

★ Congressional Legislative Action:

○ July 2018:

- During the week of July 8, the U.S. House of Representatives Energy and Commerce Committee advanced two bills related to nuclear energy to the full House for further consideration.
 - The Advanced Nuclear Fuel Availability Act (HR 6140) would ensure that adequate supplies of domestically produced high-assay low-enriched uranium (enriched above 5 percent and below 20 percent) are available.
 - The Nuclear Utilization of Keynote Energy Act (HR 1320) would (1) update the U.S. Nuclear Regulatory Commission’s (NRC) fee collection mechanism so that industry-paid fees are collected more efficiently; (2) direct studies to analyze possible outdated procedures at the NRC to identify efficiencies; and (3) create a review of timelines for license applications.



○ June 2018:

- On June 8, the U.S. House of Representatives voted 235-179 to pass H.R. 5895, “Energy and Water, Legislative Branch, and Military Construction and Veterans Affairs Appropriations Act, 2019” which includes \$267.7 million in funding to support the Yucca Mountain nuclear waste repository. The Senate version of the bill approved in May does not include funding, leaving open the prospect that differences could be ironed out in a House-Senate conference committee. Efforts in 2017 and 2018 to renew licensing both failed when the House and Senate failed to agree on funding.

○ May 2018:

- On May 24, the U.S. Senate appropriators removed the \$120 million requested to restart licensing on the Yucca Mountain nuclear waste repository from S.2975, “Energy and Water Development and Related Agencies Appropriations Act, 2019.” The decision accompanies a push by Tennessee Senator Lamar Alexander to seek a comprehensive approach to nuclear waste from power plants that includes permanent repositories like Yucca Mountain, as well as interim storage sites in other states. An annual DOE financial report showed taxpayer liability for litigation over the federal government’s failure to permanently store nuclear waste has grown to by \$3.3 billion over the past year to a total of \$34.1 billion.
- On May 10, the U.S. House of Representatives passed H.R. 3053, “The Nuclear Waste Policy Amendments Act of 2018” (NWPAA) by a vote of 340-72. The bill assists in the resolution of the pending Yucca Mountain license, which will allow the formal licensing process to determine if the repository can be licensed and constructed. It also directs the U.S. Department of Energy (DOE) to move forward with a temporary storage program to consolidate spent nuclear fuel from sites with a decommissioned nuclear reactor while work on the Yucca Mountain repository progresses, including the authority to enter into a contract with a non-Federal entity. The bill also provides the state of Nevada and local stakeholders the opportunity to engage with the Federal government as the host State for the repository.

- ★ July 29, 2018: NextEra Energy Resources, the wholesale power generating subsidiary of Florida-based NextEra Energy Inc., announced it will close the Duane Arnold Energy Center, a 615-MW nuclear power plant located in Palo, Iowa, before the end of 2020. The Duane Arnold operating license expires in 2034 but was originally planned to retire in 2025 when its power purchase agreement (PPA) with Alliant Energy



was set to expire. However, NextEra Energy Resources and Alliant agreed to a deal to shorten the PPA by 5 years. The Iowa Utilities Board must approve this deal.

