

# L Nuclear

Duke Energy Carolinas, LLC ("DEC") and Duke Energy Progress, LLC ("DEP" and, together with DEC, "Duke Energy" or the "Companies") have operated nuclear plants in the Carolinas for over 50 years, generating zero-carbon, reliable electricity, as well as supporting well-paying jobs, providing significant tax revenues, and creating many other benefits for communities in both North Carolina and South Carolina (together, the "Carolinas"). More than 50% of Duke Energy's customers' electricity needs in the Carolinas are provided by nuclear power, which is an important component of its diverse generation portfolio. The Companies cannot achieve the aggressive $CO_2$ emissions reduction targets set in North Carolina Session Law 2021-165 ("HB 951") without nuclear power - the Companies' largest generator of zero-carbon electricity. In fact, all pathways to achieving the 70% $CO_2$ emissions reductions target rely on the Companies' existing nuclear facilities continuing to provide zero-carbon energy through 2030 and beyond. Duke Energy is planning to request subsequent license renewals ("SLR") for all the nuclear plants in its existing fleet to ensure that they will continue to provide zero-carbon energy through 2050 and beyond. In addition, the Companies expect that advanced nuclear plants, such as small modular reactors ("SMR") and advanced reactors, will be critical to the energy transition and in achieving the 2050 carbon neutrality target set in HB 951 and possibly the interim target as well.

## Introduction to the Companies' Nuclear Fleet

Duke Energy currently operates 11 light water-cooled reactors at six sites across North Carolina and South Carolina, as identified in Table L-1 below. These 11 reactors have operated safely for decades while also helping to protect the environment in the surrounding communities. Duke Energy's existing nuclear fleet can generate over 10,700 megawatts ("MW") of electricity, enough to power over 8 million homes with zero-carbon electricity.

**Table L-1: Duke Energy Nuclear Power Plants Located in North Carolina and South Carolina**

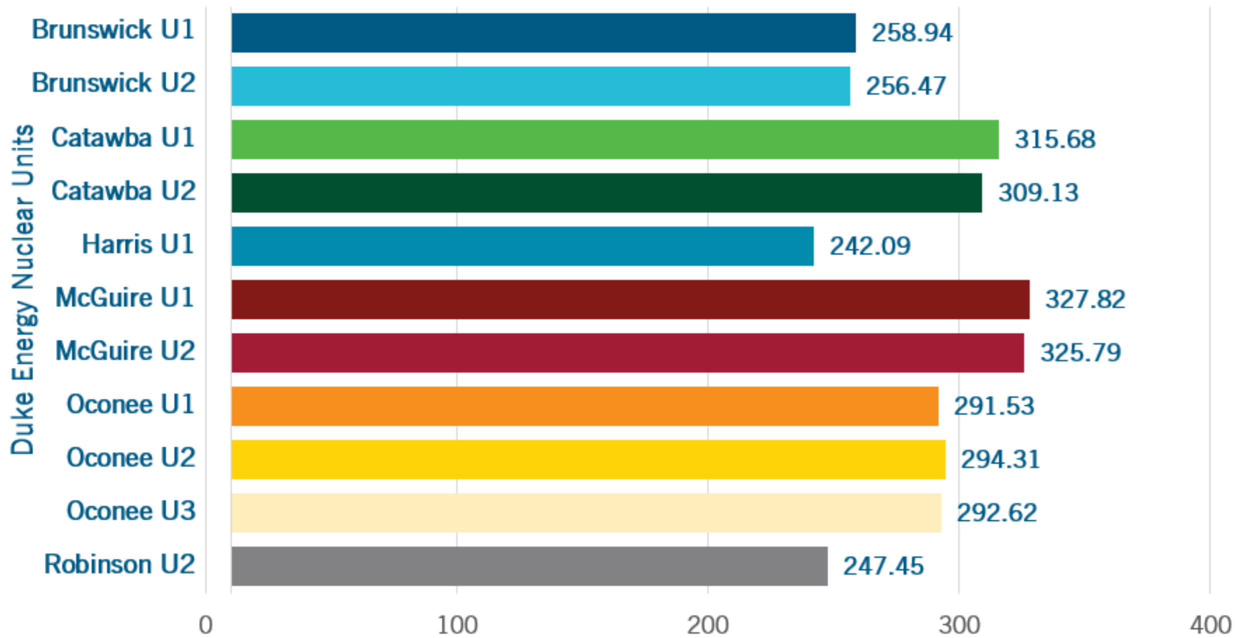
| Station | Location | Capacity* | Current License Expiration | Avoided Emissions** (tons of $CO_2$) |
|---|---|---|---|---|
| **Brunswick Nuclear Plant Units 1 & 2** | Southport, NC<br>Brunswick County | 1,870 MW | 2034, 2036 | 10.1 million |
| **Catawba Nuclear Station Units 1 & 2** | York, SC<br>York County | 2,310 MW | 2043 | 12.6 million |
| **Harris Nuclear Plant Unit 1** | New Hill, NC<br>Wake County | 964 MW | 2046 | 5.6 million |
| **McGuire Nuclear Station Units 1 & 2** | Huntersville, NC<br>Mecklenburg County | 2,316 MW | 2041, 2043 | 12.8 million |
| **Oconee Nuclear Station Units 1, 2 & 3** | Seneca, SC<br>Oconee County | 2,554 MW | 2033, 2033, 2034 | 14.5 million |
| **Robinson Nuclear Plant Unit 2** | Hartsville, SC<br>Darlington County | 759 MW | 2030 | 4.1 million |
| **Total:** | | 10,773 MW | | 59.7 million |

