

RECORD OF DECISION

U.S. NUCLEAR REGULATORY COMMISSION

DOCKET NUMBERS: 50-280 AND 281

SUBSEQUENT LICENSE RENEWAL APPLICATION FOR

SURRY POWER STATION, UNITS 1 AND 2

BACKGROUND

The U.S. Nuclear Regulatory Commission (NRC) received an application dated October 15, 2018 (Agencywide Documents Access and Management System (ADAMS) Package Accession No. ML18291A842), from Dominion Energy Virginia (Dominion) filed pursuant to Section 103 of the Atomic Energy Act of 1954, as amended; Title 10 of the *Code of Federal Regulations* (10 CFR) Part 51, "Environmental Protection Regulations For Domestic Licensing And Related Regulatory Functions;" and 10 CFR 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," for subsequent renewal of the renewed operating licenses for Surry Power Station (Surry), Units 1 and 2. Surry, Units 1 and 2, are two Westinghouse pressurized water reactors located on approximately 840 acres (ac) (340 hectares (ha)) of land in Surry County, VA. Each reactor is designed to produce a nominal core power rating of 2,587 megawatts thermal. On November 1, 2018, the NRC staff published a notice of receipt and availability of the subsequent license renewal application, including the environmental report, in the *Federal Register* (FR) (83 FR 54948).

The Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.) (AEA), specifies that licenses for commercial power reactors can be granted for an initial period of up to 40 years. The NRC regulations permit these licenses to be renewed beyond the initial 40-year term for an additional period of time, limited to 20-year increments per renewal, based on the results of an assessment to determine whether the nuclear facility can continue to operate safely during the proposed period of extended operation. There are no limitations in the AEA or NRC regulations restricting the number of times a license may be renewed.

On March 20, 2003, the NRC granted initial renewed licenses to Dominion for Surry, Units 1 and 2. The Surry, Unit 1, renewed facility operating license (DPR-32) and the Surry, Unit 2, renewed facility operating license (DPR-37) expire on May 25, 2032, and January 29, 2033, respectively. The subsequent renewed licenses would authorize Dominion to operate Surry, Units 1 and 2, until May 25, 2052, and January 29, 2053, respectively.

On December 10, 2018, the NRC accepted Dominion's application and began the environmental review process (83 FR 63541 and 83 FR 64606). Section 102 of the National Environmental Policy Act (NEPA) of 1969, as amended, directs that an environmental impact statement (EIS) be prepared for major Federal actions that have the potential to significantly affect the quality of the human environment. In accordance with 10 CFR 51.20(b)(2), the NRC prepares an EIS for all renewed reactor operating licenses, regardless of the action's environmental impact significance. The NRC's Federal action is to decide whether to

issue subsequent renewed operating licenses for Surry, Units 1 and 2, authorizing operation until May 25, 2052, and January 29, 2053, respectively, as proposed in the application.

On December 20, 2018, the NRC staff published a notice of intent to prepare a Supplemental Environmental Impact Statement (SEIS) and conduct scoping in the FR (83 FR 65367). In addition, Federal, State, and local agencies, as well as Tribal governments, were notified and asked to provide comment on and to participate in the environmental scoping process and review. On January 8, 2019, the NRC held a public scoping meeting near the Surry site in Surry County, VA, to obtain public input on the proper scope of the NRC's environmental review of the Surry subsequent license renewal application. On June 4, 2019, the NRC issued a Scoping Summary Report (ADAMS Accession No. ML19135A197), cited in Appendix A of the SEIS.

## ENVIRONMENTAL IMPACT STATEMENT

In accordance with 10 CFR 51.95(c), "Operating License Renewal Stage," the NRC staff documents its environmental review of a license renewal application and publishes it as a site-specific SEIS to NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants" (GEIS), as revised. Dominion submitted its license renewal application under the NRC's 2013 revised rule governing license renewal environmental reviews, as codified in 10 CFR Part 51. The GEIS documented the results of the NRC staff's systematic approach to evaluating the environmental consequences of renewing the licenses of individual nuclear power plants and operating them for an additional 20 years beyond the end of the current license term. The GEIS<sup>1</sup> provides the technical bases for the list of NEPA issues and associated environmental impact findings for license renewal that were contained in Table B-1, "Summary of Findings on NEPA Issues for License Renewal of Nuclear Power Plants," in Appendix B to Subpart A of 10 CFR 51. In the GEIS, the NRC staff analyzed in detail and resolved those environmental issues that are considered generic and common to all nuclear power plants (Category 1 issues). For Category 1 issues, no additional site-specific analysis is required in the SEIS unless new and significant information is identified. The GEIS also identifies site-specific issues (Category 2 issues). For Category 2 issues, an additional site-specific review is required, and the results are documented in the SEIS.

The NRC established a standard of significance for each NEPA issue evaluated in the GEIS based on the Council on Environmental Quality (CEQ) regulations on how to evaluate significance (see Title 40, "Protection of Environment," of the *Code of Federal Regulations* (40 CFR) 1508.27, "Significantly"). The term "significantly," as used in NEPA, requires consideration of both of the following:

- 1) Context—as in the geographic, biophysical, and social context in which the effects will occur.
- 2) Intensity—which refers to the severity of the impact in whatever context it occurs.

Since the significance and severity of an impact can vary with the setting of the proposed action, the NRC considered both "context" and "intensity" as defined in CEQ regulations at 40 CFR 1508.27. In the case of license renewal, the context is the environment surrounding the

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<sup>1</sup> U.S. Nuclear Regulatory Commission. 2013. NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," Rev. 1, Vols. 1-3 (ADAMS Accession Nos. [ML13106A241](#), [ML13106A242](#), and [ML13106A244](#)). June 2013.

nuclear power plant. Based on this, the NRC established a three-level standard of significance for potential impacts, SMALL, MODERATE, and LARGE, as defined below.

SMALL: Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

MODERATE: Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

LARGE: Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

On October 22, 2019, the NRC issued a draft site-specific SEIS for public comment in support of the Surry license renewal application review (ADAMS Accession No. ML19274C676 and 84 FR 56488). A 45-day comment period began on October 25, 2019, when the U.S. Environmental Protection Agency (EPA) published a Notice of Availability (NOA) in the FR (84 FR 57417) of the draft SEIS to allow members of the public and agencies time to comment on the results of the environmental review. On November 7, 2019, the NRC conducted a public meeting (webinar) at NRC headquarters in Rockville, Maryland, to present the preliminary results of the environmental review, respond to questions, and accept public comments. The comment period ended on December 10, 2019.

On April 10, 2020, the NRC issued the final site-specific SEIS (FSEIS) in support of the Surry subsequent license renewal application review (ADAMS Accession No. ML20071D538 and 85 FR 20307). On April 17, 2020, the EPA published a NOA of this FSEIS in the FR (85 FR 21428). All comments received during the draft SEIS comment period are discussed in Appendix A of the FSEIS. After consideration of those comments and its independent review, the NRC staff did not identify any new and significant information that would call into question, with respect to the subsequent license renewal of Surry, Units 1 and 2, the applicability of the GEIS conclusions on Category 1 issues. In the FSEIS, the NRC staff concluded that the adverse environmental impacts of subsequent license renewal for Surry are not great enough to deny the option of license renewal for energy-planning decisionmakers. This recommendation is based on: (1) the analysis and findings in the GEIS; (2) information provided in the environmental report and other documents submitted by Dominion; (3) consultation with Federal, State, local, and Tribal agencies; (4) the NRC staff's independent environmental review; and (5) consideration of public comments received during the scoping process and on the draft SEIS.