- ★ July 10, 2018: U.S. Secretary of Energy Rick Perry announced the DOE has selected nine domestic projects to receive nearly \$20 million in funding for cost-shared research and development for advanced nuclear technologies. These awards are through the DOE's Office of Nuclear Energy's funding opportunity announcement for U.S. Industry Opportunities for Advanced Nuclear Technology Development and are the second group selected under this solicitation. The first group was announced on April 27, 2018. Subsequent quarterly application review and selection processes will be conducted over the next five years.
- ★ July 10, 2018, Exelon Corporation filed a second license renewal application for its Peach Bottom Unit 2 and Unit 3 reactors, located in Delta, Pennsylvania. Peach Bottom Unit 2 reactor began commercial operation in July 1974, and its current license will expire in August 2033. Unit 3 reactor began commercial operation in December 1974, and its current license will expire in July 2034. If granted, the license will be renewed until 2053 and 2054 respectively.
- ★ July 9, 2018: Exelon Corporation informed the U.S. Securities and Exchange Commission that the commission it has entered into an agreement to purchase the power business of FirstEnergy Solutions for \$140 million. If the sale is completed, it would give Exelon the accounts of the commercial, industrial, government and nonprofit customers that selected FirstEnergy Solutions as their electricity provider, and those for whom FirstEnergy was a provider of last resort. The majority of the company's clients are in Pennsylvania and Ohio. The sale also does not include any of FirstEnergy's bankrupt power plants, such as Beaver Valley nuclear station and the coal-fired Bruce Mansfield plant. The transaction is expected to close in the fourth quarter of 2018 but is conditional on Exelon being the winning bidder after a bankruptcy auction and the subsequent approval of the purchase agreement by the U.S. Bankruptcy Court for the Northern District of Ohio.
- ★ July 6, 2018: Dominion is considering retiring its Millstone Power Station in Waterford, Connecticut after state regulators proposed delaying the company's ability to bid on zero carbon projects until 2023. Connecticut passed a bill last year authorizing regulators to allow nuclear plants to compete in a zero-carbon auction for fixed-price contracts with utilities. The intent of this bill is to encourage development of clean energy producers, and reward them with higher prices for their electricity. Millstone, although emitting zero carbon, still generates radioactive waste; however, it was granted an exception to enter the auction through an "at risk" designation signaling economic hardship. Under this proposal, Millstone will not be eligible to receive incentives for being at-risk for closure until at least 2023. Regulators will weigh factors beyond price only in cases where zero-carbon energy producers face potential shutdown due to economic duress. Dominion claims that while Millstone is profitable, it is still at risk now due to rising expenses and competition from cheaper natural gas that have weakened its financial position. Millstone produces 2,100 MW of from two operating reactors.
- ★ July 2, 2018: Unit 1 of the Sanmen nuclear power plant in China has been connected to the grid, becoming the world's first Westinghouse AP1000 to achieve grid connection and power generation. Hot testing of Sanmen 1 was completed in June 2017. The loading of fuel assemblies into its core began on April 25th following the issuance of a permit by the Chinese National Nuclear Security Administration. The unit achieved first criticality on June 21st, and on June 27th nuclear-generated steam was used for the first time to successfully rotate the turbine at rated speed. The unit will now undergo gradual power



ascension testing until all testing is safely and successfully completed at 100% power. Sanmen 1 is scheduled to enter commercial operation by the end of 2018.

- ★ June 28, 2018: Robert Powelson, nominated to the Federal Energy Regulatory Commission (FERC) by President Trump in May of 2017, recently announced that he will retire from the five-member body to lead the National Association of Water Companies, a group that lobbies for private water companies. An advocate for competitive power markets, Powelson opposed the coal and nuclear bailouts pushed by energy secretary Rick Perry in 2017. President Trump now has the authority to nominate a new commissioner, who would then have a hearing before the Senate Energy Committee. FERC members serve three-year terms.
- ★ June 26, 2018: U.S. District Judge J. Michelle Childs rejected the DOE's request to stay a preliminary injunction for the Mixed Oxide Fabrication Facility (MOX), which was handed down earlier this month, and allowed the MOX project to move forward. The injunction ultimately vacated an earlier partial stop work order and halted termination efforts until the case is heard in the U.S. 4th Circuit Court of Appeals.
 - June 7, 2018: The State of South Carolina was granted a preliminary injunction, preventing the US Department of Energy's shutdown of the MOX project at Savannah River Site. The injunction maintains ongoing work and construction at MOX while the state of South Carolina continues its lawsuit against the DOE. South Carolina Attorney General Alan Wilson argued that the shutdown would leave the state a permanent repository for plutonium, as no other disposal method has been approved by Congress. The DOE has identified a "dilute and dispose" alternative for dealing with the plutonium, but faces resistance from the State of New Mexico, where the plutonium would be shipped after dilution.
 - May 11, 2018: Construction of the mixed-oxide fuel fabrication facility (MOX) was formally ended by Secretary of Energy Rick Perry. The facility was designed to reprocess weapons-grade plutonium and uranium into fuel for reactors, but ballooning costs and missed construction milestones, along with the unraveling of a nuclear non-proliferation agreement between the U.S. and Russia, eventually caused the project to be discontinued. At the time of cancellation, the estimated cost of the project exceeded \$18 billion with over \$7 billion already spent. With the cancellation of the MOX plant, the National Nuclear Security Administration proposed installing pits to store plutonium waste at both the Savannah River Site and Los Alamos National Laboratory.
- ★ June 18, 2018: Accident tolerant fuels developed by Framatome are being loaded into the DOE's Advanced Test Reactor at Idaho National Laboratory for testing. The fuel company is testing two different concepts. The first is a chromium-coated cladding, which is designed to protect the fuel cladding from damage and oxidation at higher temperatures. The second concept is chromia-doped fuel pellets, which are expected to last longer and perform better under accident conditions. The tests are scheduled through January 2021, after which the fuels will be loaded into the Transient Test Reactor to determine safe operating limits.
- ★ June 14, 2018: Researchers at Pacific Northwest National Laboratory (PNNL) have successfully completed a trial to use acrylic fibers to extract uranium from seawater. The material was developed by Idaho-based LCW Supercritical Technologies with support from PNNL. Three separate month-long tests were carried out where seawater was pumped through about a kilogram of fiber in conditions mimicking the open ocean, producing about five grams of uranium. LCW is planning to conduct further testing in the Gulf of Mexico, which could produce three to five times the extraction rate due to the material's increased performance in warm water.