* Represents summer ratings.
** Annualized avoided $CO_2$ emissions based on 2020 generation.

In 2021, Duke Energy's nuclear fleet delivered 90,336,362 megawatt-hours ("MWh") of zero-carbon electricity to the Carolinas, which represents approximately 53% of the total electricity generated by Duke Energy in the Carolinas during that year. The approximately 90 million MWh represent more than 82% of all the zero-carbon electricity served to customers in the Carolinas in 2021 – meaning nuclear power provided significantly more zero-carbon energy for the Companies' customers than solar, wind and hydro power combined.

In 2021, the nuclear fleet matched its record fleet capacity factor of 95.72%, marking the 23rd consecutive year with a capacity factor, a measure of reliability, of greater than 90%. In fact, since 1971, the first year Duke Energy operated a nuclear facility in the Carolinas, nuclear has generated 3.161 billion MWh of electricity in the Carolinas. Figure L-1 below illustrates the total electricity generated by each nuclear generation unit in the Carolinas since commercial operation began, through 2021.

**Figure L-1: Total Generation (million MWh) Delivered by North Carolina and South Carolina Nuclear Power Plants, Life of Plant (through 2021)**

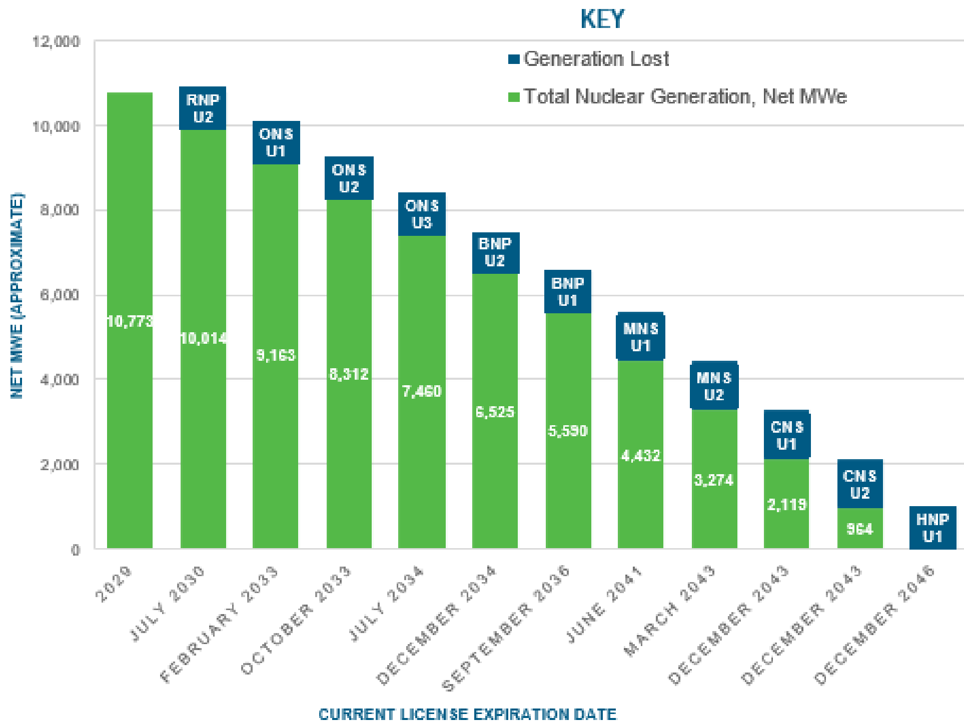



## Subsequent License Renewal

In September 2019, Duke Energy announced its intent to pursue SLRs for the 11 existing nuclear generation units in the Carolinas. The current operating licenses will begin to expire in the 2030s, as presented in Figure L-2 below, and renewing the operating licenses for another 20 years will ensure a source of reliable, zero-carbon, cost-competitive power for the Companies' customers through 2050 and beyond. Continued investment in maintaining and operating zero-carbon assets like the Companies' current fleet of nuclear plants into midcentury will result in great benefit to customers and the communities they serve. Extending the operation of these existing facilities through SLR is a critical base assumption in all the Carolinas Carbon Plan (the "Plan" or "Carbon Plan") portfolios, as discussed in Chapter 3 (Portfolios).

Figure L-2 below illustrates the approximate lost generation from the Companies' existing nuclear fleet if Duke Energy is unable to secure SLR for all 11 existing generation units. Without SLR, Duke Energy would need to replace almost 11,000-megawatt electric ("MWe") of existing baseload zero-carbon generation from 2030 through 2046.

**Figure L-2: Total Nuclear Generation Lost if SLR is Not Approved**




The first SLR application was filed for the Oconee Nuclear Station on June 7, 2021. The U.S. Nuclear Regulatory Commission ("NRC") accepted the application for review on July 22, 2021, and began review of the safety and environmental portions of the application via an aging management audit and environmental audit. Both audits were completed in October 2021, and the review process has moved on to the next phase with the NRC requesting additional information and confirmation of specific information. Duke Energy plans to submit an SLR application for each nuclear plant approximately every three years, sequenced in series, following the previous SLR application submittal.

