

★ Congressional Legislative Action:

○ November 2019:

- The Advanced Nuclear Fuel Availability Act (HR 1760), which was passed by the House on [September 9](#), would ensure that adequate supplies of domestically produced high-assay low-enriched uranium (enriched above 5 percent and below 20 percent) are available. The bill was received in the Senate and referred to the Committee on Energy and Natural Resources.
- The Nuclear Energy Leadership Act (S 903), which was approved by the Senate Committee on Energy and Natural Resources on [July 16](#), will help facilitate the path to market for advanced reactors by allowing the federal government to be an early adopter of commercialized technologies; providing for needed scientific research facilities; demonstrating advanced reactor concepts; breaking down fuel availability barriers when the market cannot; and training the next generation of nuclear scientist.
- The Nuclear Powers Act of 2019 (HR 2314 and S 1134), which was introduced to the House Ways and Means Committee on [April 12](#) and the Senate Committee on Finance on [April 10](#), would provide a tax credit for investments in qualified nuclear energy property placed in service before January 1, 2026.
- The Nuclear Waste Administration Act of 2019 (S 1234), which was introduced to the Committee on Energy and Natural Resources on [April 30](#), would establish the Nuclear Waste Administration (NWA) to provide for the permanent disposal of nuclear waste.



- ★ [November 15, 2019](#): The U.S Nuclear Regulatory Commission (NRC) requested public and stakeholder input on the potential environmental effects of advanced nuclear reactor designs in order to decide if the agency should create a "generic environmental impact statement". This change could potentially spare proposals for new types of reactors from additional review and speed up their approval process.
- ★ [November 7, 2019](#): Global Nuclear Fuel (GNF) and X-energy announced collaboration to produce high-assay low-enriched uranium (HALEU) tristructural isotropic (TRISO) particle nuclear fuel, which they expect to be able to produce at lower costs than other potential manufacturers.
- ★ [October 30, 2019](#): The NRC staff issued a Final Supplemental Environmental Impact Statement in Florida Power & Light's (FPL) application to operate its Turkey Point 3 and 4 units for an additional 20 years.
- ★ [October 2, 2019](#): BWX Technologies, Inc announced that it is in the process of restarting its existing uranium oxycarbide tristructural isotropic (TRISO) fuel production line at its Lynchburg, Virginia facility. The company, the only US manufacturer of such fuel, also plans to expand its production capacity.
- ★ [September 23, 2019](#): Three Mile Island unit 1 has been shut down for economic reasons after over 45 years of generation. Operators took the 819 MWe (net) pressurized water reactor offline for the final time at midday on September 20, 2019 after it set a site record of 709 continuous days in operation.
- ★ [September 20, 2019](#): Duke Energy has announced it will seek a second 20-year renewal of the operating licenses for all of its nuclear reactors, starting with the three-unit Oconee plant for which it expects to submit a renewal application in 2021. The company says the units are key to achieving their carbon emissions goals. Duke Energy operates 11 nuclear reactors at six sites in North and South Carolina.

- ★ [September 18, 2019](#): Connecticut utilities will purchase half of the energy output from the Millstone Power Station as part of a 10-year agreement between state regulators and the plant's owner, Dominion Energy. Dominion had said it might have to close the plant because of competition and costs.
- ★ [September 11, 2019](#): Lead test assemblies of Westinghouse EnCore fuel rods containing uranium silicide fuel pellets have been loaded into a commercial nuclear power plant for the first time. The fuels, developed through the U.S. Department of Energy's accident tolerant fuels program were loaded into Exelon's Byron unit 2 during a scheduled refueling outage.

**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 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)*

Four reactor designs that are being considered for future builds in the U.S. are certified. One small modular reactor (SMR) design is under NRC review. One is under renewal review and two have been withdrawn<sup>1</sup>.

<sup>1</sup>AREVA 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
	Korea Electric Power Corp	APR1400	Issued: 9/19/2019
Renewal	General Electric-Hitachi	ABWR	Originally Issued 5/12/1997: DC Renewal Application is under review
Active DCAs	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 withdrawn<sup>2</sup>

<sup>2</sup>Victoria 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 issued 4/03/2019 Final SER issued 6/17/2019

**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. A COLA may reference a certified design and/or an early site permit, or neither. *(From NRC website)*

Eighteen COLAs have been docketed by the NRC: Eight, totaling 14 reactors, have received COLs; 8 applications were suspended and later withdrawn<sup>3</sup> due to utility, economic or other considerations while 2 applications remain in “suspended” status<sup>4</sup>. A Reference COL (R-COL) application has been submitted for 5 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.

<sup>3</sup>Suspended 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 ,

<sup>4</sup>Remains 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****Vogtle**

On July 30, 2019 Georgia Power announced that the first nuclear fuel load had been ordered for Vogtle Unit 3. Less than one month later, on August 7, it was announced that Unit 3 began an integrated flush, which will clean and remove any foreign material from the piping system and mechanical components ahead of the initial startup. The placement of the middle containment vessel ring was also completed at Unit 4 earlier in July. The Vogtle 3 and 4 project is now estimated to be about 79% complete with expected in-service dates of November 2021 for Unit 3 and November 2022 for Unit 4.