- ★ June 12, 2018: The Federal Energy Regulatory Commission (FERC) testified during an oversight hearing before the Senate Energy and Natural Resources Committee. FERC Chairman Kevin McIntyre said, “there is no immediate calamity or threat to our ongoing ability to have our bulk power system operate and satisfy the energy needs,” before adding that the long-term issue needed to be studied. McIntyre also said the commission is reviewing feedback from grid operators to determine whether action by FERC is required. Commissioner Neil Chatterjee voiced support for grid resilience measures, while Commissioner Robert Powelson was resistant to the directive’s possible impacts to wholesale competitive markets.
- ★ June 4, 2018: The U.S. Department of Energy announced up to \$24 million in funding for ten projects as part of a new Advanced Research Projects Agency – Energy (ARPA-E) program called “Modeling-Enhanced Innovations Trailblazing Nuclear Energy Reinvigoration, or MEITNER. The MEITNER teams will identify and develop technologies that enable lower operating costs and safer designs for nuclear reactors. The MEITNER awards include private companies and universities, which will have access to DOE modeling and simulation resources and support from national laboratories.
- ★ June 1, 2018: President Trump has directed Secretary of Energy Rick Perry to prepare immediate steps to stop the loss of “fuel-secure” power facilities, including nuclear and coal power plants. The directive cites “rapid depletion of a critical part of our Nation’s energy mix,” and impacts to “the resilience of our power grid.” This represents the administration’s second attempt to prevent early retirement of coal and nuclear plants. In 2017, Secretary Perry proposed a rule that would require regional markets to compensate coal and nuclear plants based upon the reliability they provide, but the rule was rejected by the Federal Energy Regulatory Commission in January.
- ★ May 31, 2018: Toshiba America Nuclear Energy announced cancellation of plans to build a third and fourth reactor at NRG Energy’s South Texas Project nuclear power plant. The project’s economic viability has declined due to significantly lower electricity rates, as well as the trend toward tighter regulation of nuclear power plants in the aftermath of the Great East Japan Earthquake, Toshiba officials said in the release. The plant currently has two operating 1,280-megawatt reactors.
- ★ May 30, 2018: A joint brief between the Federal Energy Regulatory Commission and the US Department of Justice supported the US District Court for the Northern District of Illinois in Chicago conclusion that the state’s nuclear power subsidy program is not preempted by federal law, which strengthens the case for other states pursuing similar plans. The Illinois state legislature enacted a zero-emissions credit in 2016 for nuclear plants which were struggling to keep up with falling energy prices. A competitive power group filed a suit against the zero-emissions credit program, but the suit was dismissed in 2017 by the district court.
- ★ May 30, 2018: Exelon’s Oyster Creek Generating Station in New Jersey is beginning its first round of job cuts in preparation for its shutdown in October. On June 22, 84 jobs at the plant will be eliminated, according to a recent filing with the state.
- ★ May 23, 2018: New Jersey Governor Phil Murphy signed multiple energy-related legislative initiatives on Wednesday, May 23rd, designed to advance clean energy, including a bill to provide economic support to the state’s nuclear power industry. The legislation allows the two-reactor, 2,486-MW Salem Plant, in which PSEG has a 57% ownership stake and Exelon Generation a 43% stake, and PSEG’s fully owned 1,250-MW Hope Creek Plant, to receive zero-emission certificate payments.