All of Duke Energy's nuclear plants are currently licensed for 60 years and can safely and reliably run for many years after that. A 20-year extension is possible due to the excellent maintenance performed over the life of the plant, and the large investments made, and committed to be made, for major modifications and upgrades to each plant. When a license renewal is approved by the NRC, each plant is committed to maintain an extensive aging management program to keep the plant systems in top condition. Many other U.S. utilities have already committed, or plan to commit, to requesting SLRs extending the life of their plants to 80 years.

## Nuclear Uprates

In addition to extending the operating licenses at each site, Duke Energy will continue to optimize the use of power uprates where cost-effective. Several of the nuclear facilities (e.g., Harris, Robinson and Brunswick) have already been uprated extensively while the remaining facilities (e.g., Oconee, McGuire and Catawba) are at the early stages of being evaluated for major modifications to increase their power output. Uprates to the Oconee Nuclear Station for Measurement Uncertainty Recapture ("MUR") are included in the modeling for the Carbon Plan which results in an additional 15 MW per unit, to be implemented over the 2022-2023 period. The remaining potential uprates would require extensive component replacement which makes the economic viability of additional uprates uncertain. Therefore, the additional nuclear uprates are not included in this Carbon Plan modeling, as more investigation is needed into the cost and timing of the potential projects. If implemented, these power uprates would provide additional MW of zero-carbon electricity to Duke Energy's customers in the Carolinas.

## Advanced Nuclear

Advanced nuclear describes the next generation of reactor technologies that have significant potential to perform as zero-emitting load-following resources ("ZELFR"), which will be critically important as Duke Energy continues to develop more renewable resources in the Carolinas to achieve the energy transition and the $CO_2$ emissions reductions target set by HB 951. There are several first-of-its-kind advanced nuclear projects in development across North America, with four plants scheduled to be operational by the end of this decade. Deployment of advanced nuclear projects for Duke Energy is expected to be feasible by the early 2030s. In terms of modeling generation resources in the Carbon Plan, the Companies have determined that 2032 is the earliest possible date that advanced nuclear could be placed in service in the Carolinas.

Advanced nuclear is projected to be a significant technology in the energy transition and in enabling the achievement of the $CO_2$ emissions reductions target set out in HB 951, particularly in meeting the 2050 carbon neutrality target. In addition to the zero-carbon energy already provided by the current nuclear fleet, advanced nuclear will provide significant operational flexibility that will be needed to support increased deployment of renewable energy resources. Advanced nuclear will deliver electricity generation, and dependent on the technology chosen, it has the potential to provide thermal storage and/or high temperature steam that allows for higher efficiency electricity production, hydrogen production, or process heat used in industrial applications. This flexibility will pair well with the variable generation of wind and solar power, helping to meet the load demands of the Companies' customers.