After issuance of the FSEIS in April 2020, the NRC staff identified new information with the potential to affect the staff's environmental impact analyses presented in the FSEIS. The staff's review and consideration of this new and emerging information and determination as to whether it constitutes new and significant information is presented in the Record of Decision (ROD) section titled "CONSIDERATION OF COMMENTS ON THE FSEIS AND EMERGING INFORMATION." The staff has determined that none of the information reviewed and considered is both new and significant and, therefore, no supplement to the Surry FSEIS is required in accordance with 10 CFR 51.92(a).

Pursuant to 10 CFR 51.102(b) and 51.103(a)(1)-(5), the NRC staff has prepared this ROD to accompany its Federal action on the Surry license renewal application. This ROD incorporates by reference materials contained in the FSEIS, in accordance with 10 CFR 51.103(c).

## DECISION

Pursuant to 10 CFR Section 54.29, a renewed license may be issued if the Commission finds, in part, that any applicable requirements of Subpart A of 10 CFR 51 have been satisfied, including the completion of the ROD.

The FSEIS, which is incorporated by reference herein, documents the staff recommendation that the adverse environmental impacts of subsequent license renewal for Surry are not so great that preserving the option of license renewal for energy-planning decisionmakers would be unreasonable, in accordance with 10 CFR 51.103(a)(5).

In making its licensing decision on the proposed Federal action to authorize the continued operation of Surry, Units 1 and 2, through May 25, 2052, and January 29, 2053, respectively, the NRC must make a favorable safety finding. The purpose of the NRC's safety review is to determine if the applicant has adequately demonstrated that the effects of aging will not adversely affect the intended functions of any safety-related structures or components as specified in 10 CFR 54.4 and 10 CFR 54.21. The applicant must demonstrate that the effects of aging will be adequately managed so that the intended functions will be maintained during the license renewal period. The staff documented the results of its safety review in "Safety Evaluation Report Related to the Subsequent License Renewal of Surry Power Station, Units 1 and 2," issued March 9, 2020 (ADAMS Accession No. ML20052F520). The Advisory Committee on Reactor Safeguards provided its independent review and report (ADAMS Accession No. ML20120A610) to the Commission in accordance with 10 CFR 54.25, "Report of the Advisory Committee on Reactor Safeguards," regarding the application for subsequent renewal of the Surry, Units 1 and 2, operating licenses.

## PURPOSE AND NEED

The purpose and need for the proposed Federal action (issuance of subsequent renewed licenses for Surry, Units 1 and 2) is to provide an option that allows for power generation capability beyond the term of the current renewed nuclear power plant operating licenses to meet future system generating needs. Such needs may be determined by energy-planning decisionmakers such as State regulators, utility owners, and Federal agencies other than the NRC. This definition of purpose and need reflects the NRC's recognition that, unless there are findings in the NRC's safety review (required by the AEA) or findings in the NRC's environmental analysis (required by NEPA) that would lead the NRC to reject a subsequent license renewal application, the NRC does not have a role in energy-planning decisions as to whether a particular nuclear power plant should continue to operate. Ultimately, the appropriate energy-planning decisionmakers and Dominion will decide whether Surry will continue to operate based on factors such as the need for power or other matters within the State's jurisdiction or the purview of the owners. The issuance of a renewed license is just one of the items that Dominion must address to be able to operate its nuclear power plant during the renewal term.

## NRC EVALUATION OF THE PROPOSED ACTION AND ALTERNATIVES

In license renewal environmental reviews, the NRC considers the environmental consequences of the proposed action (i.e., renewing the operating license), the environmental consequences of the no action alternative (i.e., not renewing the operating license), and the environmental consequences of various reasonable alternatives for replacing the nuclear power plant's generating capacity. Section 102(2)(C)(iii) of NEPA and the NRC's regulations require the

consideration of alternatives to the proposed action in the EIS. In this case, the proposed action is issuance of subsequent renewed operating licenses for Surry Power Station, Units 1 and 2, which would authorize the applicant to operate the plant for an additional period beyond the expiration date of the current licenses. FSEIS Chapter 2, “Alternatives Including the Proposed Action,” and Chapter 4, “Environmental Consequences and Mitigating Actions,” present the NRC staff’s evaluation and analysis of the environmental impacts of the proposed action and alternatives to license renewal. The evaluation considered environmental impacts of each alternative across the following impact areas: land use and visual resources; meteorology, air quality, and noise; geologic environment; water resources; terrestrial resources; aquatic resources; special status species and habitats; historic and cultural resources; socioeconomics; human health; environmental justice; and waste management and pollution prevention.

As explained in the purpose and need for the proposed Federal action, outside of the safety and environmental reviews, the NRC does not have a role in the energy-planning decisions as to whether a particular nuclear power plant should continue to operate. Should the operating license not be renewed and the nuclear plant shuts down at the end of its current license, the appropriate energy-planning decisionmakers will decide how best to replace the nuclear power plant’s generating capacity. In evaluating alternatives to license renewal, the NRC considered energy technologies or options currently in commercial operation, as well as technologies not currently in commercial operation but likely to be commercially available by the time the current Surry, Units 1 and 2, operating licenses expire. The NRC staff initially considered 16 alternatives to Surry license renewal. The NRC staff dismissed 13 alternatives because of technical, resource availability, or commercial limitations that currently exist and that are likely to continue to exist when the existing Surry licenses expire, rendering these alternatives not feasible and commercially viable. This resulted in the three reasonable replacement power alternatives for in-depth evaluation. These replacement power alternatives are described in Sections 2.2.2.1 through 2.2.2.3 of the FSEIS. The NRC staff’s in-depth evaluation of these alternatives is discussed in Chapter 4 of the FSEIS. The NRC staff also considered the no action alternative (i.e., not renewing the Surry operating licenses).

However, after issuance of the FSEIS in April 2020, the Virginia General Assembly approved and the Governor signed the Virginia Clean Economy Act (2020 Virginia Laws Ch. 1194, S.B. 851 [VCEA]). The VCEA establishes a schedule by which Dominion and American Electric Power are required to retire carbon-emitting electric generating units located in the Commonwealth of Virginia and to pursue generating capacity using solar or wind power. Enactment of this legislation and future actions by Virginia’s regulated power generators to comply with the VCEA will be likely to hasten the shift in Virginia from carbon-emitting energy sources to a greater reliance on renewable energy sources. The NRC staff has evaluated this legislative development with respect to the range of reasonable alternatives considered and analyzed by the staff in the FSEIS, as summarized in Section ii of this ROD. The staff’s analysis of the VCEA as potential new and significant information is presented in the ROD section titled “CONSIDERATION OF COMMENTS ON THE FSEIS AND EMERGING INFORMATION” (see “Passage of the Virginia Clean Economy Act”). As a result of its review, the staff finds that while the VCEA is new information, it does not present new and significant information that would require a supplement to the FSEIS under 10 CFR 51.92(a), and the replacement power alternatives evaluated by the staff in the FSEIS continue to fall within the range of reasonable alternatives for replacing Surry’s baseload generating capacity.