- ★ May 21, 2018: The Minnesota House failed to pass a bill that would change the approval process for nuclear costs. Xcel Energy, Minnesota's largest utility company, sought approval for at least \$1.4 billion in maintenance costs it expects over the next 17 years at its nuclear reactors near Monticello and Red Wing. The state Senate passed the bill on May 14th, but time ran out on the House bill as the legislative session ended on May 20th. Governor Mark Dayton also threatened to veto the bill due to opposition from several of Xcel's large industrial customers.

- ★ May 9, 2018: Secretary of Energy Rick Perry stated the department is looking closely at using the Defense Production Act (DPA) to assist struggling coal and nuclear plants during a hearing with the U.S. House of Representatives committee on Science, Space, and Technology. The law allows the president to prioritize the federal government's ability to obtain critical, scarce industrial materials in a time of war, ensuring the government can buy the goods before others. A spokesperson said the agency has no timeframe to make a decision, but during the hearing Perry sought to reassure lawmakers that the agency would ultimately take some action to support coal and nuclear plants.

- ★ May 1, 2018: The NuScale Power small modular reactor (SMR) design certification application has passed an intensive Phase 1 review by the NRC. There are another five phases in the design certification process, but NuScale says the first phase is the most rigorous and now expects the NRC to complete the certification process by September 2020. SMR technology holds the potential for lower capital costs because modular components and factory production can potentially reduce construction costs and time. Proponents also cite the simplicity of design of SMRs, their enhanced safety features, and their flexibility in terms of siting, sizing, and end-use applications.



LICENSING ACTIONS

Vendors and utilities that wish to certify a new reactor design or a potential site, or construct and operate a new nuclear power plant must submit an application to the U.S. Nuclear Regulatory Commission (NRC), which will conduct an in-depth review of safety and environmental aspects related to the design and / or site.

Reactor Design Certifications (DC)

By issuing a design certification, the NRC approves a nuclear power plant design, independent of an application to construct or operate a plant. A design certification is valid for 15 years from the date of issuance, but can be renewed for an additional 10 to 15 years. A Design Certification application (DCA) must include enough information to show the design meets NRC's safety standards and that the design resolves any existing generic safety issues and issues that arose after specific events in the nuclear industry such as the Three Mile Island accident. Applications must closely analyze the design's appropriate response to accidents or natural events, including lessons learned from the Fukushima accident. Applications must also lay out the inspections, tests, analyses and acceptance criteria that will verify the construction of key design features. Certification reviews identify key information to consider in site-specific reviews for operating licenses. *(From NRC website)*

Three reactor designs that are being considered for future builds in the United States are certified. Two additional designs, (including a small modular reactor design), are under NRC review. One is under renewal review and two have been withdrawn¹.

¹AREVA US-EPR – Submitted December 12, 2007, and docketed February 25, 2008; review suspended at the request of the applicant.
Mitsubishi Heavy Industries US-APWR – Submitted December 31, 2007 and docketed February 29, 2008; MHI has requested a deferral of the review due to their work on reactor restarts in Japan.

| | VENDOR | TECHNOLOGY | STATUS |
|-------------|---------------------------|--------------------------|---|
| Issued | Westinghouse | AP1000 | Issued: 12/30/2011 |
| | General Electric-Hitachi | ESBWR | Issued: 11/14/2014 |
| Renewal | General Electric-Hitachi | ABWR | Originally Issued 5/12/1997: DC Renewal Application is under review |
| Active DCAs | Korea Electric Power Corp | APR1400 | Under Review: Final SER expected 9/2018 |
| | NuScale Power | NuScale SMR Power Module | Under Review: Final SER expected 9/2020 |



Early Site Permits (ESP)

By issuing an ESP, the NRC approves one or more sites for a nuclear power facility, independent of an application for a construction permit or combined license. An ESP is valid for 10 to 20 years from the date of issuance, and can be renewed for an additional 10 to 20 years. In reviewing an ESP application, the NRC staff will address site safety issues, environmental protection issues, and plans for coping with emergencies, independent of the review of a specific nuclear plant design. During this process, the NRC notifies all stakeholders (including the public) as to how and when they may participate in the regulatory process, which may include participating in public meetings and opportunities to request a hearing on the issuance of an ESP. (From NRC website)