Advanced nuclear includes SMRs, advanced reactors and microreactors, as described in Table L-2 below. SMRs are water-cooled reactors and advanced reactors are non-water-cooled (*e.g.,* molten salt, liquid metal, or high-temperature gas). While microreactor designs are included for awareness, Duke Energy is not currently evaluating microreactor technology for development in the Carolinas (i.e., microreactors are not included in the technologies screened in Appendix H (Screening of Generation Alternatives) due to their small scale as compared to the large replacement power needs to meet the targets of HB 951.

**Table L-2: Types of Advanced Nuclear Reactors**

| | Definitions |
|---|---|
| **Small Modular Reactors** | • Light water-cooled, much like today's current commercial fleet<br>• Proven technology and furthest along from a licensing standpoint<br>• Typically 300 MWe (i.e., 285 MWe Net) or less |
| **Advanced Reactors** | • Non-water-cooled – molten salt, helium gas, liquid sodium<br>• Operate at higher temperatures and typically at lower pressures<br>• Integrates well with variable renewable power<br>• Can be 50 MWe up to 1,200 MWe |
| **Microreactors** | • Less than 20 MWe – useful for military installations, remote communities, manufacturing facilities, industrial applications, universities with district heating and microgrids |

It is important to note that SMRs and advanced reactors have significant advantages over their historical counterparts. The modular design of these new reactors allows for more off-site construction and decreases production timelines. Designs have gotten smaller, meaning units require less capital investment and are more flexible, allowing for greater ability to match power output to system loads. In addition, the new generation of nuclear plants are significantly safer. Inherent safety features, such as passive shut down and self-cooling through natural circulation, mean that the system can turn off and cool indefinitely with no operator intervention.

There are additional benefits unique to advanced reactors. These units can operate at higher temperatures, increasing thermal efficiency. This feature allows the systems to carry out more flexible operations such as hydrogen production, industrial applications and desalination projects. Thermal storage systems enable advanced reactors to increase power output during periods of high load demand or variable renewable energy and decrease output during periods of overproduction. There are also increased safety features as the new reactors operate near atmospheric pressure, meaning emergency planning zones are smaller with reduced pressure-related design basis events.

## Federal Government Funding for Advanced Nuclear

The federal government, specifically the Department of Energy ("DOE"), has aggressively supported and provided funding for the development of advanced nuclear technologies, with a goal of ensuring that the U.S. remains the leader in global nuclear technology. The biggest program to date is the Advanced Reactor Demonstration Program ("ARDP"), which in 2020 announced awards (i.e., 50% cost share funding) described in Table L-3 below. The ARDP is a seven-year program; it is expected that the reactors that received the demonstration awards will be online by 2028. The approximately $2.5 billion in funding for the two demonstration reactors, as illustrated in Table L-3, was fully funded as part of the Infrastructure Investment and Jobs Act ("IIJA") that was approved by Congress in November 2021.

**Table L-3 Advanced Reactor Demonstration Program Awards**

| Demonstration Awards | |
|---|---|
| TerraPower for the Natrium Reactor | $80 million (year 1) + $1.25 billion (approx.) |
| X-energy for the Xe-100 Reactor | $80 million (year 1) + $1.25 billion (approx.) |
| **Risk Reduction Awards** | |
| Kairos Power for the KP-FHR | $303 million |
| Holtec for the SMR-160 Reactor | $116 million |
| Southern Company for the MCFR (TerraPower) | $90.4 million |
| BWXT for the BANR Microreactor | $85.3 million |
| Westinghouse for the eVinci Microreactor | $7.4 million |

Note: The ARDP awards shown are the DOE cost share amounts (based on 50%-50% cost share).
Reference: *DOE Office of Nuclear Energy ARDP Awards, Demonstration and Risk Reduction, announced October 13, 2020, and December 16, 2020, respectively.*

Duke Energy partnered with TerraPower in the ARDP to build the Natrium reactor. Duke Energy's role is to provide consulting and advisory in-kind services to TerraPower. The Natrium reactor will be built in Kemmerer, Wyoming, at the site of a retiring coal plant owned by PacifiCorp. Partnering with TerraPower and PacifiCorp on this project will allow Duke Energy to be involved early in the development of this new technology without taking on the risk of building a first-of-its-kind plant. The full list of the Natrium team partners includes:

- TerraPower and GE Hitachi (Reactor Design/Licensing)
- Bechtel Power (Engineering, Procurement and Construction)
- Duke Energy, Energy Northwest and PacifiCorp (Utilities)
- GE Global Nuclear Fuels, Centrus Energy and Orano (Fuels/Decommissioning)
- NC State University, Oregon State University and University of Wisconsin
- Idaho National Laboratory ("INL") & Argonne National Laboratory

## Leading Advanced Nuclear Technologies

There are a number of advanced nuclear technologies that are currently under development. A summary of the leading advanced nuclear technologies from either a design and/or licensing perspective in the U.S. is summarized in Table L-4 below.