## Evaluation of Alternatives

### *i. No Action Alternative*

At some point, all operating nuclear power plants will (a) permanently cease operations (shutdown) and (b) undergo decommissioning. Under the no-action alternative, the NRC would not issue the subsequent renewed operating licenses for Surry and the units would shut down at or before the expiration of the current renewed licenses. The License Renewal GEIS (NUREG-1437) describes the environmental impacts that arise directly from permanent plant shutdown. The NRC expects shutdown impacts to be relatively similar whether they occur at the end of the current renewed license term (i.e., after 60 years of operation) or at the end of a subsequent renewed license term (i.e., after 80 years of operation). After permanent shutdown, plant operators will initiate decommissioning in accordance with 10 CFR 50.82, "Termination of license." Chapter 4 of the License Renewal GEIS and Section 4.15.2, "Terminating Plant Operations and Decommissioning," of this SEIS describe the incremental environmental impacts of subsequent license renewal on decommissioning activities. The Decommissioning GEIS describes the environmental impacts from decommissioning a nuclear power plant and related activities. The analysis in the Decommissioning GEIS bounds the environmental impacts of decommissioning when Dominion terminates reactor operations at Surry, after permanent shutdown.

Termination of plant operations at Surry would result in the total cessation of electrical power production by Surry, Units 1 and 2. Unlike the replacement power alternatives described below, the no-action alternative does not expressly meet the purpose and need of the proposed action, because the no-action alternative does not provide a means of delivering baseload power to meet future electric system needs. Assuming a need currently exists for the power generated by Surry Units 1 and 2, the no-action alternative would likely create a need for a replacement power alternative.

### *ii. Reasonable Power Replacement Alternatives Evaluated in Depth in the FSEIS*

The GEIS presents an overview of some alternative energy technologies but does not conclude which alternatives are most appropriate (reasonable). Because alternative energy technologies are continually evolving in capability and cost, and because regulatory structures have changed to either promote or impede the development of particular technologies, the analyses in the FSEIS rely on a variety of sources of information to determine which alternatives would be available and commercially viable when the current licenses expire. Dominion's environmental report provides a discussion of replacement power alternatives. In addition to the information Dominion provided in its environmental report, the NRC staff's analyses relied on appropriate Federal, State, and industry information sources. The three reasonable alternatives selected for detailed evaluation in the FSEIS are briefly described below.

#### *New Nuclear Alternative (Small Modular Reactors)*

The NRC staff considers the construction of a new nuclear plant to be a reasonable alternative to Surry subsequent license renewal. Nuclear generation currently accounts for approximately 34 percent of the electricity produced in Virginia. The NRC received the first design certification application for a small modular reactor (SMR) in December 2016. Following NRC certification, this design could potentially achieve operation on a commercial scale by 2026. Therefore, SMRs could be constructed and operational by the time the Surry, Units 1 and 2, licenses expire in 2032 and 2033, respectively.

The FSEIS assumes two co-located SMR facilities; each SMR facility contains two or more modular reactor units, replacing approximately 1,600 MWe [megawatt electric] or 95 percent of the 1,676 MWe that Surry provides currently. The reactors would be located at the Surry site on developed and undeveloped land, consisting of approximately 50 ac (20 ha) of land for plant facilities and 83 acres (34 ha) of land for relocation of some existing buildings.

The SMR facilities would use a closed-cycle cooling system with mechanical draft cooling towers. This cooling system would withdraw approximately 53 million gallons per day (mgd) (200,000 cubic meters per day (m<sup>3</sup>/d)) of water and consume 37 mgd (140,000 m<sup>3</sup>/d) of water. Although some infrastructure upgrades may be required, it is assumed that the existing transmission line infrastructure would be sufficient to support the new nuclear SMR alternative. Onsite visible structures could include cooling towers, intake and discharge structures, transmission lines, and an electrical switchyard.

#### *Natural Gas Combined Cycle*

The NRC staff consider the construction of a natural gas combined cycle power plant to be a reasonable alternative in the FSEIS because it is and remains a feasible, commercially available option for providing baseload capacity. Baseload natural gas combined cycle power plants have proven reliability and can have capacity factors as high as 87 percent. Natural gas represents approximately 46 percent of the installed generation capacity and 49 percent of the electrical power generated in Virginia.

The FSEIS assumes three approximately 645 MWe natural gas units would be constructed and operated using an 87 percent capacity factor, to collectively replace Surry's generating capacity of 1,676 MWe. Approximately 80 acres (32 ha) would be used to construct and operate the natural gas plant. Although some infrastructure upgrades may be required in association with the natural gas alternative (e.g., connection to the existing pipeline corridor that supplies gas to the adjacent Gravel Neck Combustion Turbines Station), it is assumed that the existing transmission line infrastructure at the selected location would be adequate to support the alternative.

The natural gas combined-cycle plant would use a closed-cycle cooling system with mechanical draft cooling towers. This cooling system would withdraw approximately 10 mgd (38,000 m<sup>3</sup>/d) of water and consume 7.9 mgd (30,000 m<sup>3</sup>/d) of water. Because of the high overall thermal efficiency of this type of plant, it requires less cooling water than Surry subsequent license renewal. To support this alternative, onsite visible structures could include cooling towers, exhaust stacks, intake and discharge structures, transmission lines, natural gas pipelines, and an electrical switchyard.

#### *Combination Alternative (Natural Gas, Solar, and Demand-Side Management)*

The NRC staff considers a combination alternative, consisting of (1) a natural gas combined-cycle plant supplying 1,300 MWe, (2) solar photovoltaic power plants supplying 200 MWe, and (3) 180 MWe of energy savings gained from energy efficiency initiatives (i.e., demand-side management).

### Natural Gas Combined-Cycle Portion of Combination Alternative

As evaluated in the FSEIS, the natural gas portion of the combination alternative would entail construction and operation of a natural gas combined-cycle plant located at Surry similar in function and appearance to the description of the Natural Gas Combined-Cycle alternative, which may require some infrastructure upgrades. This plant would consist of three approximately 500 MWe natural gas units that would be constructed and operated using an 87 percent capacity factor to collectively provide an approximate net generating capacity of 1,300 MWe. Land use would be similar to that of the standalone natural gas alternative. Similarly, onsite visible structures could include cooling towers, exhaust stacks, intake and discharge structures, transmission lines, natural gas pipelines, and an electrical switchyard. The use of a closed-cycle cooling system with mechanical draft cooling towers would withdraw approximately 7.9 mgd (30,000 m<sup>3</sup>/d) of water and consume 6.1 mgd (23,000 m<sup>3</sup>/d) of water.