Five ESPs have been issued. One is currently under review and one was withdrawn²

²Victoria County Station, Texas (Exelon) was withdrawn from NRC review 10/2012

| | SITE/LOCATION | | UTILITY | TECHNOLOGY REFERENCED | STATUS |
|-------------|---------------|----|----------------|--------------------------------|---|
| Issued | Clinton | IL | Exelon | Plant Parameter Envelope (PPE) | Issued: 3/15/2007 |
| | Grand Gulf | MS | Entergy | PPE | Issued: 4/5/2007 |
| | North Anna | VA | Dominion Power | PPE | Issued: 11/27/2007 Amended 1/30/2013 |
| | Vogtle | GA | Southern | AP1000/ Westinghouse | Issued: 8/26/2009 |
| | Salem County | NJ | PSEG | PPE | Issued: 5/5/2016 |
| Active ESPs | Clinch River | TN | TVA | PPE | Under Review: Final Environmental Impact Statement expected 6/2019 Final SER expected 9/2019 |

Combined Construction and Operating Licenses (COL)

By issuing a COL, the NRC authorizes the licensee to construct and (with specified conditions) operate a nuclear power plant at a specific site, in accordance with established laws and regulations. In a COL application (COLA), NRC staff reviews the applicant's qualifications, design safety, environmental impacts, operational programs, site safety, and verification of construction with inspections, testing, analyses, and acceptance criteria. The staff conducts its review in accordance with the Atomic Energy Act, NRC regulations, and the National Environmental Policy Act. All stakeholders (including the public) are given notice as to how and when they may participate in the regulatory process, which may include participating in public meetings and opportunities to request a hearing on the issuance of a COL. Once issued, a COL is good for 40 years and can be renewed for an additional 20. (From NRC website). A COLA may reference a certified design and/or an early site permit, or neither.



Eighteen COLAs have been docketed by the NRC: Eight, totaling 14 reactors, have received COLs; one, totaling two nuclear reactors, remains under active NRC review; 10 were suspended and later withdrawn³ due to utility, economic or other considerations while four remain in “suspended” status⁴. A Reference COL (R-COL) application has been submitted for five reactor designs (in addition to the designs for which a COL has been issued listed in the table below, COL applications were submitted for a USEPR and an US-APWR but were later withdrawn); subsequent COLs (S-COLs) incorporate the corresponding R-COL application by reference, noting any site-specific departures.

³Suspended and Withdrawn: Bell Bend; Bellefonte 3&4 Callaway 2, Calvert Cliffs 3, Grand Gulf 3, Nine Mile Point 3, River Bend 3, Victoria County 1&2,

⁴Remains Suspended: Shearon Harris 2&3, Comanche Peak 3&4

| | SITE/LOCATION | | UTILITY | REACTOR TECHNOLOGY/ NO. of REACTORS | | STATUS |
|--------|---------------------|----|-------------------------|--|---|--------------------|
| Issued | Vogtle | GA | Southern Nuclear | AP1000 | 2 | Issued: 2/10/2012 |
| | V.C. Summer | SC | SCE&G | AP1000 | 2 | Issued: 3/30/2012 |
| | Fermi | MI | DTE Energy | ESBWR | 1 | Issued: 5/1/2015 |
| | South Texas Project | TX | STPNOC | ABWR | 2 | Issued: 2/12/2016 |
| | Levy | FL | Duke Energy | AP1000 | 2 | Issued: 10/26/2016 |
| | William States Lee | SC | Duke Energy | AP1000 | 2 | Issued: 12/19/2016 |
| | North Anna | VA | Dominion Energy | ESBWR | 1 | Issued: 6/2/2017 |
| | Turkey Point | FL | Florida Power and Light | AP1000 | 2 | Issued: 4/12/2018 |

A COL is valid indefinitely. If a licensee chooses not to construct a plant immediately following being granted a COL, it must submit a COL update annually to the NRC to reflect the most recent regulatory requirements and any new or different environmental or design information, or it can request an exemption. To begin construction, the COL must be fully updated.



NEW PLANT CONSTRUCTION

Until recently there were four Westinghouse AP1000 reactors under construction at the Vogtle (Georgia) and V.C. Summer (South Carolina) sites. Their construction has been impacted when Westinghouse declared bankruptcy last year.