**Table L-4: Leading Advanced Nuclear Reactor Technologies**

| Small Modular Reactors |
|---|
| **NuScale: VOYGR-6 and VOYGR-12**<br>• 77 MWe light water-cooled pressurized water reactor ("PWR"): 6-reactor plant = 462 MWe, 12-reactor plant = 924 MWe<br>• Received design certification approval from the NRC in August 2020<br>• Has a contract with the Utah Associated Municipal Power Systems to build a VOYGR-6 plant at INL as part of the Carbon Free Power Project ("CFPP") with the first module to be operational by 2029<br>• The CFPP received a cost share funding award from the Department of Energy ("DOE"), providing $1.4 billion for the project |
| **GE Hitachi: BWRX-300**<br>• 300 MWe light water-cooled boiling water reactor ("BWR"), scaled from the previously licensed Economic Simplified Boiling Water Reactor ("ESBWR")<br>• Started design certification process, five submitted licensing topical reports have been approved by the NRC<br>• Ontario Power Generation ("OPG") announced plans to build a BWRX-300 plant at their Darlington Site in Clarington, Ontario, with an estimated 2028 online date<br>• In February 2022, Tennessee Valley Authority ("TVA") announced their intent to evaluate this technology for their Clinch River site in Oak Ridge, Tennessee |
| **Holtec International: SMR-160**<br>• 160 MWe light water-cooled PWR<br>• A DOE ARDP risk reduction award winner of up to $116 million |
| **Advanced Reactors** |
| **TerraPower and GE Hitachi: Natrium Reactor**<br>• 345 MWe liquid sodium-cooled fast reactor<br>• Uses a molten salt thermal storage system that can increase power output up to 155 MWe for approximately six hours<br>• A DOE ARDP demonstration award winner of approximately $1.25 billion<br>• Will build the initial ARDP plant in Kemmerer, Wyoming, at the site of a PacifiCorp retiring coal plant with an expected online date of 2028 based on ARDP requirements; Duke Energy is a partner on this project, as described above |
| **X-energy: Xe-100 Reactor**<br>• 80 MWe high-temperature gas reactor, uses helium for cooling, standard design is a 4-reactor plant = 320 MWe<br>• A DOE ARDP demonstration award winner of approximately $1.25 billion<br>• The first plant will be built in Richland, Washington, and be operated by Energy Northwest and will include four reactors for 320 MWe of total power, with an online date of 2028 based on ARDP requirements |

| |
|---|
| **Kairos Power: KP-FHR**<br>• 140 MWe molten fluoride salt-cooled high-temperature reactor, operating temperature of 1200ºF (650ºC)<br>• Uses Tristructural Isotropic (“TRISO”) fuel in pebble form, great properties for operating at high temperatures<br>• A DOE ARDP risk reduction award winner of up to $303 million to build a prototype reactor (Hermes) in Oak Ridge, Tennessee<br>• TVA signed an agreement to provide licensing, engineering and operations support to build Kairos Power KP-FHR prototype reduced-scale reactor (Hermes reactor) in Oak Ridge, Tennessee |
| **Terrestrial Energy: Integral Molten Salt Reactor (“IMSR”®)**<br>• 195 MWe molten salt-cooled reactor<br>• Uses a liquid/molten salt fuel rather than solid fuel<br>• Uses a permanently sealed core-unit that is replaced every seven years with another core unit |
| **TerraPower: Molten Chloride Fast Reactor (“MCFR”)**<br>• Up to 1,200 MWe, uses a liquid/molten salt fuel rather than solid fuel<br>• High efficiency steam for process applications and thermal storage<br>• Southern Company received ARDP risk reduction award to build a MCFR prototype (DOE $90.4 million) |

## Time Frame for Development and Commercialization

Currently, there are four new advanced nuclear plants scheduled to be built and in commercial operation by the end of this decade: two SMRs and two advanced reactors, as described in Table L-5 below. The two prototype plants described in the table are for designs that are not advanced enough to support Duke Energy in meeting the 70% $CO_2$ emissions reductions target set out in HB 951. Duke Energy will continue to monitor the developing technologies to identify the appropriate and most viable technologies to be included in the 2050 carbon neutrality target.

