

- ★ The Westinghouse bankruptcy (March 2017) has resulted in the following recent actions:
 - On January 4, 2018, Brookfield Business Partners LP agreed to buy Westinghouse Electric Company from Toshiba (parent company of Westinghouse), including both its U.S. business out of bankruptcy and its non-bankrupt European business, for \$4.6 billion. Toshiba bought Westinghouse for \$5.4 billion in 2006. The U.S. Bankruptcy Court must approve the sale.
 - In January 2018, Dominion Energy proposed to buy SCANA Corporation in a \$7.8 billion all-stock deal, and agreed to cut electricity bills by 5% to make up for customers being charged for the failed V.C. Summer nuclear construction project. The proposal will be reviewed by the South Carolina Public Service Commission.
 - In December 2018, SCANA proposed handing over the V.C. Summer nuclear site to Santee Cooper so the project can be preserved and perhaps finished later.
 - December 21, 2017, Georgia's Public Service Commission voted unanimously to allow continued construction of two Westinghouse AP1000 nuclear reactors at Georgia Power's Plant Vogtle. The commission chair said the decision was based on the importance of fuel diversity and the long term benefits the project would have on Georgians.
 - October 2017: The U.S. Securities and Exchange Commission opened an investigation into how SCANA handled the V.C. Summer construction project. Meanwhile the utility faces two class-action lawsuits in federal court for violations of U.S. securities law, alleging the company and top executives made misleading and fraudulent statements to investors and the public about the project.
 - September 2017: The U.S. Department of Energy guaranteed another \$3.7 billion in loan guarantees for the Vogtle project. SCANA and Santee Cooper accepted a \$2.2 billion settlement offer from Toshiba. These two companies also received federal subpoenas asking for documents related to a February 2016 Bechtel assessment report of construction at V.C. Summer, after which South Carolina lawmakers called for a criminal investigation into how SCANA and its primary subsidiary, South Carolina Electric and Gas Co., handled the V.C. Summer project.
- ★ Congressional Legislative Action:
 - February 2018: Section 40501 of the recently passed budget agreement extends the Nuclear Production Tax Credit (PTC).
 - Specifically, it permits the secretary of energy to allocate credits up to 6,000 megawatts of new nuclear capacity when the reactors are placed into service. Originally, new reactors were required to be online by December 31, 2020. The deadline change ensures the two reactors being built at Vogtle will benefit from the PTC.
 - The 6,000 megawatt capacity limit may allow the PTC to also benefit any utility that chooses to pursue construction of a NuScale Power small modular reactor (SMR), such as the plans under consideration to build a NuScale SMR at the Idaho National Laboratory by 2026.
 - In January 2018, as part of the Nuclear Regulatory Commission's (NRC's) new Safety Evaluation Report on the NuScale Power Small Modular Reactor, the NRC approved NuScale's "Safety Classification of Passive Nuclear Power Plant Electrical Systems" licensing report. In that report, NuScale established the bases of how a SMR design can be safe without reliance on any safety-related electrical power.



- ★ On January 8, 2018, U.S. Federal Energy Regulatory Commission (FERC) terminated the proceeding initiated to address Secretary Perry's proposed rule on grid reliability and resilience pricing and initiated a new proceeding to specifically evaluate the resilience of the bulk power system in the regions operated by regional transmission organizations (RTO) and independent system operators (ISO). In this new order, the RTO/ISOs were directed to submit information to FERC on certain resilience issues and other concerns to enable FERC to examine holistically the resilience of the bulk power system within 60 days. The additional information is expected to enable FERC to determine appropriate actions to address grid resilience. Interested entities may submit reply comments within 30 days of the due date of RTO/ISO submissions.
- ★ Pending License Renewal Applications
 - In 2018:
 - Florida Power & Light (FP&L) will file an application for a second license renewal of its Turkey Point 3 and 4 reactors with the U.S. Nuclear Regulatory Commission. This will be 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. Throughout 2018, FP&L plans to perform upgrades to increase capacity by an estimated 40 megawatts.
 - Exelon Corporation will file a second license renewal application in 2018 for its Peach Bottom Unit 2 and Unit 3 reactors, located in Delta, Pennsylvania. Peach Bottom Unit 2 began commercial operation in July 1974, and its current license will expire in August 2033. Unit 3 began commercial operation in December 1974, and its current license will expire in July 2034.
 - Dominion will file a second license renewal for North Anna Unit 1 and 2 reactors near Mineral, Virginia. Unit 1's license was granted April 1978 and expires April 2038. Unit 2's license was granted August 1980 and expires August 2040.
 - In 2019:
 - 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 began commercial operation in December 1972, and its current license will expire in May 2032. Unit 2 began commercial operation in May 1973, and its current license will expire in January 2033.
- ★ On February 1, 2018, in response to the concerns over the long term operations of Dominion's Millstone Power Station near Waterford, Connecticut, the Connecticut Department of Energy & Environmental Protection and Public Utilities Regulatory Authority issued on February 1, its final "Resource Assessment, Appraisal, and Determination of Millstone Report" regarding the current and projected future viability of the Millstone nuclear generating facilities, the role of such facilities as well as others in meeting Connecticut's carbon and other emission targets, and mechanisms to achieve those targets. The report concluded that the Millstone units are critical to both Connecticut and New England in terms of fuel security and in meeting statutory greenhouse gas reduction goals. As a result of this study, Millstone will be allowed to more fairly compete in the state's clean energy market.
- ★ On February 2, Exelon announced it has moved up the retirement date for Oyster Creek Generating Station in Forked River, New Jersey, to October 2018, instead of the end of 2019, as originally planned. Oyster Creek is the oldest commercially operated nuclear power plant in America.