Vogtle

In late July, 2018, Bechtel announced it was making a push to attract and hire skilled workers to meet the peak construction labor requirements beginning at the end of 2018 and continuing into 2019. On July 9, 2018, Georgia Power announced it was providing a second of three \$25 credits to its customers in response to an order by the Georgia Public Service Commission (PSC) to shoulder some of the cost overruns when the PSC agreed to let the utility finish the delayed, over-budget Plant Vogtle nuclear expansion. The total credit provided sums to \$188 million.



Vogtle 4 step-up transformer is lifted into place. (Courtesy of Georgia Power/ Southern Company, May 2018)

On May 10, 2018, Georgia Power announced that over the previous week workers placed the four main step-up transformers, each weighing 420,000 pounds, inside the Unit 4 reactor transformer bays located near the reactor's turbine building. Teams also completed a significant concrete placement inside the Unit 4 reactor containment vessel, clearing the path for installation of the first-floor module for the reactor.

Two groups filed legal challenges to the Georgia Public Service Commission's (PSC) decision to allow Georgia Power and partners to complete two unfinished nuclear reactors at Plant Vogtle in early 2018. Southern Environmental Law Center, Partnership for Southern Equity, and Georgia Interfaith Power and Light filed a lawsuit in February arguing PSC violated state laws and the commission's own rules by approving spending that would nearly double the estimated cost of the project. Consumer group Georgia Watch filed a legal challenge in March alleging the PSC's decision benefits Georgia Power's shareholders over ratepayers. No hearing dates have been set for these filings. In April, Georgia Power filed motions to dismiss the cases.

VC Summer

In January 2018, Dominion Energy proposed to buy SCANA Corporation for \$14.6 billion and agreed to make up for customers being charged for the failed V.C. Summer nuclear construction project with \$1.3 billion in rebates and no rate increases for three years. In March, the Georgia Public Service Commission unanimously approved the merger. In July, SCANA received the Federal Energy Regulatory Commission and its stockholders' approval of the proposed sale to Dominion. The acquisition now requires approval from North and South Carolina state regulators where SCANA operates, in addition to the Nuclear Regulatory Commission.

SCANA is being sued by its shareholders and customers after it and its minority partner, the state-owned Santee Cooper utility, pulled the plug last July on the \$9 billion, decade-long construction of two nuclear reactors in Fairfield County. The lawsuits allege SCANA leaders were aware of critical problems dooming the



nuclear project and covered them up. SCANA announced in July, 2018, it would open its own investigation in mismanagement of the Summer project

At the time of its August 2017 cancellation, the V.C. Summer project was about 65% complete. All four steam generators for Units 2 and 3 reactors were being installed, while two of the four reactor coolant pumps for Unit 2 reactor are on site. Units 2 and 3 reactors were planned to come online in April 2020 and December 2020, respectively.



OPERATING FLEET STATUS

Nation-Wide Status

As the pioneer of nuclear power development, America is the world's largest producer of nuclear power, accounting for more than 30% of worldwide nuclear generation of electricity. Our 99 reactors produced approximately 805 billion kilowatt-hours (kWh) in 2017, 20% of America's total electrical output and nearly 60% of our emissions-free electricity. Since the early 1970s, the U.S. nuclear industry has significantly improved its safety and operational performance. By the turn of the century, it was among world leaders with a record breaking capacity factor in 2017 of over 92% and all safety indicators exceeding targets.

In deregulated electricity markets, nuclear power plants are facing financial challenges from low cost electrical power sources.

This section covers information on operating plant uprates, supportive initiatives, and challenges impacting specific plants.

License Renewal and Uprate Status

License Renewal

Eighty-nine reactors have received 20-year extensions of their operating licenses from the U.S. Nuclear Regulatory Commission (NRC), including Kewaunee, Vermont Yankee and Fort Calhoun, which are now permanently closed. Applications for an additional four renewals (five reactors total) are currently under NRC review.