**Table L-5: Advanced Nuclear Reactor Projects in Development**

| Developer | Technology | DOE Funding | Utility | Location | Size | Expected Year Online |
|---|---|---|---|---|---|---|
| **First-of-its-kind Plants** | | | | | | |
| **TerraPower and GE Hitachi** | Natrium Reactor<br>Liquid Sodium-cooled | ARDP Demonstration | PacifiCorp | Kemmerer, WY | 345 MWe, Up to 500 MWe with Thermal Storage | 2028 |
| **X-energy** | Xe-100 Reactor<br>Helium Gas-cooled High Temperature | ARDP Demonstration | Energy Northwest | Richland, WA | 4 Reactors @ 80 MWe = 320 MWe | 2028 |
| **GE Hitachi** | BWRX-300 Reactor<br>Light Water-cooled (BWR) | None | Ontario Power Generation; TVA | Darlington Site Clarington, ONT (OPG); Clinch River Site, Oak Ridge, TN (TVA) | 300 MWe | 2028 (OPG); Within the next decade (TVA) |
| **NuScale** | VOYGR Reactor<br>Light Water-cooled (PWR) | Carbon Free Power Project | UAMPS | Idaho Falls, ID (INL) | 6 Reactors @ 77 MWe = 462 MWe | 2029 |
| **Prototype Plants** | | | | | | |
| **TerraPower w/Southern Co.** | MCFR<br>Molten Chloride Fast Reactor | ARDP Risk Reduction | N/A | Idaho Falls, ID (INL) | < 1 MWe | 2026 |
| **Kairos Power w/TVA** | KP-FHR Reactor<br>Fluoride Salt-cooled High Temperature | ARDP Risk Reduction | N/A | Oak Ridge, TN | 15 MWe | 2026 |

