NARUC
National Association of Regulatory Utility Commissioners

NASEO
National Association of State Energy Officials

Developing State Advanced Nuclear Energy Strategic Frameworks: Guidance for State Energy Offices and Public Utility Commissions

Kathryn Kline and Kiera Zitelman, NARUC
Kelsey Jones, NASEO
June 2025

Acknowledgments

This material is based upon work supported by the U.S. Department of Energy under award number DE-NE0009043. The authors of this paper are Kelsey Jones, Kathryn Kline, and Kiera Zitelman. The authors would like to thank Advanced Nuclear State Collaborative members who participated in the workshops held in February and April 2024. The insights from these discussions helped in developing the paper scope and identifying content. Further, the authors recognize the contributions of the Advanced Nuclear State Collaborative co-chairs (denoted with a * below).

The authors would also like to thank the following individuals for their insights and expertise:

- **Hon. Zenon Christodoulou**, New Jersey Board of Public Utilities
- **Molly Cripps***, Tennessee Department of Environment and Conservation Office of Energy Programs
- **Jared Hatch**, Office of Nuclear Energy, U.S. Department of Energy
- **Cheryl Moss Herman**, former Office of Nuclear Energy, U.S. Department of Energy
- **Melinda Krahenbuhl**, Utah Public Service Commission
- **Hon. René Lopez**, Arizona Corporation Commission
- **Hon. Lea Márquez Peterson***, Arizona Corporation Commission
- **Alyse Peterson***, New York State Energy Research and Development Authority
- **Natalia Saraeva**, Office of Nuclear Energy, U.S. Department of Energy
- **Kenya Stump**, Kentucky Office of Energy Policy
- **Jim Zolnierek**, Illinois Commerce Commission

Disclaimer

This material is based upon work supported by the U.S. Department of Energy, Office of Nuclear Energy, under award number DE-NE0009043. This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, expressed or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

Table of Contents

Executive Summary

Energy policymakers and regulators are keenly interested in advanced nuclear energy generation and its environmental, grid reliability, and economic development benefits. In several states, this interest has translated into State Energy Offices and Public Utility Commissions (PUCs) developing or considering developing strategic frameworks examining the role that new nuclear energy generation could play in the state, assessing factors impacting project development, and identifying action items for governors, legislatures, and state agencies. This publication summarizes recommended steps in developing a strategic framework, discusses factors for states to explore, and offers considerations for integrating a nuclear energy strategic framework with other state energy planning, policy development, and regulatory processes.

This document has been structured as follows:

- **Section I** identifies how State Energy Offices and PUCs can prepare to lead and/or contribute to the development of a strategic framework for new nuclear energy generation deployment in their state, and provides an overview of advanced nuclear energy generation;
- **Section II** defines a strategic framework and contrasts it with other types of planning documents, and provides some case study examples from states that have already embarked on strategic frameworks for advanced nuclear energy generation;
- **Section III** provides a set of initial steps and identifies early considerations for states embarking on developing a strategic framework for advanced nuclear energy generation. This section also identifies potential advanced nuclear energy framework categories, and highlights possible questions and resources for each category;
- **Section IV** offers examples where advanced nuclear energy generation planning is being incorporated into existing state planning documents; and
- **Section V** concludes by providing closing thoughts and identifying technical resources available to states.

I. Introduction

A. Purpose

The purpose of this publication is to assist State Energy Offices and PUCs in preparing to lead and/or contribute to the development of a strategic framework for new nuclear energy generation projects in their states. Policymakers and regulators are giving renewed consideration to new energy generation as demand for electricity is projected to increase in coming years. A key player in this discussion is advanced nuclear energy generation. In several states, interest from governors, legislators, or regulators has led to State Energy Offices and PUCs developing or considering the development of strategic frameworks examining where new nuclear energy generation fits within the state's energy needs, assessing factors impacting the likelihood of successful deployment, and identifying action items for state agencies in reducing barriers to new nuclear generation. While other nuclear energy ecosystem projects such as preparing supply chains, workforce, fuel, and spent fuel management are important and relevant to advanced nuclear energy, these are not the primary focus of this document. This publication summarizes recommended steps in developing a strategic framework, discusses factors for states to explore, and offers considerations for integrating a nuclear energy strategic framework with other state energy planning and regulatory processes.