Applications for License Renewal

- ★ Pending Applications:
 - Indian Point 2 & 3
 - Seabrook 1
 - Waterford 3
 - River Bend
- ★ Anticipated Future Submittals:
 - Clinton Power Station 1
 - Comanche Peak Nuclear Power Plant 1 & 2

Applications for Second License Renewal

- ★ In 2018:
 - On July 10, 2018, Exelon Corporation filed a second license renewal application for its Peach Bottom Unit 2 and Unit 3 reactors, located in Delta, Pennsylvania. Peach Bottom Unit 2 reactor began commercial operation in July 1974, and its current license will expire in August 2033. Unit 3 reactor began commercial operation in December 1974, and its current license will expire in July 2034. If granted, the license will be renewed until 2053 and 2054 respectively.
 - In late January, Florida Power & Light (FP&L) filed an application for a second license renewal of its Turkey Point 3 and 4 reactors with NRC. This was the first application for a second renewal



period to be filed and, if granted, will allow the reactors to operate to 2052 and 2053—a total of 80 years.

- ★ By 2020:
 - Dominion will file a second license renewal application for its Surry Power Station Unit 1 and 2 reactors in Surry, Virginia. Surry Power Station Unit 1 reactor began commercial operation in December 1972, and its current license will expire in May 2032. Unit 2 reactor began commercial operation in May 1973, and its current license will expire in January 2033.
 - Dominion will file a second license renewal for North Anna Unit 1 and 2 reactors near Mineral, Virginia. Unit 1 reactor's license was granted April 1978 and expires April 2038. Unit 2 reactor's license was granted August 1980 and expires August 2040.

Operating Fleet Uprate Activities

U.S. nuclear power plants have submitted power uprate applications to the NRC since the 1970s, accounting for an additional 7,923 MWe of output.

- ★ Approved Applications
 - Hope Creek Unit 1 reactor – The NRC approved PSEG's 1.6% uprate request on April 24, 2018, increasing the reactor's output from approximately 3,840 to 3,902 megawatts thermal.
 - Browns Ferry Units 1, 2, and 3 – The NRC approved Tennessee Valley Authority's (TVA) 14.3% uprate request on August 14, 2017, increasing the reactors' output from the currently licensed thermal power level of 3,293 to 3,952 megawatts thermal. TVA just completed an upgrade to Browns Ferry Unit 3 for an additional 155 MW and have plans to upgrade Units 1 and 2 in the near future.
 - Peach Bottom Units 2 and 3 – The NRC approved Exelon's 1.66% uprate request on November 15, 2017, increasing the reactors' output from approximately 3,951 to 4,016 megawatts thermal.
- ★ Expected Applications, 2018 & beyond
 - As of July 31, 2018, the NRC reports there are zero pending or expected applications for power uprate.
 - As of July 31, 2018 there are four (4) expected applications for power uprate in 2019 (per NRC)

Operating Fleet Status: Supportive Federal and State Action

Initiatives are taking place at the national and state level to ensure a more competitive market for nuclear power. For example, state action in New York and Illinois to level the playing field and include nuclear energy in their clean energy policies has averted the closure of five power plants.

- ★ Secretary of Energy Rick Perry told the U.S. House of Representatives committee on Science, Space, and Technology on [May 9th](#) that the department is looking at using the Defense Production Act to keep coal and nuclear plants from closing.
- ★ In May, New Jersey Governor Phil Murphy directed the state to issue zero emissions credits to eligible nuclear power plants. These credits are expected to apply to Hope Creek and Salem reactors but will not prevent the closure of Exelon's Oyster Creek reactor, which is scheduled to close in October 2018.
- ★ Based on action initiated by the U.S. Department of Energy, the [U.S. Federal Energy Regulatory Commission \(FERC\)](#) is currently collecting resilience preparedness information from the regional transmission organizations/ independent system operators to ensure the resilience of the bulk power system.



- ★ PJM Interconnection LLC, a regional transmission organization, is considering enhancements to energy price formation to allow all resources selected for dispatch to set price (i.e., baseload plants that are currently “price takers”) which would more accurately reflect true costs to serve load.
- ★ Two states (New York and Illinois) approved the creation of “zero emissions credit” (ZEC) to provide additional revenue to at-risk nuclear power plants.
- ★ Ohio has considered ZEC legislation similar to New York and Illinois, but progress appears to have stalled.
- ★ The New Jersey Senate and Assembly passed bills, which Governor Phil Murphy signed into law on May 23rd, directing the state’s Board of Public Utilities to issue zero emissions credits to eligible nuclear power plants. These credits are expected to apply to Hope Creek and Salem reactors but will not prevent the closure of Exelon’s Oyster Creek reactor, which is scheduled to close in October 2018.
- ★ Pennsylvania’s state legislature created a nuclear caucus, and there is growing interest in potential state action. Community and union leaders asked the caucus in April to award zero emissions tax credits to Exelon-owned Three Mile Island and FirstEnergy’s Beaver Valley. Three Mile Island is currently scheduled to close in 2019, and FirstEnergy recently announced plans to close Beaver Valley in 2021.