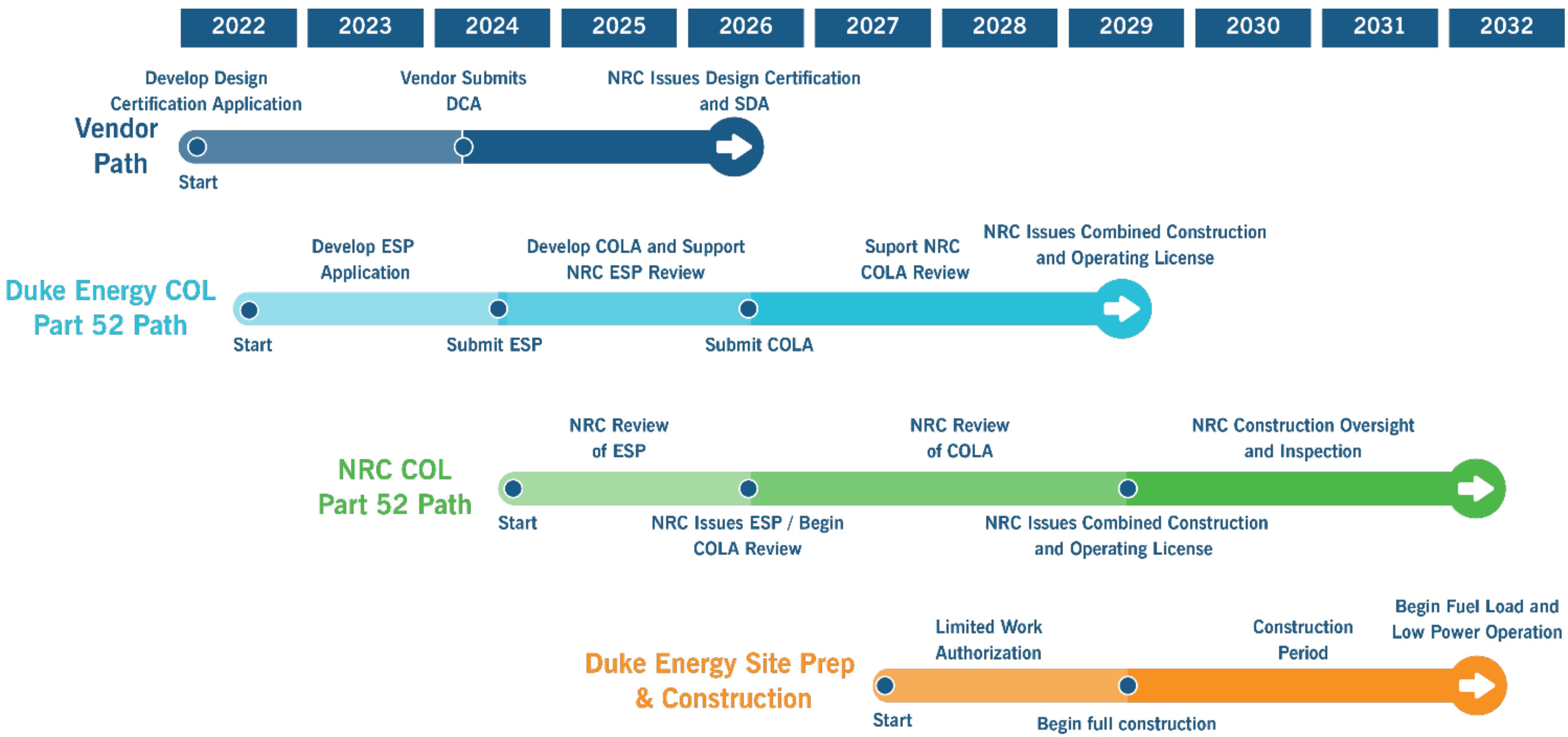
## Advanced Nuclear in the Carbon Plan

To further the energy transition and meet the $CO_2$ emissions reductions target, Duke Energy is planning to move forward with the development of advanced nuclear in the Carolinas. It is projected that the first advanced nuclear unit for Duke Energy could come online in mid-2032. These timing assumptions align with stakeholder feedback that advanced nuclear technologies would likely not be available prior to 2030. The availability and timing of new advanced nuclear in the Carolinas was discussed with stakeholders in Carbon Plan Stakeholder Meeting 1 and Carbon Plan Stakeholder Meeting 3.

A mid-2032 in-service date requires an aggressive timeline but is feasible if Duke Energy accelerates actions into 2022 to start the licensing process, including preparing and submitting an Early Site Permit ("ESP") application to the NRC. Note that the overall licensing timeline is also dependent on the action of the NRC, as the new reactor designs must go through the design certification process. To date, the only advanced nuclear reactor technology to receive an approved design certification from the NRC is the NuScale VOYGR plant. All other leading designs are in various stages of the pre-license application process.

Figure L-3 below illustrates the steps that will be required to build an advanced nuclear facility, meeting the timeline of having the unit online by mid-2032. Note that the project timeline for an actual project could have different permitting, licensing, construction and commissioning time frames due to design specifics of the technology chosen and potential regulatory changes.

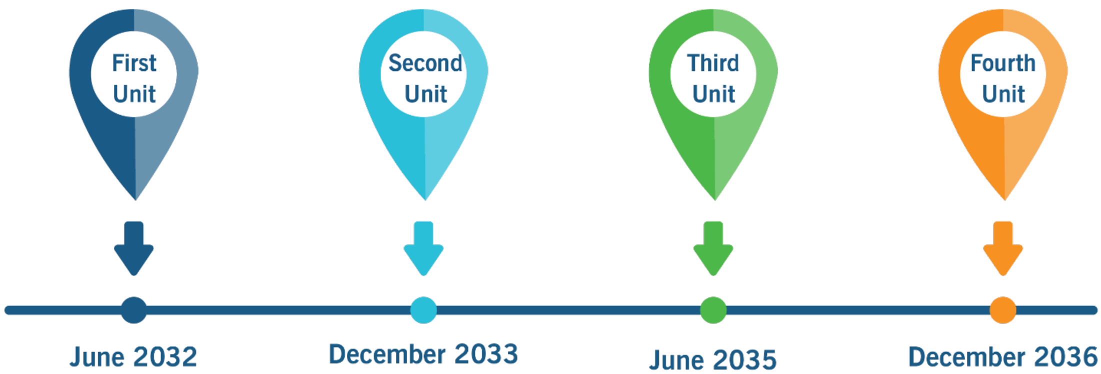
**Figure L-3: Estimated Timeline for Development of a SMR – to be Operational by Mid-2032**




Notes:
DCA – Design Certification Application
COL – Combined Construction and Operating License
ESP – Early Site Permit
SDA – Standard Design Approval
COLA – COL Application

Following the first new plant online, additional nuclear plants will be required to advance the retirement of existing coal facilities and to meet generation demands. Figure L-4 below represents the currently projected potential schedule. Dates shown are earliest practicable for the first four units and may differ by portfolio chosen. Regardless of the portfolio chosen, the addition of advanced nuclear units will be critically important to achieving the 2050 carbon neutrality target as reflected by every portfolio choosing two SMRs for the system by 2035.

