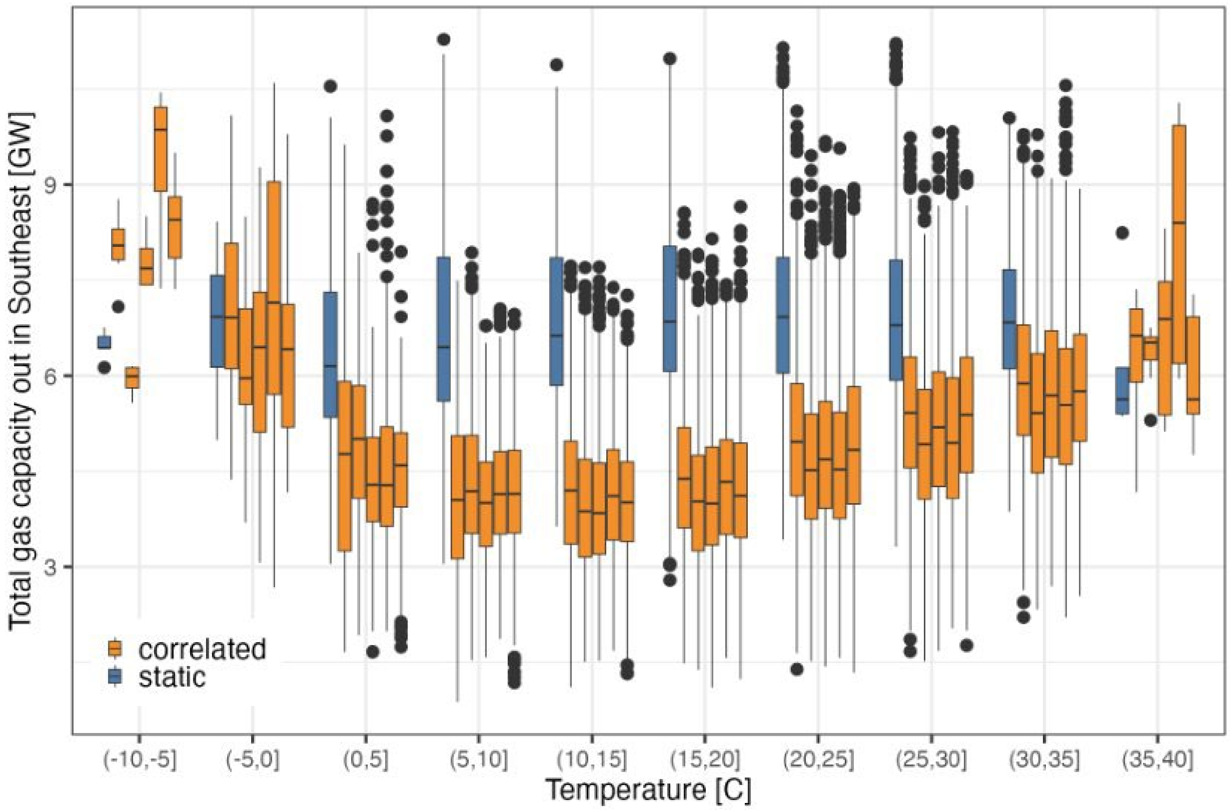

Figure S-8. Simulated natural gas outages by temperature bin for the temperature-correlated and original random draw.