### Solar Portion of Combination Alternative

The NRC staff considers the construction and operation of solar photovoltaic facilities to be reasonable when combined with other generation sources, for this combination alternative. This is because the region of influence relative to Surry contains average solar photovoltaic resources and because solar photovoltaic technology is a commercially available option for providing electrical generating capacity. For example, nationwide, growth in utility-scale solar photovoltaic facilities (greater than 1 MW [megawatt]) has resulted in an increase from 70 MW in 2008 to over 20,000 MW installed capacity in 2017. Existing solar photovoltaic resources across Virginia range from 4.0 to 5.0 kilowatt hours per square meter per day. Unlike concentrating solar power technology, solar photovoltaic cells can generate electricity whenever there is sunlight, regardless of whether the sun is directly or indirectly shining on the solar panels.

The FSEIS assumes two approximately 400 MWe standalone and utility-scale solar facilities would be constructed and operated to provide a gross generating capacity of 800 MWe. Both of these facilities would be located at offsite locations from Surry. Assuming a 25 percent capacity factor, the solar units provide an approximate combined net generating capacity of 200 MWe. For standalone sites, solar photovoltaic facilities may require approximately 6.2 ac (2.5 ha) per megawatt. Therefore, a total of approximately 5,000 ac (2,000 ha) would be required to construct and operate the two solar power installations needed under this alternative. Not all of this land would necessarily need to be cleared of vegetation and permanently impacted. Solar photovoltaic systems do not require water for cooling purposes, but they do require a small amount of water to clean the panels and for potable water for the workforce.

### Demand-Side Management Portion of Combination Alternative

Energy conservation and efficiency programs are more broadly referred to as demand-side management. Demand-side management programs can include reducing energy demand through consumer behavioral changes or through altering the shape of the electricity load and do not require the addition of new generating capacity. These programs can be initiated by a utility, transmission operators, the State, or other load serving entities. Although Virginia does not have a mandatory energy efficiency resource standard, demand-side management programs represent a fundamental component of Dominion's 2018 Integrated Resource Plan, which is assumed to be implemented. A 2018 study of Dominion-approved demand-side management programs projected that these initiatives could reduce electrical demand across Dominion Energy's service area by more than 300 MWe by 2033. Therefore, the NRC staff



considers the replacement of 180 MWe of Surry output through demand-side management programs to be reasonable when combined with other generation sources, for this combination alternative.

*iii. Summary*

In the FSEIS for the Surry subsequent license renewal, the NRC staff considered the environmental impacts associated with subsequent license renewal and with alternatives to subsequent license renewal, including alternative power generation technologies (replacement power alternative), and the impacts of not renewing the Surry, Units 1 and 2, operating licenses (the no action alternative). The FSEIS concludes that environmental impacts of the proposed action (subsequent renewal of the Surry, Units 1 and 2, operating licenses) would be SMALL for all impact categories.

As summarized in Table 2-2, “Summary of Environmental Impacts of the Proposed Action and Alternatives,” of the FSEIS (reproduced below in Table 1), each of the three reasonable replacement power alternatives have environmental impacts in at least two resource areas that are greater than the environmental impacts of the proposed action of subsequent license renewal. The replacement power alternatives could involve the environmental impacts inherent to new construction projects. If the NRC decides to select the no-action alternative and does not issue subsequent renewed licenses for Surry, energy-planning decisionmakers could implement one of the three replacement power alternatives that are deemed reasonable by the NRC staff and discussed in depth in Chapter 4 of the FSEIS. Based on the NRC staff’s review of these three replacement power alternatives, the no-action alternative, and the proposed action, the staff concludes that the environmentally preferred alternative is the proposed action of subsequent license renewal. Therefore, in the FSEIS, the NRC staff recommended that the NRC issue subsequent renewed operating licenses for Surry, Units 1 and 2.

**Table 1: Summary of Environmental Impacts of the Proposed Action and Alternatives**

<b>Impact Area (Resource)</b>	<b>Surry License Renewal (Proposed Action)</b>	<b>No Action Alternative</b>	<b>New Nuclear Alternative (Small Modular Reactor)</b>	<b>Natural Gas Combined Cycle Alternative</b>	<b>Combination Alternative (Natural Gas Combined Cycle, Solar, and Demand-Side Management)</b>
Land Use	SMALL	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to LARGE
Visual Resources	SMALL	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to LARGE
Air Quality	SMALL	SMALL	SMALL	SMALL to MODERATE	SMALL to MODERATE
Noise	SMALL	SMALL	SMALL	SMALL	SMALL to MODERATE
Geologic Environment	SMALL	SMALL	SMALL	SMALL	SMALL
Surface Water Resources	SMALL	SMALL	SMALL	SMALL	SMALL

Groundwater Resources	SMALL	SMALL	SMALL	SMALL	SMALL
Terrestrial Resources	SMALL	SMALL	MODERATE	MODERATE	MODERATE
Aquatic Resources	SMALL	SMALL	SMALL	SMALL	SMALL to MODERATE
Special Status Species and Habitats	See Note <sup>(a)</sup>	See Note <sup>(b)</sup>	See Note <sup>(c)</sup>	See Note <sup>(c)</sup>	See Note <sup>(c)</sup>
Historic and Cultural Resources	See Note <sup>(d)</sup>	See Note <sup>(e)</sup>	See Note <sup>(f)</sup>	See Note <sup>(f)</sup>	See Note <sup>(f)</sup>
Socioeconomics	SMALL	SMALL to MODERATE	SMALL to LARGE	SMALL to LARGE	SMALL to MODERATE
Transportation	SMALL	SMALL	SMALL to LARGE	SMALL to LARGE	SMALL to MODERATE
Human Health	SMALL <sup>(g)</sup>	SMALL <sup>(g)</sup>	SMALL <sup>(g)</sup>	SMALL <sup>(g)</sup>	SMALL <sup>(g)</sup>
Environmental Justice	See Note <sup>(h)</sup>	See Note <sup>(h)</sup>	See Note <sup>(h)</sup>	See Note <sup>(h)</sup>	See Note <sup>(h)</sup>
Waste Management and Pollution Prevention	SMALL <sup>(i)</sup>	SMALL <sup>(i)</sup>	SMALL <sup>(i)</sup>	SMALL	SMALL

<sup>(a)</sup> May affect, but is not likely to adversely affect, northern long-eared bat, shortnose sturgeon, and Atlantic sturgeon. May affect, but is not likely to adversely modify, designated critical habitat of the Chesapeake Bay distinct population segment of Atlantic sturgeon. No more than minimal adverse effects on essential fish habitat of the summer flounder (larvae, juveniles, and adults), Atlantic butterfish (juveniles and adults), bluefish (juveniles), and windowpane flounder (juveniles and adults) or on the prey base of the little skate (adults) or winter skate (adults). No adverse effects on the essential fish habitat of any life stages of the black sea bass, Atlantic herring, clearnose skate, or red hake.

<sup>(b)</sup> Overall, the effects on Federally listed species and critical habitats and essential fish habitat (EFH) would likely be smaller under the no action alternative than the effects under continued operation but would depend on the specific shutdown activities as well as the listed species, critical habitats, and designated EFH present when the no action alternative is implemented.