**Figure L-4: Estimated Schedule for Targeted Commercial Operation Date of First Four New Advanced Nuclear Plants in Duke Energy Service Territories (Subject to Regulatory Approvals)**




## Execution and Risk Management

Delivering on the 70% interim target will require extending the life of the Companies' existing nuclear fleet through SLR for all four of the portfolios described in Chapter 3 (Portfolios) and, in two of the four portfolios, constructing advanced nuclear. The detailed near-term actions and procurement activities that will be required around both the existing and new nuclear resources are discussed in Chapter 4 (Execution Plan). The execution risks related to nuclear are discussed in detail in the remainder of this section, including some of the mitigation strategies to address these risks.

**Subsequent License Renewal:** All four of the portfolios presented in the Plan assume SLR for the entirety of the Companies' existing nuclear fleet. The execution risk related to SLR is primarily limited to the approval of SLR by the NRC. If SLR is approved for these generation facilities, then Duke Energy will continue to operate these carbon-free facilities safely and reliably for an additional 20 years, as it has for decades.

**Early site permits ("ESP"):** ESPs can be used to reduce the financial and regulatory risk of a new reactor project. An ESP allows the NRC to review and approve the environmental impacts and site safety analysis associated with nuclear deployment before a technology is selected or a decision to build has been made. ESPs can be used to avoid delays from siting issues that could adversely impact the construction schedule after significant capital has been invested. The ESP can be approved for up to 20 years and renewed for an additional 20 years. The permit is tied to the site and can be transferred to another owner. A limited work authorization ("LWA") allows for some site preparation activities, ground excavation, and site development to occur while the NRC is reviewing an application. A LWA reduces the time to field once a decision to build has been made. The ESP process takes approximately two years to develop the application and then approximately two to three years for the NRC to review and approve the application.

An ESP provides an advantage to the customer by de-risking the upfront costs of building a new plant. The total cost is expected to be approximately $50 million to $75 million. An ESP would allow Duke Energy to make progress in deploying advanced nuclear while the state of technology advances and the detailed designs are completed. As explained in more detail in Chapter 4 (Execution Plan), it is reasonable and appropriate to commence development work at this time, including through preparation and submittal of an ESP application to the NRC.

**Supply Chain Constraints:** Due to current socio-political, economic, and COVID-19-related conditions, challenges exist to obtain the long lead time items and material, such as steel, raw materials and electronics needed to build a new plant. Early engagement with major vendors of primary components will be key, along with early procurement and storage of equipment and materials when they are available. Due to the later timeline of when Duke Energy will enter the construction phase, it is believed that some of these supply chain restraints will have dissipated.

**Labor Shortages:** The development of the advanced nuclear technologies is currently in the early stages, while first-of-its-kind projects are just being developed, an adequate labor force may not exist to support design, construction, and management of advanced nuclear projects. Given the amount of advanced nuclear that will need to be installed to deliver on any of the pathways presented in the plan, development of a qualified labor force could be a significant constraint for Duke Energy, especially as other utilities across the U.S. are also looking to build out their labor forces to support the development of their own advanced nuclear projects.

**Storage of Spent Fuel:** Assuming no U.S. central storage site develops, spent fuel from the reactors will be safely stored on the plant site, just as the current fleet of operating reactors do. These storage installations are within the protected or security-maintained areas of the plant. In addition, some of the advanced reactors have challenges that current reactors do not have, due to the fuel being contained in molten salt or liquid sodium cores, versus the existing water-cooled plants and new SMRs.

**Decommissioning:** Duke Energy will stay abreast of industry research addressing decommissioning challenges around cost and the potential to recycle materials. Additional information will be needed for Duke Energy to forecast the associated decommissioning costs as source selections are made.

## Conclusion

The energy transition and the $CO_2$ emissions reductions target set in HB 951 will not be achieved without nuclear power. The Companies' existing nuclear fleet will be an important part of delivering the baseload power needed to deliver on both the 2030 and 2050 targets, and advanced nuclear will offer a new ZELFR technology that could be operational as early as June 2032. Advanced Nuclear is key to achieving the 2050 carbon neutrality target with all portfolios bringing at least 7.7 GW of new units online from 2032 through 2048. Advanced nuclear has benefits over its historical counterpart, including reduced risks associated with construction and cost, inherent safety features, thermal storage capabilities, and increased functionality as a ZELFR to integrate with a grid with more variable generation from renewables. As the new advanced nuclear reactor technologies progress and become more commercially viable, the Companies will stay at the forefront of this important zero-carbon technology to bring value to customers in the Carolinas. The Companies have identified and requested approval of a defined set of near-term activities for advanced nuclear that are described in more detail in Chapter 4 (Execution Plan).