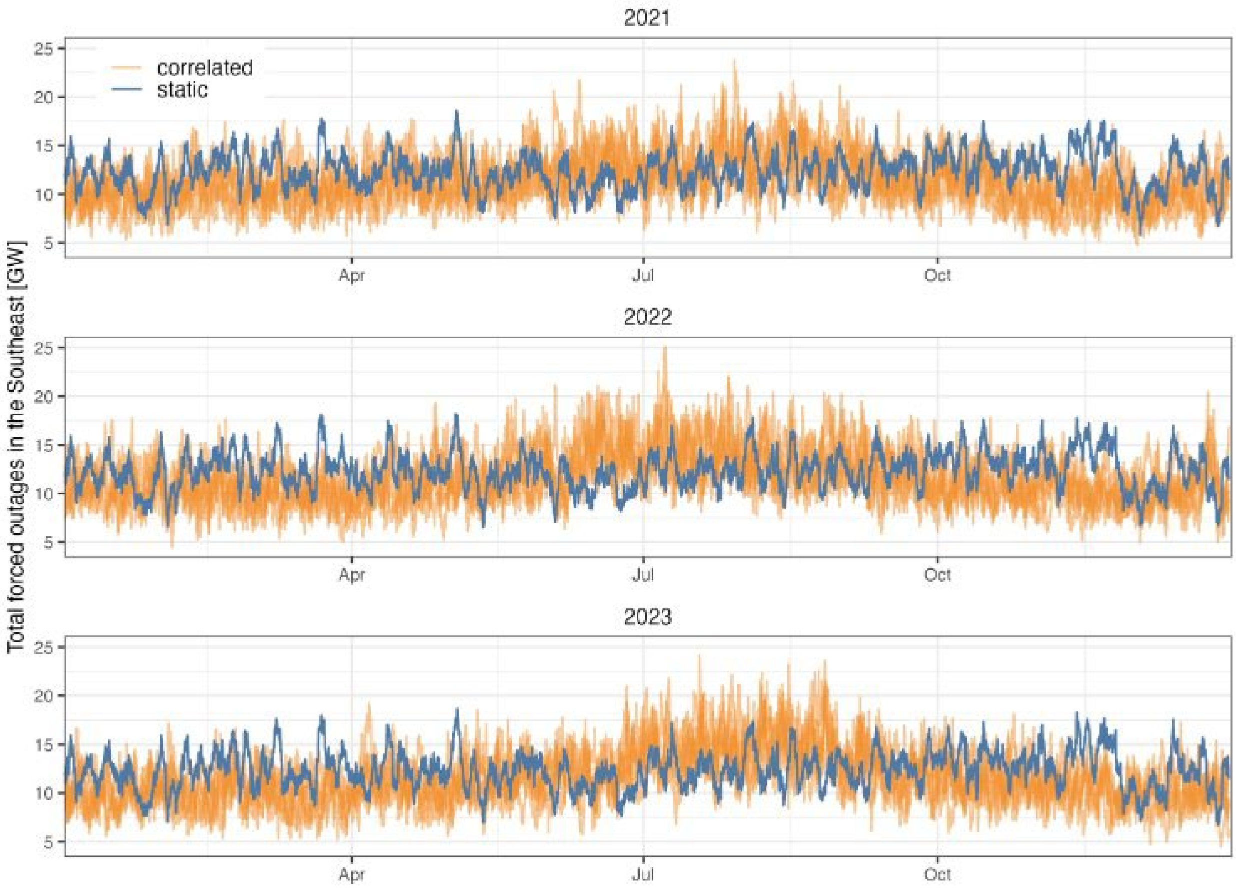

Figure S-9. Simulated units forced out in the Southeast for three years (2021–2023) comparing the temperature-correlated draw ("correlated") to the random draw ("static").

The price duration curves for the main scenarios can be used to examine locational marginal price impacts (which are used to compute the primary transmission valuation metric). Figure S-10 and Figure S-11 show the price duration curves for each utility region in the Southeast. First, Figure S-10 shows the price during the top 100 hours of the year, and Figure S-11 shows all years, capped at $100/MWh. Both versions of the duration curve are included for full visibility of all hours. In both plots, the addition of realistic complexity (indicated by the darkening red colors) shifts the prices upward, further increasing the model's representation of volatility. The top-priced hours result from model constraints, and in this case, prices near $3,000/MWh indicate unserved reserves, meaning that scarcity conditions are triggering that high price and not all reserves can be guaranteed during those hours. The number of hours with unserved reserves typically increases with model complexity. Likewise, Figure S-11 indicates that lower prices are also shifting downward in most cases, so the model can also capture conditions that lead to lower prices as well.