<sup>(c)</sup> The types and magnitudes of adverse impacts to species listed in the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (ESA), designated critical habitat, and EFH would depend on the proposed alternative site, plant design and operation, as well as listed species and habitats present when the alternative is implemented. Therefore, the NRC staff cannot forecast a level of impact for this alternative.

<sup>(d)</sup> Based on the location of historic properties within and near the area of potential effect, Tribal input, Dominion’s administrative procedures, a site-specific cultural resource management plan, and no planned physical changes or ground-disturbing activities, the proposed action (license renewal) would not adversely affect historic properties.

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- (e) Until the post-shutdown decommissioning activities report is submitted, the NRC cannot determine whether historic properties would be affected outside the existing industrial site boundary after the nuclear plant is shut down.
  - (f) The impact determination of this alternative would depend on the specific location of the new facility. The Virginia Department of Historic Resources would need to be consulted prior to any ground-disturbing activities in undisturbed land areas at Surry.
  - (g) The chronic effects of electromagnetic fields on human health associated with operating nuclear power and other electricity generating plants are uncertain.
  - (h) With the exception of the no action alternative, there would be no disproportionately high and adverse impacts to minority and low-income populations. For the no action alternative, the loss of jobs and income could have an immediate socioeconomic impact. This could disproportionately affect minority and low-income populations that may have become dependent on these services.
  - (i) NUREG-2157, "Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel," (NRC 2014b) discusses the environmental impact of spent fuel storage for the timeframe beyond the licensed life for reactor operations.
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## MITIGATION MEASURES

The NRC has taken all practicable measures within its jurisdiction to avoid or minimize environmental harm from the alternative selected. Continued operation of Surry would have SMALL environmental impacts in all resource areas. The NRC is not imposing any license conditions in connection with mitigation measures. Additionally, the NRC is not requiring any new environmental monitoring programs. However, Surry is subject to requirements including permits, authorizations, and regulatory orders imposed by other Federal, State, and local agencies governing facility operation. For example, the Virginia Pollutant Discharge Elimination System (VPDES) permit issued to Dominion imposes requirements to ensure that impacts to water quality and aquatic life are minimized. The NRC is not requiring any new environmental monitoring programs outside what is required for the VPDES permits or otherwise required of the licensee under NRC's regulations, as discussed in the FSEIS.

## CONSIDERATION OF COMMENTS ON THE FSEIS AND EMERGING INFORMATION

### Environmental Protection Agency Comments on the FSEIS

On April 17, 2020, the EPA published an NOA of the FSEIS in the FR (85 FR 21428); the review period ended on May 18, 2020. On May 12, 2020, EPA Region III provided comments (ADAMS Accession No. ML20140A091), in which EPA stated that it had no objections to the proposed action (Surry subsequent license renewal) moving forward. However, while the EPA indicated it understood that plant operations would continue to comply with State (Commonwealth of Virginia) requirements, EPA requested that NRC consider reevaluating Surry conditions prior to the commencement of the second renewal period. Specifically, EPA suggested that in the future, innovative approaches to stormwater management and/or methods for reduction of fish entrainment be considered and incorporated, as needed, in the Surry facility maintenance. Therefore, the NRC is considering EPA's comments on the FSEIS as a part of this ROD, which documents the completion of the NRC staff's environmental review and specifies the NRC's decision with respect to the applicant's proposed action (i.e., whether to renew the Surry operating licenses for an additional 20 years). It is beyond the scope of the NRC staff's

environmental review of the application to consider reevaluating environmental conditions at Surry after the NRC has issued its license renewal decision.

NRC licensees are responsible for meeting current and future stormwater management requirements and for ensuring compliance with requirements for reducing entrainment and impingement of aquatic organisms in accordance with the Federal Clean Water Act, including Surry's VPDES permit requirements. Accordingly, Surry's VPDES permit is relevant to EPA's comments on stormwater management. This permit, as noted in Appendix A.2.2 of the FSEIS and discussed in Section 3.5.1.3 of the SEIS, is issued by the Virginia Department of Environmental Quality (VDEQ) and authorizes the discharge of stormwater from the facility. The VPDES permit stipulates that Dominion (as the owner and operator of Surry) develops and maintains a stormwater pollution prevention plan for the facility. In accordance with NEPA and the NRC's regulations in 10 CFR Part 51, the NRC considered the environmental impacts of license renewal, including the impacts of continued operation on surface water quality. However, the NRC has no regulatory authority under the Clean Water Act, and the NRC has no role in VPDES permitting or stormwater management. Since VPDES permits issued under the Clean Water Act must be renewed every five years, the VDEQ will ensure that Surry operations will be conducted in accordance with all necessary standards and practices to protect receiving water quality and to minimize impacts on aquatic resources. Surry's VPDES permit (permit number VA0004090) expired on February 28, 2021. Dominion submitted its application to renew the Surry VPDES permit on August 26, 2020. As a result, Surry's VPDES permit for facility operations remains in effect (i.e., administratively continued) because Dominion submitted its renewal application at least 180 days before the expiration of the current permit, as required by Virginia's regulations for administering the VPDES permit program.

With regards to EPA's comments on fish entrainment, Section 4.7.1 of the FSEIS describes Surry's status of compliance with Section 316(b) of the Clean Water Act, as implemented through Surry's VPDES permit, including interim measures for demonstrating Best Technology Available (BTA) for minimizing the impingement and entrainment of aquatic species. As noted in Appendix A.2.5 of the FSEIS and discussed above, Dominion was required to submit its VPDES permit renewal application prior to September 1, 2020. In support of the VPDES permit renewal process, Dominion also submitted required Clean Water Act Section 316(b) reports as required by 40 CFR 122.21(r) to VDEQ in June 2020, as further discussed below.

As also referenced in the NRC's responses to comments in Appendix A.2.5 of the FSEIS, the Clean Water Act Section 316(b) reports submitted by Dominion provide information to VDEQ to characterize and evaluate impingement mortality and entrainment at Surry. The VDEQ will review the information submitted by Dominion along with the additional information provided in Dominion's completed VPDES permit renewal application to make BTA determinations for Surry. Based on its determinations, the VDEQ may impose additional requirements to minimize the adverse impacts of impingement mortality or entrainment in a future VPDES permit. In the interim, Dominion has agreed to implement seasonal reductions on the volume of cooling water withdrawn by Surry from the James River (see discussion below under "Coastal Zone Management Act Consistency Determination"). Nevertheless, as stated above, the NRC has no role in this review process under the Clean Water Act and VPDES permit renewal.

Because EPA's comments do not identify any new and significant information regarding the environmental impacts of the proposed action, the NRC staff concludes that no further evaluation of EPA's comments is needed, and no change to conclusions in the FSEIS is warranted.