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 the 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.

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 2018 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 2018 alleging the PSC's decision benefits Georgia Power's shareholders over ratepayers. While the Fulton County Superior Court dismissed the cases in December 2018 on the basis that the commission's decision was not "final" and appealable until the project is complete, the Georgia Court of Appeals sent the group's legal challenge back to the lower court in October 2019.

In September 2018, JEA, Jacksonville, the largest community-owned electric utility in Florida, 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. On April 8, 2019, the U.S. District Court for the Northern District of Georgia allowed JEA's suit to proceed while denying MEAG's claim. JEA and MEAG have since entered settlement discussions.

**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 2018, the Georgia Public Service Commission unanimously approved the merger. In July 2018, 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 was completed on January 2, 2019.

SCANA was sued by its shareholders and customers after it and its minority partner, the state-owned Santee Cooper utility, pulled the plug in July 2018 on the \$9 billion, decade-long construction of two nuclear reactors in Fairfield County. The lawsuits alleged SCANA leaders were aware of critical problems dooming the nuclear project and covered them up. SCANA settled the class-action lawsuit for \$2 billion.

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 96 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 solar and wind power sources.

### License Renewal and Uprate Status

#### License Renewal

Ninety-three reactors have received 20-year extensions of their operating licenses from the NRC, including Kewaunee, Vermont Yankee, Fort Calhoun, and Oyster Creek which are now permanently closed.

#### Applications for License Renewal

- ★ Issued Applications
  - Indian Point 2 & 3 - 9/17/2018
  - River Bend – 12/27/2018
  - Waterford 3 – 12/27/2018
  - Seabrook 1 – 3/12/2019
- ★ Pending Applications:
  - Currently no applications for license renewal under review
- ★ Anticipated Future Submittals:
  - Clinton Power Station 1
  - Comanche Peak Nuclear Power Plant 1 & 2

#### Second License Renewal

The NRC staff has defined subsequent license renewal (SLR) to be the period of extended operation from 60 years to 80 years. (per NRC)

#### Applications for Second License Renewal

- ★ Pending Applications:
  - Turkey Point 3 and 4
  - Peach Bottom Units 2 and 3
  - Surry Units 1 and 2
- ★ Anticipated Future Submittals:
  - North Anna Power Station 1 and 2

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.

- ★ Expected Applications
  - As of November 20, 2019, there are 3 expected applications for power uprate in 2020 (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, Illinois, and New Jersey to level the playing field and include nuclear energy in their clean energy policies has averted the closure of seven power plants.

- ★ [Connecticut](#) ruled in November 2018 to allow Millstone to bid into the Request for Proposals issued by the state’s Department of Energy and Environmental Protection. The selection resulted in a 10-year bid for almost 50% of Millstone’s output. The state also accepted a bid from New Hampshire’s Seabrook nuclear plant for 1900 Gwh of energy.
- ★ In September 2018, a federal appellate court ruling upheld [Illinois’s](#) law providing zero emissions credits to nuclear plants and other green energy providers while, in May, the Supreme Court rejected appeals to that ruling.
- ★ 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](#) created the Clean Air Program on July 23, 2019 which allowed FirstEnergy to rescind the deactivation notices for the Davis-Besse and Perry plants.
- ★ [Pennsylvania’s](#) House and Senate both introduced bills in early 2019 that would include nuclear power in the state’s Alternative Energy Portfolio Standards.

Nine plants (12 reactors) announced they were closing prior to their license expiration date but were saved due to State Actions:

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
2019	Salem – 1 & 2	NJ	PSEG	2036 / 2040 (60)	2,304
	Hope Creek	NJ	PSEG	2046 (60)	1,172
	Davis-Besse	OH	FirstEnergy	2037 (60)	893
	Perry	OH	FirstEnergy	2026 (40)	1,261
				<b>Total Saved</b>	<b>11,729</b>



**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.

- ★ Eight plants (9 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
2019	Pilgrim	MA	Entergy	2032 (60)	685
	Three Mile Island 1	PA	Exelon	2034 (60)	803
				<b>Total Closed since 2013:</b>	<b>6,773</b>

- ★ Five plants (7 reactors) have announced plans to retire prior to their license expiration date with many utilities attributing these decisions to market and policy factors:

PENDING CLOSURE YEAR	SITE / LOCATION		UTILITY	LICENSE EXPIRATION (TERM)	POWER (MWe)
2020	Duane Arnold	IA	NextEra	2034 (60)	615
2020-21	Indian Point 2 & 3	NY	Entergy	2024 / 2025 (60)	2,061
2021	Beaver Valley	PA	FirstEnergy Nuclear	2036 / 2047 (60)	1,872
2022	Palisades	MI	Entergy	2031 (60)	789
2024-25	Diablo Canyon 1 & 2	CA	PG&E	2024 / 2025 (40)	2,240
				<b>Total Pending Closures:</b>	<b>7,577</b>