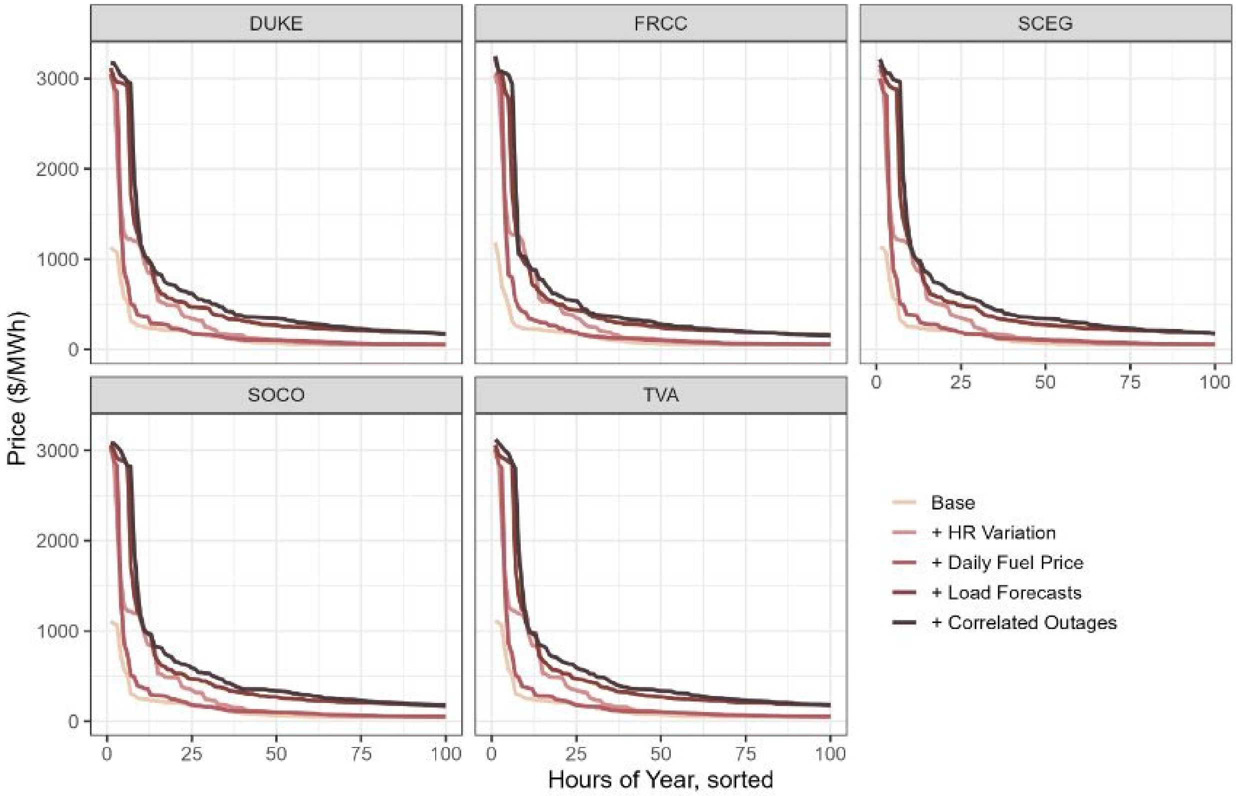

Figure S-10. Price duration curves for the top 100 priced hours of the year for each utility region as modeled for 2023.

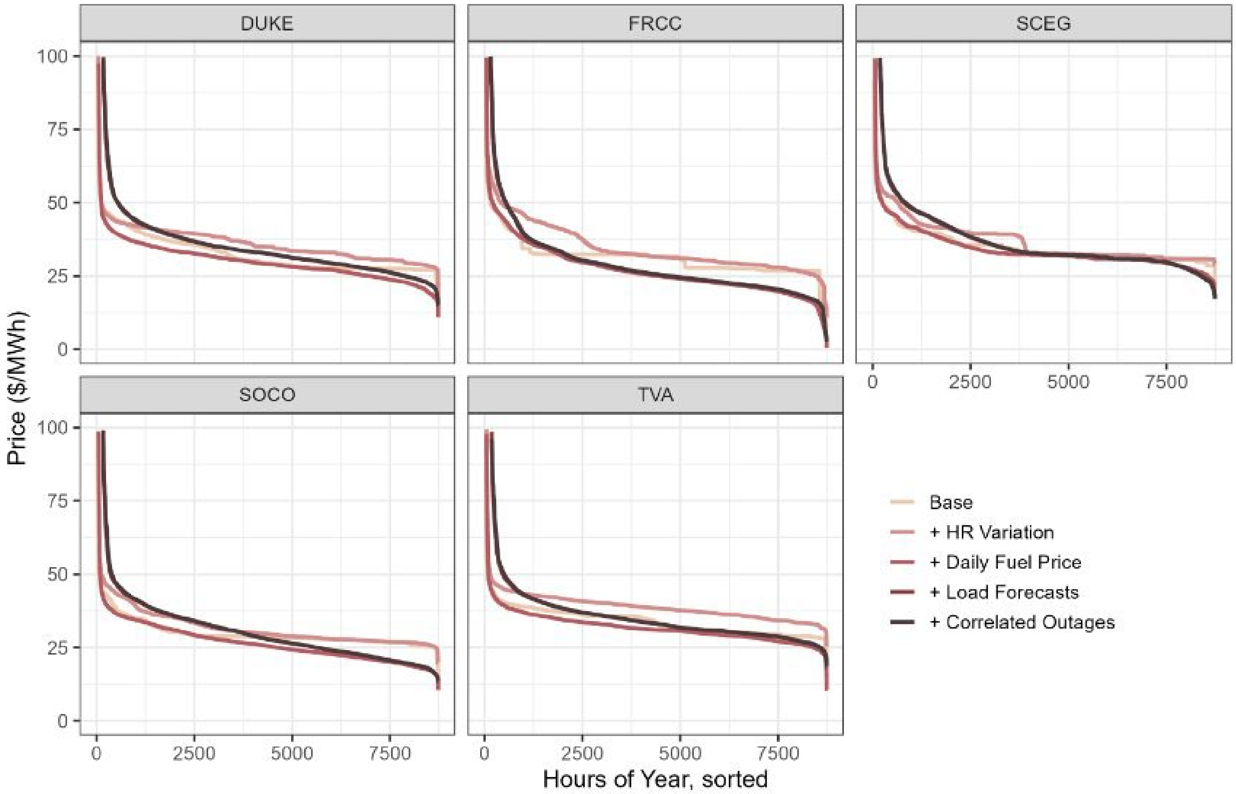

Figure S-11. Price duration curves for all hours of the year (capped at $100/MWh) for each utility region as modeled for 2023.

Figure S-12 and Figure S-13 show the price duration curves for each utility region in the Southeast under the weather year sensitivities, indicating substantial variation that primarily depends on weather conditions and natural gas fuel prices. Of note are the higher prices during 2022 caused by soaring natural gas prices (*see* also Figure S-3 and Figure S-5).