### Availability of 40 CFR 122.21(r) Impingement and Entrainment Information

The NRC staff evaluates the impacts of impingement and entrainment on aquatic organisms, Federally listed endangered and threatened species, and essential fish habitat in Sections 4.7.1.1, 4.8.1.2, and 4.8.1.4 of the FSEIS, respectively. Following issuance of the FSEIS, in June 2020, Dominion submitted to the VDEQ certain information specified in 40 CFR 122.21(r), including results of impingement and entrainment sampling, consideration of impingement and entrainment reduction technologies and operating modes, and its chosen methods of compliance with the Clean Water Act (CWA) Section 316(b) Phase II impingement mortality BTA standard. Notably, Dominion's submittal included the final results of impingement sampling conducted from 2015-2016 and the final results of entrainment sampling conducted from 2015-2017. While the NRC staff considered and incorporated the final results of the 2015-2016 impingement sampling in the FSEIS, only preliminary results of the 2015-2017 entrainment sampling were available to the NRC staff when preparing the FSEIS.

Following Dominion's June 2, 2020 submittal to the VDEQ, the NRC staff examined the submittal (ADAMS Accession No. ML20269A409) to determine whether the submittal presented new and significant information such that a supplement to the Surry FSEIS would be required, in accordance with 10 CFR 51.92(a). With respect to the final impingement sampling results, the staff confirmed that the final impingement report contained the same information that the staff had already reviewed and incorporated in the FSEIS. With respect to the final entrainment sampling results, the staff identified no substantial changes between the preliminary results and final report that would change any conclusions presented in the FSEIS. With respect to all other components of Dominion's submittal, including Dominion's consideration of impingement and entrainment reduction technologies and operating modes and its chosen methods of compliance with the CWA 316(b) Phase II impingement mortality BTA standard, the staff did not identify any information that would materially affect the FSEIS or change any conclusions presented therein. Therefore, the NRC staff determined that no supplement to the Surry FSEIS was required.

### Coastal Zone Management Act Consistency Determination

Section 307(c)(3)(A) of the Coastal Zone Management Act (CZMA) (16 U.S.C. 1456(c)(3)(A)) requires that applicants for Federal licenses who conduct activities in a coastal zone provide a certification to the licensing agency (here, the NRC) that the proposed activity complies with the enforceable policies of the State's coastal zone program.

The VDEQ is the lead agency for the Virginia Coastal Zone Management Program and is responsible for coordinating the Commonwealth of Virginia's review of Federal consistency determinations and certifications with cooperating agencies and responding to the appropriate Federal agency or applicant. The NRC may not issue renewed operating licenses to an applicant where a State (e.g., Commonwealth of Virginia) has issued its CZMA certification with conditions.

As described in Section 3.2.1.2 of the FSEIS, the VDEQ issued a conditional concurrence finding on Dominion's application for coastal zone consistency certification on February 2, 2018. The conditions upon which the concurrence was predicated related to concerns raised by the Virginia Department of Game and Inland Fisheries (VDGIF) regarding measures to minimize impacts to fishery resources from operation of Surry's cooling water intake. The VDGIF reiterated its concerns from the VDEQ's February 2, 2018, conditional concurrence in its

comments on the NRC's draft SEIS. Consequently, Dominion initiated a process to resolve the VDEQ's coastal zone conditional concurrence.

By letter dated April 1, 2021 (ADAMS Accession No. ML21096A095), VDEQ issued Dominion its Federal Consistency Concurrence, without conditions, stipulating that Surry subsequent license renewal is consistent with the Virginia coastal zone management program. The letter includes several enclosures that document the outcome of coordination activities conducted between Dominion and the VDEQ, Virginia Marine Resources Commission, Virginia Institute of Marine Science, and the Virginia Department of Wildlife Resources (formerly, the VDGIF) to resolve the concerns regarding potential aquatic resources impacts.

As documented in the enclosures to the Federal Consistency Concurrence, Dominion has agreed to institute seasonal reductions in the volume of cooling water withdrawn by Surry through its intake structures to minimize the entrainment and impingement of aquatic species in the James River. Specifically, Surry will reduce intake volume by approximately 25 percent during May and June of each year, and in April of each year when practicable. The stated purpose of these seasonal intake flow reductions is to reduce the mortality of eggs, larvae, and juveniles of fauna that inhabit the James River during peak times for these life stages of potentially affected species. Dominion further committed to evaluating mitigation measures with the aforementioned agencies as part of the ongoing Clean Water Act 316(b) review process for Surry.

The seasonal flow reductions that Dominion agreed to implement do not alter the NRC staff's conclusions in Section 4.7.1.1 of the FSEIS that the impacts of impingement and entrainment of aquatic organisms would be SMALL during the subsequent license renewal term. The reductions also do not affect the NRC staff's conclusions in Sections 4.8.1.2 or 4.8.1.3 concerning Federally listed aquatic species or essential fish habitat, respectively, nor would these changes require the NRC staff to reinitiate Endangered Species Act consultation or Essential Fish Habitat consultation with the National Marine Fisheries Service (NMFS).

The VDEQ's April 1, 2021, Federal Consistency Concurrence letter provides the NRC with the necessary certification from the Commonwealth of Virginia that the proposed action (Surry subsequent license renewal) complies with the enforceable policies of the State's coastal zone management program.

#### Endangered Species Act Consultation with the NMFS

In the FSEIS, the NRC staff concluded that the proposed action may affect but is not likely to adversely affect the Federally listed Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) and shortnose sturgeon (*Acipenser brevirostrum*). The NRC also concluded that the proposed action may affect but is not likely to adversely modify designated critical habitat of the Chesapeake Bay distinct population segment of Atlantic sturgeon. Sections 3.8 and 4.8 of the FSEIS contains the staff's analysis supporting these findings.

On October 17, 2019, the NRC requested the NMFS's concurrence with the staff's ESA effect determinations (ADAMS Accession No. ML19274B590). The NMFS provided its concurrence and concluded ESA consultation between the NRC and NMFS in a letter dated January 30, 2020 (ADAMS Accession No. ML20030B278). Appendix C.1 of the FSEIS summarizes the consultation.

Following issuance of the FSEIS, on October 26, 2020, Dominion personnel identified an Atlantic sturgeon at Surry's low-level intake structure trash racks. Divers entered the water to remove the fish. The maintenance supervisor and divers reported that the sturgeon's back fin was entangled in a crab pot line associated with shellfish trapping. The line was hooked into the back fin and tightly wound around the fish. The other end of the line was tangled on components of the trash rack such that the fish was unable to swim away. The divers reported the fish as healthy and breathing other than some cuts and scrapes on the back fin associated with the entanglement. The divers untangled the sturgeon, brought it to the surface, and used a plastic sheet to transport the fish back to the water for release along the side of the low-level intake structure. Once released, the fish swam away.

On October 27, 2020, Dominion notified relevant Federal and State agencies of the incident, including the NRC, NMFS, the Virginia Marine Resources Commission, the Virginia Department of Wildlife Resources, and the VDEQ (ADAMS Accession No. ML20302A459). On the same day, the NRC notified NMFS of the incident by phone and e-mail (ADAMS Accession No. ML20307A139), and NMFS confirmed its receipt of the information (ADAMS Accession No. ML20307A138).

