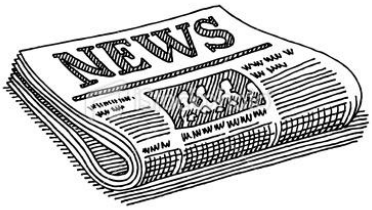

- ★ Congressional Legislative Action:
  - February 2019:
    - The Advanced Nuclear Fuel Availability Act (HR 6140), which passed the House on December 11, would ensure that adequate supplies of domestically produced high-assay low-enriched uranium (enriched above 5 percent and below 20 percent) are available. The bill was received in the Senate and referred to the Committee on Energy and Natural Resources.
    - The Nuclear Energy Innovation and Modernization Act (NEIMA), which will modify the licensing process for commercial advanced nuclear reactor facilities, was signed into law on January 14, 2019.

- ★ February 28, 2019: The Utah House passed a resolution on February 27, 2019 supporting Utah cities that are interested in a nuclear energy-based power supply from a NuScale Power 12-module plant that would be located at the Idaho National Laboratory. The bill now awaits the governor's signature

- ★ February 21, 2019: Southern Company announced "significant progress" during 2018 on its fourth quarter results call regarding Vogtle 3 and 4. President and CEO Thomas Fanning said Southern Company had achieved its "major 2018 construction milestones" and the project is now about 74% complete. The two units are currently scheduled to come online in November 2021 and 2022.

- ★ February 19, 2019: The Tennessee Valley Authority released its draft 2019 Integrated Resource Plan (IRP) highlighting the company's long-term plan for power generation on February 15, 2019. The plan shows the utility will not pursue any new full-scale nuclear plants, but it opens the door for boosting resiliency through the use of small modular nuclear reactors.

- ★ February 14, 2019: Representatives from companies including Centrus Energy, Exelon, General Electric, Lightbridge, NuScale Power, TerraPower, Westinghouse and X-energy met with President Donald Trump on February 12, 2019 to discuss a variety of issues relating to nuclear energy.

- ★ January 31, 2019: The US Department of Energy awarded $111.2 million to General Electric, Westinghouse, and Framaome to develop Accident Tolerant Fuels in order to further innovate fuel concepts to meet the needs of the US nuclear power industry.

- ★ January 28, 2019: The US Nuclear Regulatory Commission approved the publication of its final rule on lessons learned from the 2011 accident at the Fukushima Daiichi nuclear power plant in Japan. Most US nuclear power plants must comply with the rule's requirements within two years and 30 days of its publication in the Federal Register, which the NRC said will happen in the spring of 2019.

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 withdrawn[1].

[1]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
Renewal	General Electric-Hitachi	ABWR	Originally Issued 5/12/1997: DC Renewal Application is under review
Active DCAs	Korea Electric Power Corp	APR1400	Technical review complete: Rulemaking expected March 2019
	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[2]

[2]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 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; 8 applications were suspended and later withdrawn[3] due to utility, economic or other considerations while 2 applications remain in "suspended" status[4]. 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.

[3]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 ,

[4]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 December 4, 2018 Georgia Power announced that Southern Nuclear has continued to make progress on construction of Vogtle Units 3 & 4 with the placement of the third and final ring of the containment vessel and the fourth reactor coolant pump for Unit 3. The Vogtle 3 and 4 project is now estimated to be about 74% complete.

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.

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. In December 2018, Fulton County Superior Court dismissed the cases on the basis that the commission's decision was not "final" and appealable until the project is complete.

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. The Federal Energy Regulatory Commission dismissed JEA's request to intervene in the dispute because MEAG is "not a public utility" and "the Commission has no authority … to review or approve (or alternatively disprove) the wholesale sales of electricity in interstate commerce from MEAG to JEA pursuant to the PPA."

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 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 last July 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 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 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 U.S. Nuclear Regulatory Commission (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 Nuclear Regulatory Commission (NRC) staff has defined subsequent license renewal (SLR) to be the period of extended operation from 60 years to 80 years.

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 April 16, 2018, there are 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.

- ★ 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 2018, 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.
- ★ Pennsylvania's Nuclear Energy Caucus recently announced upcoming legislation that would include nuclear power in the state's Alternative Energy Portfolio Standards.

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**	