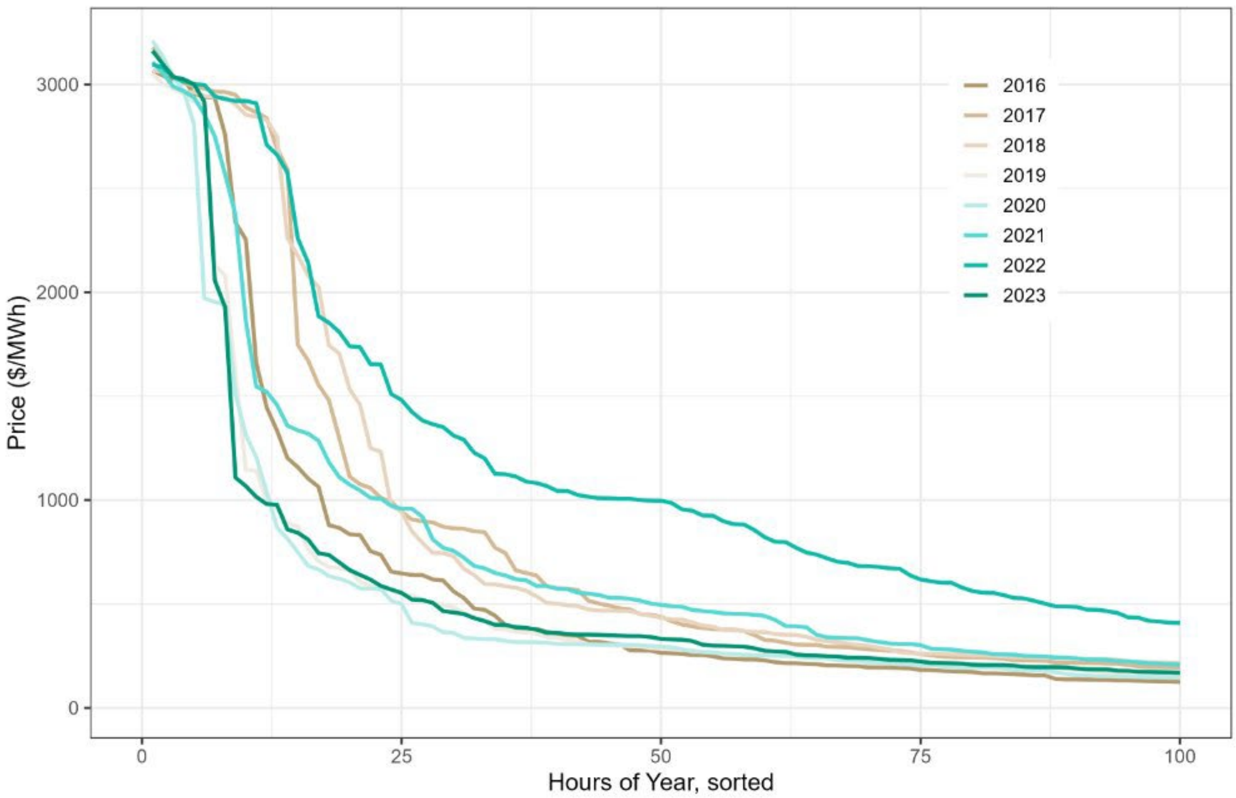

Figure S-12. Price duration curves for each weather year for the top 100 hours for the full Southeast region (weighted by generation).