On November 30, 2020, the NRC, NMFS, and Dominion discussed the event in a teleconference. The NRC's summary of this teleconference (ADAMS Accession No. ML20335A112) includes photographs of the entangled sturgeon.

On January 19, 2021, the NRC sent NMFS a letter (ADAMS Accession No. ML21004A039) summarizing the incident. In the letter, the NRC determined that reinitiation of ESA Section 7 consultation is not required as a result of this incident. The NRC explained that the incident did not reveal information about an effect of the proposed action that is reasonably certain to occur as defined in 50 CFR 402.02 and 50 CFR 402.17(a). Because the Atlantic sturgeon was entangled tightly in a crab pot line and the line was also tangled on components of the trash rake, the fish was unable to swim away. Such an event has only occurred once in 48 years of operation at Surry. The NRC stated that this particular set of circumstances is extremely unlikely to occur again and that impingement of another sturgeon (either Atlantic or shortnose) is extremely unlikely to occur over the course of the proposed license renewal term. The NRC requested that NMFS confirm in writing its agreement with the NRC's position that reinitiation of consultation for Atlantic and shortnose sturgeon at Surry is not required and that the NRC's previous conclusions regarding these species remain valid.

On February 24, 2021, the NMFS responded to NRC's letter (ADAMS Accession No. ML21055A595). In its response, the NMFS confirmed that it has no information that would cause NMFS to reach a different conclusion than the one reached in NRC's January 19, 2021, letter. As such, NMFS confirmed that no further consultation under Section 7 of the ESA is required for the proposed action.

#### Passage of the Virginia Clean Economy Act

In April 2020, the Virginia General Assembly passed and the Governor signed new legislation, the Virginia Clean Economy Act (2020 Virginia Laws Ch. 1194, S.B. 851 [VCEA]). The law requires regulated power generators, including Dominion to:

- Retire, by December 31, 2045, all electric generating units located in the Commonwealth that emit carbon as a by-product of combusting fuel to generate electricity, unless the

Virginia State Corporation Commission finds that the retirement of a particular unit would threaten grid reliability and security.

- Petition the Virginia State Corporation Commission, by December 31, 2035, for necessary approvals to construct, acquire, or enter into agreements to purchase 16,100 megawatts of generating capacity located in the Commonwealth using energy derived from sunlight or onshore wind; and construct or purchase one or more offshore wind generation facilities located off the Commonwealth's Atlantic shoreline or in Federal waters interconnected directly into the Commonwealth with an aggregate capacity of up to 5,200 megawatts.

The NRC staff has evaluated this legislation and related developments to determine if it represents new and significant information within the context of the staff's consideration of the range of reasonable alternatives to its proposed action (issuance of subsequent renewed reactor operating licenses for Surry, Units 1 and 2) as considered and evaluated in the NRC's April 2020 FSEIS.

As required by 10 CFR 51.92(a), the NRC staff has conducted an evaluation of the new information presented by the VCEA, as summarized below, to determine if a supplement to the Surry FSEIS is needed. The regulation at 10 CFR 51.92(a) requires that a supplement to the FSEIS be prepared if the proposed action has not been taken and:

- there are substantial changes in the proposed action that are relevant to environmental concerns; or
- there are new and significant circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.

### Replacement Power Alternatives

As described in Section 2.2 of the FSEIS and summarized above in this ROD, the NRC staff evaluated in detail three replacement power alternatives to Surry subsequent license renewal: (1) New Nuclear Alternative (Small Modular Reactor), (2) Natural Gas Combined-Cycle Alternative, and (3) Combination Alternative (Natural Gas Combined-Cycle, Solar, and Demand-Side Management).

The NRC staff initially considered 16 alternatives to Surry subsequent license renewal; the staff ultimately eliminated from detailed study 13 of these alternatives because of technical, resource availability, or commercial limitations that were likely to continue to exist when the current Surry licenses expired, rendering these alternatives not feasible from a technical and economic standpoint and thus not commercially viable. Specifically, the NRC staff determined that the following individual technologies or approaches would not be reasonable alternatives for providing baseload power to independently replace Surry's generating capacity:

- solar power
- wind power
- biomass power
- demand-side management
- hydroelectric power
- geothermal power
- wave and ocean energy
- municipal solid waste



- petroleum-fired power
- coal-fired power
- fuel cells
- purchased power
- delayed retirement of other generating facilities

The NRC based this determination on several factors, including Dominion's assessment of replacement power alternatives presented in its November 2018 environmental report (ADAMS Accession No. ML18291A834); the existing portfolio of electrical generating technologies in Virginia; State and Federal policies that may promote or oppose certain alternatives; and Dominion's May 2018 Integrated Resource Plan (IRP) (ADAMS Accession No. ML21105A858). The IRP is a long-term planning document filed periodically by regulated power generators with the Virginia State Corporation Commission that identifies how the utility intends to meet future load obligations based on a "snapshot in time" of current technologies, market information, and energy demand projections.

Subsequent to NRC issuing the FSEIS in April 2020, the Virginia General Assembly passed and the Governor signed the Virginia Clean Economy Act. Additionally, in its May 2020 IRP filing (ADAMS Accession No. ML21105A859), Dominion also identified a substantial increase in its future reliance on renewable energy sources, particularly solar photovoltaic and offshore wind generation. These developments have factored into the NRC staff's revised consideration of reasonable alternatives to replace Surry's baseload electrical generating capacity.

#### *Natural Gas-Fired Generation*

The FSEIS discusses the viability of using a natural gas combined-cycle alternative to replace Surry's power generating capacity, both as a discrete technology (FSEIS Section 2.2.2.2) and in combination with other replacement power technologies (FSEIS Section 2.2.2.3).

At the time the staff was finalizing the FSEIS, natural gas-fired plants represented nearly half of Virginia's electrical generation, and Dominion's 2018 IRP indicated its continuing plans to augment its gas-fired generating capacity. Accordingly, the NRC staff considered the use of natural gas to be a reasonable alternative to Surry subsequent license renewal because natural gas is a widely used, commercially available option for providing baseload electrical generating capacity beyond the expiration of Surry's current operating licenses.

Since 2018, natural gas generation has grown to approximately 60 percent of Virginia's electrical power generation. In its 2020 IRP, Dominion continues to project that the utility would likely need to maintain existing and new natural gas-fired generation as a continuing component of its generation portfolio in order to offset the intermittency associated with the increased build out of renewable energy sources required under the VCEA.

Although the VCEA is intended to phase out carbon-emitting electrical generating units by 2045, it does allow Dominion to keep most of its natural gas plants in operation until 2045 and to build new natural gas units if Dominion can successfully demonstrate to the State Corporation Commission that natural-gas units would be necessary for maintaining grid reliability and security. As such, the NRC staff concludes that natural gas-fired generation is currently and would likely remain a component of Dominion's power generating portfolio at least through 2045. The timeframes for Surry's renewed licenses (if approved) would extend from 2032 to 2052 for Unit 1 and 2033 to 2053 for Unit 2. Therefore, the time period from the expiration of

the current licenses for Surry Unit 1 and Unit 2 to the phase-out date of 2045 represents approximately 13 years out of the proposed 20-year subsequent license renewal period for each unit. As such, natural gas-fired generation, as evaluated in the FSEIS, remains a reasonable alternative to provide baseload power as a replacement for Surry Units 1 and 2.