- ★ As a result of a cost recovery order issued by Michigan's Public Service Commission, Entergy announced Palisades Nuclear Power Plant, in Covert Township, Michigan, will continue operations through 2022, when its current power purchase agreement expires, rather than 2018, as originally announced in December 2016.
- ★ FirstEnergy Nuclear Operating Corporation has indicated publically it is likely to close or sell its Ohio Davis-Besse and Perry plants as it seeks to exit the competitive power generation business which is struggling to compete with cheaper natural gas.
 - The Ohio legislature is considering a second bill, introduced in October, which values the zero-emissions plan by providing a subsidy, similar to programs in New York and Illinois, paid for by their customers.
 - Several hearings were held on the proposed bill in the Senate but it has yet to pass out of committee. A similar bill was considered in the spring but stalled. Governor Kasich indicated he does not support such legislation.
 - FirstEnergy Solutions has a roughly \$100 million debt payment due on April 2, 2018. In late January 2018, Moody's Investor Services downgraded the subsidiary citing the likelihood of default.
- ★ August 2017, the U.S. Department of Energy (DOE) issued its much anticipated [Staff Report to the Secretary on Electricity Markets and Reliability](#). Noting that a reliable and resilient electric grid is critical not only to our national and economic security, but also to the everyday lives of American families, Secretary Perry directed staff at DOE to develop a report assessing the reliability and resilience of the electric grid and providing an overview of the evolution of electricity markets.



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 and in-depth review of all 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 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 / Final Safety Evaluation Report (SER) expected 3/2018 |
| 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: Seven, totaling 12 reactors, have received COLs; one, totaling two nuclear reactors, remain 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; 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. UNITS | | STATUS |
|--------------|---------------------|----|-------------------------|-------------------------------|---|---------------------------------|
| Issued | Vogtle | GA | Southern Nuclear | AP1000 | 2 | Issued: 2/10/2012 |
| | V.C. Summer | SC | SCE&G | AP1000 | 2 | Issued: 4/10/2012 |
| | 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: 5/31/2017 |
| | Turkey Point | FL | Florida Power and Light | AP1000 | 2 | In Review Docketed: 9/4/2009 |
| Active COLAs | | | | | | |

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 by the recent Westinghouse declaration of bankruptcy. Their current status:

Vogtle

On December 21, 2017, the Georgia Public Service Commission (PSC) unanimously approved the recommendation of Vogtle's co-owners to complete construction of the new units as the most economic choice for customers, while the project's owners agreed to new penalties for delays and cost increases stipulated by the PSC.

In July 2017, Georgia Power took over engineering, procurement, construction, and licensing of Vogtle from Westinghouse. Toshiba, the parent company to Westinghouse, agreed to pay the owners of Vogtle \$3.7 billion.



Vogtle Unit 3 Nuclear Island and Turbine Building; Vogtle Unit 4 Containment Vessel
(Courtesy of Georgia Power/Southern Company; June 2017)

V.C. Summer

In January 2018, Dominion Energy proposed to buy SCANA Corporation in a \$7.8 billion all-stock deal, and agreed to cut electricity bills by 5 percent to make up for customers being charged for the failed V.C. Summer nuclear construction project. The proposal be reviewed by the South Carolina Public Service Commission.

In December 2017, SCANA proposed handing over the V.C. Summer nuclear site to Santee Cooper so the project can be preserved and perhaps finished later.



In early August 2017, SCANA (55% owner) and Santee Cooper (45%) decided to cancel further construction of the AP1000 units at V.C. Summer. Toshiba, the parent company to Westinghouse, agreed to pay the owners of V.C. Summer \$2.2 billion, which was fully settled in January 2018.

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



SCE&G Places Final Unit 2 Containment Vessel Ring; The First U.S. AP1000 Steam Generator is placed in Unit 2 (Courtesy of SCE&G)



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 805 billion kilowatt-hours (kWh) in 2016, almost 20% of America's total electrical output and about 60% of our carbon-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 2016 of 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 supportive initiatives as well as challenges impacting specific plants.

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 additional power plants.

- ★ 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.
- ★ FERC continues to consider price formation changes
- ★ 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 units 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” to provide additional revenue to at-risk nuclear power plants;
- ★ Ohio has considered similar legislation but progress appears to have stalled.
- ★ New Jersey is actively considering such legislation.
- ★ Pennsylvania’s state legislature created a nuclear caucus and there is growing interest in potential state action.



- ★ Five plants 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 | | 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 units 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 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 |



- ★ Six plants 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 |
| 2020-21 | Indian Point 2 & 3 | | Entergy | 2013 / 2015 (40) * renewal application under review | 2,060 |
| 2022 | Palisades | MI | Entergy | 2031 (60) | 789 |
| 2024-25 | Diablo Canyon 1 & 2 | CA | PG&E | 2024 / 2025 (40) | 2,240 |
| | | | | | Total Pending Closures: 6,570 |

*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.