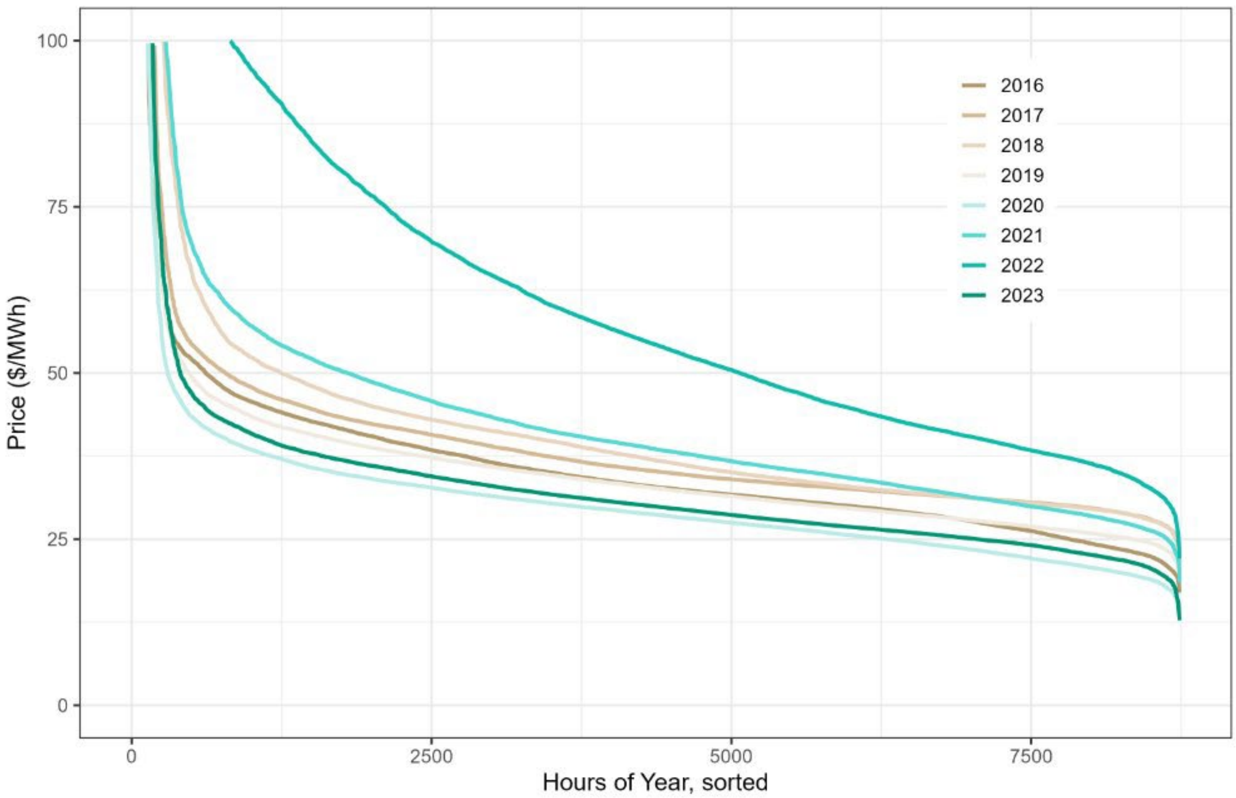

Figure S-13. Price duration curves for each weather year for all hours of the year (capped at $100/MWh for readability) for all the Southeast region, weighted by generation.

Current and Future Needs Assessment through Review of Existing Studies

The *2026 National Transmission Needs Study: Consultation and Public Comment Draft* is informed by a survey of more than 120 recent reports that highlight the needs of the U.S. bulk power system. The literature includes reports from the federal government, state governments, national laboratories, RTOs/ISOs, market monitoring units, planning entities, utilities, academia, consultants, and other nonprofit and advocacy groups that incorporate quantitative and qualitative measures of electricity transmission needs. Reports were chosen on the basis of geographic diversity, diversity among sources, and author subject matter expertise, and to cover a range of reliability issues faced by the transmission system today. The title, author(s), publication date, publisher, and funding source(s) for all reviewed reports are included in Table S-2. The report title is hyperlinked to the study if an active link was available at the time of Needs Study publication.

Table S-2. List of all studies reviewed in this report. Funding source is listed as not applicable (N/A) when study was either author-funded or when funding source is not known.

Study Title	Author(s)	Publication Date	Publisher	Funding Source(s)
Alaska Energy Authority Railbelt Innovation Resiliency Project: Award Kickoff Meeting	Alaska Energy Authority	Mar. 2025	Alaska Energy Authority	N/A
Alaska Energy Security Task Force Report	Alaska Energy Authority	Dec. 2023	Alaska Energy Authority	N/A
2024–2033 Ten-Year Transmission System Plan	Arizona Public Service Company	Jan. 2024	Arizona Public Service Company	N/A
2025 Electric Integrated Resource Plan	Avista	Dec. 2024	Avista	N/A
2050 Transmission Study	Bernard, Collins, Durkin, Kleeman, Kniska, Oberlin, Schwarting, Sreenivasachar, Perez, Vijayan	Feb. 2024	Independent System Operator New England, Inc	N/A
2024 Transmission Plan	Bonneville Power Administration	Oct. 2024	Bonneville Power Administration	N/A

Study Title	Author(s)	Publication Date	Publisher	Funding Source(s)
California Energy Resource and Reliability Outlook, 2024	California Energy Commission	Aug. 2024	California Energy Commission	N/A
California Energy Resource and Reliability Outlook, 2025	California Energy Commission	Jul. 2025	California Energy Commission	N/A
2023–2024 Transmission Plan	California Independent System Operator	May 2024	California Independent System Operator	N/A
2024 20-Year Transmission Outlook	California Independent System Operator	Jul. 2024	California Independent System Operator	N/A
2024–2025 Transmission Plan	California Independent System Operator	May 2025	California Independent System Operator	N/A
Power Surge: Navigating US Electricity Demand Growth	Chandramowli, Cook, Mackovyak, Parmar, Scheller	Sep. 2024	ICF	N/A
Empirical Assessment of Interregional Coordination to Support Resource Adequacy	Cheyette, Kemp, Gorman, Jeong, Millstein	Jun. 2025	Lawrence Berkeley National Laboratory	U.S. Department of Energy Grid Deployment Office
2023 Carolinas Resource Plan. Appendix I – Renewables and Energy Storage	Duke Energy	Aug. 2023	Duke Energy	N/A
2023 Carolinas Resource Plan. Appendix L – Transmission System Planning and Grid Transformation	Duke Energy	Aug. 2023	Duke Energy	N/A
System Expansion Plan 2025–2034	El Paso Electric	2024	El Paso Electric	N/A
Powering Data Centers: U.S. Energy System and Emissions Impact of Growing Loads	Electric Power Research Institute	Oct. 2024	Electric Power Research Institute	N/A

Study Title	Author(s)	Publication Date	Publisher	Funding Source(s)
2023 Demand and Energy Report	Electric Reliability Council of Texas	Mar. 2024	Electric Reliability Council of Texas	N/A
2024 Regional Transmission Plan	Electric Reliability Council of Texas	Dec. 2024	Electric Reliability Council of Texas	N/A
ERCOT Permian Basin Reliability Plan Study	Electric Reliability Council of Texas	Jul. 2024	Electric Reliability Council of Texas	N/A
Report on Existing and Potential Electric System Constraints and Needs	Electric Reliability Council of Texas	Dec. 2023	Electric Reliability Council of Texas	N/A
Transmission Metrics: Staff Report	Federal Energy Regulatory Commission	Oct. 2017	Federal Energy Regulatory Commission	N/A
2024 State of the Markets	Federal Energy Regulatory Commission	Mar. 2025	Federal Energy Regulatory Commission	N/A
Report on Barriers and Opportunities for High Voltage Transmission	Federal Energy Regulatory Commission	Jun. 2020	Federal Energy Regulatory Commission	N/A
Inquiry into Bulk-Power System Operations During December 2022 Winter Storm Elliott	Federal Energy Regulatory Commission, North American Electric Reliability Corporation, Midwest Reliability Organization, Northeast Power Coordinating Council, ReliabilityFirst Corporation, SERC Corporation, Texas Reliability Entity, Western Electricity Coordinating Council	Oct. 2023	Federal Energy Regulatory Commission, the North American Electric Reliability Corporation, and Regional Entities Staff	N/A
Ten Year Power Plant Site Plan 2025-2034	Florida Power & Light	Apr. 2025	Florida Power & Light	N/A