### *Solar Generation*

Section 2.3.1 of the FSEIS discusses the viability of using solar power to replace Surry's power generating capacity. In 2018, only 347 MWe of solar power capacity had been installed in Virginia, with solar power representing a small but increasing contribution to the Commonwealth's electrical generation. Based on this information, the NRC staff concluded that it was not reasonable to project that solar power energy facilities alone could provide baseload replacement power in place of the power generated by Surry. However, the staff concluded that an alternative using solar power in combination with other power generating technologies would be a reasonable replacement power alternative. Accordingly, the NRC staff evaluated in depth a reasonable alternative (as described in Section 2.2.2.3 of the FSEIS) that combines 200 MWe of solar generation with natural gas-fired generation and demand side management initiatives.

Currently, only 611 MWe of utility-scale solar power capacity has been installed in Virginia, and solar power continues to represent a small but increasing contribution to the Commonwealth's electrical generation. In its 2020 IRP, Dominion identified its plans to substantially increase its solar power capacity and generation over the next 15 years. Assuming a capacity factor of 25 percent, approximately 6,700 MWe of additional solar energy capacity would need to be installed in Dominion's service area to replace Surry's 1,676 MWe generating capacity. Given that standalone solar photovoltaic facilities require approximately 6.2 acres of land per megawatt, this would correspond to approximately 41,500 acres (16,800 ha). Because Dominion is already pursuing an aggressive solar strategy to offset current and forecasted reductions in fossil-fuel fired generating capacity, the staff expects that acquiring additional large tracts of land could be increasingly difficult for Dominion as solar development across Virginia continues. Accordingly, the NRC staff does not consider a solar-only alternative to be a reasonable alternative to Surry subsequent license renewal. However, the NRC staff still considers the construction and operation of solar photovoltaic facilities to be reasonable when combined with other generation sources.

### *Wind Generation*

Section 2.3.2 of the FSEIS discusses the viability of using wind power to replace Surry's power generating capacity. In 2018, Virginia had no installed utility-scale onshore or offshore wind capacity, and limited prospects for future development of such capacity. As a result, the NRC staff determined that wind power would not be a reasonable alternative to subsequent license renewal for Surry for providing baseload replacement power.

Currently, Virginia still does not have any utility-scale wind energy capacity and limited onshore wind potential available to support the development of future land-based wind energy systems. However, in December 2020, Dominion filed a construction and operations plan for 2,640 MWe of offshore wind along Virginia's Atlantic Coast (see <https://news.dominionenergy.com/2020-12-18-Dominion-Energy-Files-Construction-and-Operations-Plan-for-Coastal-Virginia-Offshore-Wind-Project>). This is the largest planned offshore wind project in the United States. At present, Dominion proposes to begin construction in 2024 and commence operations in 2026. This additional capacity is not intended to replace Surry's generation. Assuming a capacity factor of 50 percent, new offshore wind energy facilities in the region of influence would need to

produce an additional 3,300 MWe of electricity to replace Surry's 1,676 MWe generating capacity. Because Dominion is already pursuing an aggressive offshore wind strategy to offset current and forecasted reductions in fossil-fuel fired generating capacity, the staff expects that acquiring additional leases to support an unprecedented level of offshore wind development beyond that required under the VCEA could be increasingly difficult. Accordingly, the NRC staff does not consider a wind-only alternative to be a reasonable alternative to Surry subsequent license renewal. However, because Virginia's offshore environment offers considerable wind power resources, and because offshore wind technologies are poised to become a commercially available option for providing electrical generating capacity in the region of interest by the time the Surry licenses expire in 2032 and 2033, the NRC staff considers the construction and operation of offshore wind facilities to be reasonable when combined with other generation sources.

The passage of the VCEA by the Commonwealth of Virginia, together with Dominion's 2020 IRP filing, substantially increased the potential economic viability of future solar and wind development in Virginia, while decreasing the future viability of natural gas-fired (or other carbon-emitting) technologies.

The NRC staff has considered the VCEA and Dominion's 2020 IRP filing with respect to the composition of the range of reasonable alternatives evaluated in the FSEIS. Specifically, the VCEA and Dominion's 2020 IRP filing suggest that both wind and solar power could now be reasonable components of a combination alternative at levels beyond what was considered in Section 2.2.3.3 of the FSEIS and the associated impacts summary presented in Table 2-1 of the FSEIS. Nevertheless, the potential changes in environmental impacts associated with replacing the construction and operation of gas-fired generation evaluated in the FSEIS as part of a combination alternative with renewable solar and wind generation would not change the NRC staff's determination that license renewal of Surry Units 1 and 2 is the environmentally preferred alternative.

Based on the staff analysis and as described above, the VCEA does not present information or implications for the staff's range of reasonable alternatives that is both new and significant. The replacement power alternatives evaluated and analyzed in detail by the NRC staff in the FSEIS continue to fall within the range of reasonable alternatives to provide baseload electrical generating capacity as a replacement for Surry.

#### *Conclusion (Passage of the Virginia Clean Economy Act)*

The NRC staff has reviewed and evaluated new information on Virginia's clean energy legislation, Dominion's 2020 IRP filing, and their implications for the range of reasonable alternatives evaluated by the NRC staff in the April 2020 FSEIS. The staff's evaluation did not identify any new and significant information bearing on the proposed action (issuance of subsequent renewed reactor operating licenses for Surry, Units 1 and 2) or its impacts that presents a seriously different picture of the environmental impacts that would change the conclusions in the FSEIS. Further, the new information considered by the staff regarding the range of reasonable alternatives to the proposed action does not alter the NRC staff's conclusion in the Surry FSEIS that the adverse environmental impacts of license renewal for Surry are not so great that preserving the option of license renewal for energy-planning decisionmakers would be unreasonable. Accordingly, there are no new and significant circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts so as to require a supplement to the FSEIS under 10 CFR 51.92(a)(2).

Therefore, the staff has determined that preparation of a supplement to the FSEIS is not necessary.

#### DETERMINATION

Based on the NRC staff's (a) independent review, analysis, and evaluation contained in the subsequent license renewal FSEIS; (b) careful consideration of all of the identified social, economic, and environmental factors; (c) input received from other agencies, organizations, and the public; and (d) consideration of mitigation measures, the NRC has determined that the standards for the issuance of a subsequently renewed operating license, with respect to the environmental matters as described in 10 CFR 54.29(b), have been met and that the requirements of Section 102 of NEPA, as prescribed in 10 CFR 51.103, have been satisfied. The NRC has determined that the adverse environmental impacts of issuing subsequent renewed operating licenses for Surry Power Station, Units 1 and 2, are not so great that preserving the option of license renewal for energy-planning decisionmakers would be unreasonable.

Dated at Rockville, MD, this 4<sup>th</sup> day of May 2021,

APPROVED BY:

Anna H. Bradford, Director  
Division of New and Renewed Licenses  
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