



- ★ Congressional Legislative Action:
 - September 2018:
 - The Nuclear Energy Innovation Capabilities Act (S. 97) was signed into law on [September 28](#). The bill allows the private sector to partner with US National Laboratories to vet advanced nuclear technologies. The bill also directs the Department of Energy (DOE) to lay the ground work for establishing a versatile, reactor-based fast neutron source.
 - On [September 6](#), Senator Lisa Murkowski introduced a bill called the Nuclear Energy Leadership Act (S. 3422) which would direct the DOE to establish a fast neutron reactor. The bill also directs the DOE to make available high-assay, low-enriched uranium for research purposes. The Nuclear Energy Leadership Act has not yet made it past a Senate vote.
 - The Nuclear Utilization of Keynote Energy Act (HR 1320), which passed the House on September 26, 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collection mechanism so that industry-paid fees are collected more efficiently; (2) direct studies to analyze possible outdated procedures at the NRC to identify efficiencies; and (3) create a review of timelines for license applications.
 - July 2018:
 - During the week of July 8, the U.S. House of Representatives Energy and Commerce Committee introduced the Advanced Nuclear Fuel Availability Act (HR 6140), which would ensure that adequate supplies of domestically produced high-assay low-enriched uranium (enriched above 5 percent and below 20 percent) are available.
- ★ [October 29, 2018](#): US Utility Uses Drones for Nuclear Plant Inspections Xcel Energy is using unmanned aircraft to assist in inspections at the company’s nuclear facilities in Minnesota, achieving safety and cost benefits. The company flew a drone at a nuclear facility for the first time at its Prairie Island plant and has now used a drone to carry out an inspection of a cooling tower at the Monticello plant, the company said on 25 October.
- ★ [October 26, 2018](#): The US Department of Energy (DOE) has awarded a USD33.7 million project to continue the development of advanced fuel rod technologies to GE’s Global Research Center. The two-and-a-half year project aims to develop and demonstrate new, more resilient fuel rods with improved performance in both normal and accident conditions that can be commercially deployed. The new fuel will be developed in partnership with three US national laboratories.
- ★ [October 16, 2018](#): Dominion Energy has applied for another 20-year extension with the Nuclear Regulatory Commission for its Surry nuclear plant’s operating license. The utility has said it also plans to seek similar extension for its North Anna nuclear plant.
- ★ [October 12, 2018](#): Nuclear Regulatory Commission has issued an order approving the transfer of the Vermont Yankee operating license from Entergy to NorthStar Nuclear Decommissioning Co., which plans to conduct an accelerated decommissioning of the reactor.
- ★ [October 11, 2018](#): A federal appellate court on Tuesday, October 9, 2018 declined to rehear a case against Illinois’ nuclear subsidies.



- ★ [October 10, 2018](#): The Ohio Clean Energy Jobs Alliance wants to prevent FirstEnergy Solutions' Perry and Davis-Besse nuclear plants from shutting down. The group is a coalition of Ohio community leaders and organizations committed to preserving the jobs and economic benefits, carbon-free energy and electricity grid reliability that nuclear plants provide to the state, according to a news release from the group.
- ★ [October 2, 2018](#): Dominion Energy's Millstone nuclear plant in Connecticut has the backing of the state Department of Energy and Environmental Protection and Office of Consumer Counsel in its push to be considered a closure risk in order to be eligible to participate in a zero carbon auction.



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

On August 8, 2018 Georgia Power announced that Southern Nuclear has made significant progress on construction of Vogtle Units 3 & 4 since assuming project management on behalf of the project co-owners from Westinghouse. Milestones over the past 60 days alone, have included a major concrete placement lasting more than eight continuous hours inside the Unit 3 shield building and the placement of a 52,000-pound Q233 piping module for Unit 4, a critical piece of the overall passive core cooling system, inside the containment vessel allowing large quantities of specialized piping to now be installed.



Vogtle Unit 3 containment building under construction. (Courtesy of Georgia Power/Southern Company, July 2018)

The cost projections for the completion of the Vogtle plant have increased by an estimated \$2.2 billion, to more than \$27 billion total costs, more than double its original estimate. Drivers for the increase include providing craft labor incentives to attract and retain staffing levels and increased field supervision and engineering oversight.

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.

Pending: 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.

In September 2018, JEA, Jacksonville, Florida's electric utility, filed a suit against the Municipal Electric Authority of Georgia (MEAG) seeking to void a 2008 agreement obligating Florida ratepayers to help build and buy power from the two new reactors at Vogtle. JEA entered into a power purchase agreement with MEAG in 2008, but cost overruns and delays have increased JEA's financial obligations. MEAG subsequently filed a federal suit accusing JEA of having a clear intent to breach the contract and undermine and disrupt the project.



JEA has entreated the Federal Energy Regulatory Commission to intervene in the dispute, but it is not clear if they will agree to hear the case.

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 and shareholders voted in favor of the merger. In September, the Nuclear Regulatory Commission approved the change in ownership from SCANA to Dominion. The merger remains contingent upon approvals from the public service commissions of South Carolina and North Carolina.

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 98 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 October 16, 2018, Dominion filed a second license renewal application for its Surrey 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.
 - On August 29, 2018, NRC accepted Exelon Corporation's 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 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 in 2018
 - 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.
- ★ Expected Applications, 2018 & beyond
 - As of October 31, 2018, the NRC reports there are zero pending or expected applications for power uprate.
 - As of October 31, 2018, there are four 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.

- ★ Two states (New York and Illinois) approved the creation of “zero emissions credit” (ZEC) to provide additional revenue to at-risk nuclear power plants. In [September](#), a federal appellate court ruling upheld Illinois’s law providing zero emissions credits to nuclear plants and other green energy providers.
- ★ 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 did not prevent the closure of Exelon’s Oyster Creek reactor, which closed in September 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.
- ★ Ohio has considered ZEC legislation similar to New York and Illinois in response to the forecast closure of the Perry and Davis-Besse plants, but progress stalled in late 2017.
- ★ 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)	1,065
2017-18	Nine Mile Point-1 & 2	NY	Exelon	2029 / 2046 (60)	1,780
2018	Quad Cities 1 & 2	IL	Exelon	2032 (60)	1,820
				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.

★ Six plants (7 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
2018	Oyster Creek	NJ	Exelon	2029 (60)	610
				Total Closed since 2013:	5,285



- ★ Nine plants (11 reactors) have announced plans to retire prior to their license expiration date:

PENDING CLOSURE YEAR	SITE / LOCATION	UTILITY	LICENSE EXPIRATION (TERM)	POWER (MWe)	REASON (NEI)	
2019	Pilgrim 1	MA	Entergy	2032 (60)	678	Market
	Three Mile Island 1	PA	Exelon	2034 (60)	803	Market
2020	Davis-Besse	OH	FirstEnergy Nuclear	2037 (60)	908	Market
	Duane Arnold	IA	NextEra	2034 (60)	615	
2020-21	Indian Point 2 & 3	NY	Entergy	2013 / 2015 (40) * renewal application under review	2,061	Market & Policy
2021	Perry	OH	FirstEnergy Nuclear	2026 (40)	1,268	Market
	Beaver Valley	PA	FirstEnergy Nuclear	2036 / 2047 (60)	1,872	Market
2022	Palisades	MI	Entergy	2031 (60)	789	Market
2024-25	Diablo Canyon 1 & 2	CA	PG&E	2024 / 2025 (40)	2,240	Policy
Total Pending Closures:				11,234		