Study Title	Author(s)	Publication Date	Publisher	Funding Source(s)
2023 Standard Scenarios Report: A U.S. Electricity Sector Outlook	Gagnon, Pham, Cole, Awara, Barlas, Brown, Brown, Carag, Cohen, Hamilton, Ho, Inskeep, Karmakar, Lavin, Lopez, Mai, Mowers, Mowers, Murphy, Pinchuk, Schleifer, Sergi, Steinberg, Williams	Jan. 2024	National Renewable Energy Laboratory	U.S. Department of Energy Office of Energy Efficiency and Renewable Energy Strategic Programs Office
2024 Standard Scenarios Report: A U.S. Electricity Sector Outlook	Gagnon, Pham, Cole, Hamilton	Dec. 2024	National Renewable Energy Laboratory	U.S. Department of Energy Office of Energy Efficiency and Renewable Energy Strategic Programs Office
2025 Integrated Resource Plan	Georgia Power	Jan. 2025	Georgia Power	N/A
The Value of Transmission During Winter Storm Elliott. American Council on Renewable Energy	Goggin, Zimmerman	Feb. 2023	American Council on Renewable Energy	American Council on Renewable Energy
Integrated Grid Plan: A Pathway to a Clean Energy Future. Hawaiian Electric	Hawaiian Electric	May 2023	Hawaiian Electric	N/A
Integrated Grid Plan Action Plan Annual Update	Hawaiian Electric	Jun. 2024	Hawaiian Electric	N/A
Regulators approve 5-year grid resilience plan	Hawaiian Electric	Feb. 2024	Hawaiian Electric	N/A
2023 Annual Report on Market Issues and Performance	Hildebrandt, Blanke, Kurlinski, Deshmukh, Swadley, Avalos, Dawson, Gevercer, Girardot, Jeong, O'Connor, Ok, Prendergast, Pretz, Robinson, Selling, Westendorf	Jul. 2024	California Independent System Operator	N/A

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Tribal Engagement in Transmission Planning	Hurlbut, Pandian, Palchak, Smith	Feb. 2026	National Laboratory of the Rockies	U.S. Department of Energy Office of Electricity
2023 Integrated Resource Plan	Idaho Power	Sep. 2023	Idaho Power	N/A
2023 Regional System Plan	Independent System Operator New England, Inc.	Nov. 2023	Independent System Operator New England, Inc.	N/A
Third Maine Resource Integration Study: Study Results	Independent System Operator New England, Inc.	Jun. 2024	Independent System Operator New England, Inc.	N/A
2023 Annual Markets Report	Independent System Operator New England, Inc., Internal Market Monitor	May 2024	Independent System Operator New England, Inc.	N/A
Strategic Plan Update 2023–2033	Kaua‘i Island Utility Cooperative	Jan. 2023	Kaua‘i Island Utility Cooperative	N/A
Alaska's Changing Arctic: Energy Issues and Trends	Lovecraft, Boylan, Burke, Glover, Parlato, Robb, Thoman, Walsh, Watson	Jan. 2023	The University of Alaska Fairbanks	N/A
Wasted Wind and Tenable Transmission during Winter Storm Elliott	Massie, Toth	Feb. 2023	RMI	N/A
2023 Historical Regional Forecast and Actual Load	Midcontinent Independent System Operator	2023	Midcontinent Independent System Operator	N/A
MISO's Renewable Integration Impact Assessment (RIIA)	Midcontinent Independent System Operator	Feb. 2021	Midcontinent Independent System Operator	N/A
MTEP24 Transmission Portfolio	Midcontinent Independent System Operator	Sep. 2024	Midcontinent Independent System Operator	N/A
Overview of Winter Storm Elliott December 23, Maximum Generation Event	Midcontinent Independent System Operator	Jan. 2023	Midcontinent Independent System Operator	N/A