Five plants (7 reactors) announced they were closing prior to their license expiration date but were saved due to State Action:

| ORIGINALLY PROPOSED CLOSURE YEAR | SITE / LOCATION | | UTILITY | LICENSE EXPIRATION (TERM) | POWER (MWe) |
|----------------------------------|-----------------------|----|---------|---------------------------|--------------|
| 2017 | FitzPatrick | NY | Entergy | 2034 (60) | 852 |
| | Ginna | NY | Exelon | 2029 (60) | 582 |
| | Clinton | IL | Exelon | 2026 (40) | 1065 |
| 2017-18 | Nine Mile Point-1 & 2 | NY | Exelon | 2029 / 2046 (60) | 1780 |
| 2018 | Quad Cities 1 & 2 | IL | Exelon | 2032 (60) | 1820 |
| Total Saved | | | | | 6,099 |



Operating Fleet Status: Premature Closure

Some of the nuclear plants now closing are doing so because of state policy pressure (as with California’s Diablo Canyon, New Jersey’s Oyster Creek, and New York’s Indian Point), and some have had maintenance issues that were too costly to fix. However, most plants are closing or threatening closure because—given the economics in some regions—they have become unable to compete against primarily low-cost, gas-fired generation and, to a lesser extent, subsidized and mandated "variable renewable energy," such as wind- and solar-power, in a low electricity demand environment.

- ★ Five plants (6 reactors) have closed prior to their license expiration date:

| CLOSURE YEAR | SITE / LOCATION | | UTILITY | LICENSE EXPIRATION (TERM) | POWER (MWe) |
|---------------------------------|------------------|----|--------------|---------------------------|-------------|
| 2013 | Crystal River 3 | FL | Duke | 2016 (40) | 860 |
| | San Onofre 2 & 3 | CA | SoCal Edison | 2023 / 2024 (40) | 2,150 |
| | Kewaunee | WI | Dominion | 2033 | 566 |
| 2014 | Vermont Yankee | VT | Entergy | 2032 | 620 |
| 2016 | Fort Calhoun | IN | Omaha Power | 2033 (60) | 479 |
| Total Closed since 2013: | | | | | 4675 |



★ Ten plants (13 reactors) have announced plans to retire prior to their license expiration date:

| PENDING CLOSURE YEAR | SITE / LOCATION | | UTILITY | LICENSE EXPIRATION (TERM) | POWER (MWe) |
|--------------------------------|---------------------|----|---------------------|--|---------------|
| 2018 | Oyster Creek | NJ | Exelon | 2029 (60) | 610 |
| 2019 | Pilgrim 1 | MA | Entergy | 2032 (60) | 678 |
| | Three Mile Island 1 | PA | Exelon | 2034 (60) | 803 |
| 2020 | Davis-Besse | OH | FirstEnergy Nuclear | 2037 (60) | 908 |
| | Duane Arnold | IA | NextEra | 2034 (60) | 615 |
| 2020-21 | Indian Point 2 & 3 | NY | Entergy | 2013 / 2015 (40) * renewal application under review | 2061 |
| 2021 | Perry | OH | FirstEnergy Nuclear | 2026 (40) | 1,268 |
| | Beaver Valley | PA | FirstEnergy Nuclear | 2036 / 2047 (60) | 1872 |
| 2022 | Palisades | MI | Entergy | 2031 (60) | 789 |
| 2024-25 | Diablo Canyon 1 & 2 | CA | PG&E | 2024 / 2025 (40) | 2240 |
| Total Pending Closures: | | | | | 11,844 |

*NRC webpage: Per 10 CFR 2.109, if a licensee submits a sufficient application for renewal at least five years before expiration of its current license, the request is considered "timely" and the facility is allowed to continue to operate under its existing license until the NRC completes its review and reaches a decision on the license renewal request. Because the license renewal application remains under consideration, the utility will be allowed to continue to operate IP2 and IP3 under its existing licenses, with certain modifications to its procedures and safety analyses that the utility is making to assure continued safe operation during the timely renewal period.