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The February Arctic Event	Midcontinent Independent System Operator	Apr. 2021	Midcontinent Independent System Operator	N/A
Assessing Electric Transmission Value in the Southeast United States and its Sensitivity to Model Inputs	Millstein, Jorgenson, Sergi, Wijekoon, Kharl, Hamilton, Liakopoulou	2026 (forthcoming)	Lawrence Berkeley National Laboratory and National Laboratory of the Rockies	U.S. Department of Energy Office of Electricity
State of the Market Report for PJM	Monitoring Analytics	Mar. 2024	Monitoring Analytics	N/A
GETting Interconnected in PJM	Mulvaney, Siegner, Teplin, Toth	Feb. 2024	RMI	Amazon
Congestion levels on existing infrastructure	Kemp, Millstein	Aug. 2025	Lawrence Berkeley National Laboratory	U.S. Department of Energy Grid Deployment Office
Electric transmission value and its drivers in United States power markets	Kemp, Millstein Gorman, Jeong, Wiser	Aug. 2025	Lawrence Berkeley National Laboratory	U.S. Department of Energy Grid Deployment Office
Explained: Fundamentals of Power Grid Reliability and Clean Electricity	National Renewable Energy Laboratory	Jan. 2024	National Renewable Energy Laboratory	N/A
Explained: Maintaining a Reliable Future Grid with More Wind and Solar	National Renewable Energy Laboratory	Jan. 2024	National Renewable Energy Laboratory	N/A
Explained: Reliability of the Current Power Grid	National Renewable Energy Laboratory	Jan. 2024	National Renewable Energy Laboratory	N/A
2023–2032 Comprehensive Reliability Plan	New York Independent System Operator	Nov. 2023	New York Independent System Operator	N/A
2023–2042 System & Resource Outlook	New York Independent System Operator	Jul. 2024	New York Independent System Operator	N/A
2024 Load & Capacity Data	New York Independent System Operator	Apr. 2024	New York Independent System Operator	N/A

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2024 Reliability Needs Assessment	New York Independent System Operator	Nov. 2024	New York Independent System Operator	N/A
2025 Power Trends: The New York ISO Annual Grid and Markets Report	New York Independent System Operator	Apr. 2025	New York Independent System Operator	N/A
2022 State of Reliability: An Assessment of 2021 Bulk Power System Performance	North American Electric Reliability Corporation	Jul. 2022	North American Electric Reliability Corporation	N/A
2023 ERO Reliability Risk Priorities Report	North American Electric Reliability Corporation	Jul. 2023	North American Electric Reliability Corporation	N/A
2024 Long-Term Reliability Assessment	North American Electric Reliability Corporation	Dec. 2024	North American Electric Reliability Corporation	N/A
2024 State of Reliability: Technical Assessment of the 2023 Bulk Power System Performance	North American Electric Reliability Corporation	Jun. 2024	North American Electric Reliability Corporation	N/A
Interregional Transfer Capability Study (ITCS): Strengthening Reliability Through the Energy Transformation, Transfer Capability Analysis (Part 1). North American Electric Reliability Corporation	North American Electric Reliability Corporation	Aug. 2024	North American Electric Reliability Corporation	N/A

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Interregional Transfer Capability Study (ITCS): Strengthening Reliability Through the Energy Transformation, Recommendations for Prudent Additions to Transfer Capability (Part 2) and Recommendations to Meet and Maintain Transfer Capability (Part 3)	North American Electric Reliability Corporation	Nov. 2024	North American Electric Reliability Corporation	N/A
Regional Transmission Plan for the 2022–2023 NorthernGrid Planning Cycle	NorthernGrid	Dec. 2023	NorthernGrid	N/A
NorthWestern Energy to participate in regional transmission projects	NorthWestern Energy	Dec. 2024	NorthWestern Energy	N/A
Montana Integrated Resource Plan Vol 1	NorthWestern Energy	May 2023	NorthWestern Energy	N/A
2024 Joint Energy Supply Plan	NV Energy	May 2024	NV Energy	N/A
Northwest Regional Forecast of Power Loads and Resources	Pacific Northwest Utilities Conference Committee	May 2024	Pacific Northwest Utilities Conference Committee	N/A
2025 Integrated Resource Plan (Draft)	PacifiCorp	Dec. 2024	PacifiCorp	N/A
2023 Assessment of the ISO New England Electricity Markets	Patton, LeeVanSchaick, Chen, Coscia	Jun. 2024	Potomac Economics	Independent System Operator New England, Inc.
2023 State of the Market Report for the New York ISO Markets. Potomac Economics, Market Monitoring Unit for the New York ISO	Patton, LeeVanSchaick, Chen, Coscia	May 2024	Potomac Economics	N/A

Study Title	Author(s)	Publication Date	Publisher	Funding Source(s)
Transmission Investment Needs and Challenges	Pfeifenberger and Tsoukalis	Jun. 2021	The Brattle Group	N/A
Transmission Planning for the 21st Century: Proven Practices that Increase Value and Reduce Costs	Pfeifenberger, Spokas, Hagerty, Tsoukalis, Gramlich, Goggin, Caspary, Schneider	Oct. 2021	The Brattle Group and Grid Strategies	N/A
RTEP 2023 Regional Transmission Expansion Plan	PJM Interconnection, LLC	Mar. 2024	PJM Interconnection, LLC	N/A
Clean Energy Plan and Integrated Resource Plan	Portland General Electric	Jun. 2023	Portland General Electric	N/A
2023 Annual Audit Report on the Southeast Energy Exchange Market	Potomac Economics	May 2024	Potomac Economics	N/A
2023 State of the Market Report for the ERCOT Electricity Markets	Potomac Economics	May 2024	Potomac Economics	N/A
2023 State of the Market Report for the MISO Electricity Markets	Potomac Economics	Jun. 2024	Potomac Economics	N/A
2023 Integrated Resource Plan	Public Service Company of New Mexico	Dec. 2023	Public Service Company of New Mexico	N/A
2023 Electric Progress Report. Chapters 1–9. Puget Sound Energy	Puget Sound Energy	Mar. 2023	Puget Sound Energy	N/A
2023 Integrated System Plan	Salt River Project	Dec. 2023	Salt River Project	N/A
Empirical Indicators of Transmission Value in the Southeast United States	Seel, Millstein, Kemp	Aug. 2025	Lawrence Berkeley National Laboratory	U.S. Department of Energy Grid Deployment Office
2024 United States Data Center Energy Usage Report	Shehabi, Smith, Hubbard, Newkirk, Lei, Siddik, Holecek, Koomey, Masanet, Sartor	Dec. 2024	Lawrence Berkeley National Laboratory	Office of Science of the U.S. Department of Energy

Study Title	Author(s)	Publication Date	Publisher	Funding Source(s)
2023 Transmission Congestion Report	Shreve, Selker, Zimmerman, Gramlich	Sep. 2024	GridStrategies	N/A
Transmission Congestion for 2024	Shreve, Selker, Zimmerman, Gramlich	Nov. 2025	GridStrategies	N/A
Impacts of Regional Coordination on Transmission Needs for Power System Resource Adequacy	Serpe, Sharma, Mai, Chernyakhovskiy	Jan. 2026	National Laboratory of the Rockies	U.S. Department of Energy
Utah Transmission Study: A Study of the Options and Benefits to Unlocking Utah's Resource Potential	Simonson, Ramirez, Muhs, Emery, Moyer	Jan. 2021	Energy Strategies	Utah Governor's Office of Energy Development
2023–2033 SERC Annual Long-Term Reliability Assessment Report	Southeastern Electric Reliability Corporation	2024	Southeastern Electric Reliability Corporation	N/A
2024–2026 Regional Risk Report	Southeastern Electric Reliability Corporation	2024	Southeastern Electric Reliability Corporation	N/A
Regional Transmission Plan & Input Assumptions Overview. Southeastern Regional Transmission Planning	Southeastern Regional Transmission Planning	Nov. 2024	Southeastern Regional Transmission Planning	N/A
2024 Integrated Transmission Planning Assessment Report	Southwest Power Pool	Jan. 2025	Southwest Power Pool	N/A
The Value of Transmission	Southwest Power Pool	Mar. 2022	Southwest Power Pool	N/A
Western Interconnection Unscheduled Flow Mitigation Plan	Southwest Power Pool	Aug. 2019	Southwest Power Pool	N/A
State of the Market Report 2023	Southwest Power Pool Market Monitoring Unit	May 2024	Southwest Power Pool	N/A

Study Title	Author(s)	Publication Date	Publisher	Funding Source(s)
Increasing the Resilience of the Texas Power Grid Against Extreme Storms by Hardening Critical Lines	Stürmer, Plietzsch, Vogt, Hellmann, Kurths, Otto, Frieler, Anvari	Mar. 2024	Nature Energy	Deutsche Forschungsgemeinschft, CoCoHype, German Academic Scholarship Foundation, German Federal Ministry of Education and Research
Integrated Resource Plan 2025	Tennessee Valley Authority	Sep. 2024	Tennessee Valley Authority	N/A
2023 Reliability Performance and Regional Risk Assessment	Texas RE	2024	Texas RE	N/A
Integrated Transmission Lines	Thayer	Mar. 2024	Alaska Energy Authority	N/A
Principles for Equitable Transmission Planning	Twitchell, Kazimierczuk, Yoshimura, Gunn	Dec. 2023	Pacific Northwest National Laboratory	U.S. Department of Energy
The Alaska Energy Authority Grid Resilience and Innovation Partnership (GRIP) Project Application	U.S. Department of Energy	Jun. 2023	U.S. Department of Energy	N/A
Grid Modernization Strategy 2024	U.S. Department of Energy	Jul. 2024	U.S. Department of Energy	N/A
The National Transmission Planning Study	U.S. Department of Energy	Oct. 2024	U.S. Department of Energy	N/A
The National Transmission Planning Study: Chapter 3 – Transmission Portfolios and Operations for 2035 Scenarios	U.S. Department of Energy	Oct. 2024	U.S. Department of Energy	N/A

Study Title	Author(s)	Publication Date	Publisher	Funding Source(s)
The National Transmission Planning Study: Executive Summary. U.S. Department of Energy	U.S. Department of Energy	Oct. 2024	U.S. Department of Energy	N/A
Resource Adequacy Report: Evaluating the Reliability and Security of the United States Electric Grid	U.S. Department of Energy	Jul. 2025	U.S. Department of Energy	N/A
Tribal Electricity Access and Reliability	U.S. Department of Energy, Office of Indian Energy Policy and Programs	Aug. 2023	U.S. Department of Energy	N/A
A Clean Energy Transmission Policy Platform for Thriving Communities and Wildlife. National Wildlife Federation	Ung-Kono	Jun. 2023	National Wildlife Federation	N/A
WestConnect Regional Transmission Planning: 2024–25 Planning Cycle	WestConnect	Jan. 2025	WestConnect	N/A
Public Service of Colorado 2021 ERP & CEP Transmission System Impact Study for the Approved Portfolio	Xcel Energy	Oct. 2024	Xcel Energy	N/A

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