B. Advanced Nuclear Energy Background

Interest in new electricity generation is growing across the country as demand for power is projected to increase sharply, driven by manufacturing, industrial, and data center facilities.[1] Many states are looking to advanced nuclear energy generation to meet growing power needs while simultaneously supporting other state policy goals such as clean power generation, economic growth, and energy security. The existing United States nuclear energy generation fleet is the country's largest source of carbon-free electricity generation and runs at more than 90 percent of its capacity. Past and announced retirements of aging plants, due mainly to economic factors rather than technical ones, have shrunk the fleet from a peak of 112 reactors with a capacity of nearly 102 gigawatts (GW) to 94 reactors with a capacity of less than 97 GW.[2] In recent years, advanced reactors have matured in technological readiness, offering a range of new choices to generation-owning utilities and competitive power producers.

The term "advanced nuclear" encompasses Generation III+ (Gen III+) and Generation IV (Gen IV) reactors (**Table 1**). Gen III+ reactors rely on low-enriched uranium for fuel and water for a coolant, similar to conventional reactors. Southern Company's Plant Vogtle Units 3 and 4, using the Westinghouse AP1000 reactor design, came online in 2023 and 2024. These two units, each slightly over 1 GW of capacity, mark the first Gen III+ reactors built in the United States and the first nuclear generating units to come online in the United States in three decades.[3,4] Gen IV reactors use novel fuels and coolants. Advanced reactors can range in size from microreactors (<50 megawatts [MW]) to small modular reactors (SMRs, 50–300 MW), to large reactors on the GW scale. As of August 2024, the Nuclear Innovation Alliance, a pro-nuclear nonprofit think tank, identified 12 advanced nuclear developers with announced U.S. deployment dates between 2026 and 2031.[5]

With such a broad variety of advanced reactor designs and capabilities, as well as the growing need for new electricity generation, states are searching for information to guide energy policy and regulation of advanced nuclear energy. Many state decision-makers are engaged in discussions about the benefits of advanced nuclear energy and how states can attract nuclear energy firms and workers. According to the Nuclear Energy Institute, 25 states passed pro-nuclear energy legislation in 2024, ranging from overturning moratoriums on nuclear energy development to explicitly promoting nuclear energy in state energy policies.[6] Several states, including Connecticut, Michigan, North Carolina, South Carolina, and Tennessee, have taken recent action to expand the definition of renewable generation resources to zero-carbon or clean resources, where nuclear generation is included and thus eligible for state policies incentivizing these resources. These

Table 1: Overview of Advanced Reactors (U.S. Department of Energy 2024)

Advanced nuclear includes reactor types of all sizes across two generations

	Gen III+	Gen IV		
Coolant	Light water	Gas	Liquid metal	Molten salt
Examples	• Pressurized water reactor • Boiling water reactor	• High temperature gas reactor • Gas fast reactor	• Sodium fast reactor • Lead fast reactor	• Fluoride high temperature reactor • Molten chloride fast reactor
Typical fuel	LEU, LEU+	HALEU	HALEU	HALEU
Outlet temperature	~300°C	~750°C	~550°C	~750°C
Power output	Large, small	Small, micro	Small, micro	Small
Example reactor designs	• GE Hitachi • Holtec • NuScale • Westinghouse	• BWXT • General Atomics • Radiant • X-energy	• ARC • TerraPower • Oklo	• Kairos • Terrestrial

U.S. DEPARTMENT OF ENERGY

policies reflect an acknowledgement of the value that nuclear brings to an energy portfolio as a zero-emission, firm generation energy resource.

The goal of this document is to serve as a resource and guidance document for states as they look to move projects forward and advance supportive policies, programs, and regulations through an advanced nuclear energy strategic framework. An advanced nuclear energy strategic framework can be a helpful tool for State Energy Offices, PUCs, and other stakeholders as they navigate different opportunities and challenges.

To inform this guidance document, the National Association of State Energy Officials (NASEO) and National Association of Regulatory Utility Commissioners (NARUC) worked closely with the State Energy Offices and PUCs involved in the NARUC-NASEO Advanced Nuclear State Collaborative (ANSC). In February 2024, NARUC and NASEO each held an in-person workshop to share an overview of the framework document, what the benefit of a strategic framework is, and to get input directly from states. Additionally, at the NARUC and NASEO ANSC in-person meeting in Knoxville, Tennessee, in April 2024, an overview of some of the key framework categories was shared. States were able to discuss prioritization of these different categories and offer suggestions on items their states would explore in a framework.

The remaining sections of this report will offer information on strategic frameworks with brief case studies from across the country and then delve into the actionable steps that can be taken to develop and implement an advanced nuclear energy strategic framework.

II. Strategic Frameworks – Definition and Relevance for States

State policy, advances in technology, and changes to markets have often called on state utility regulators and State Energy Directors to lead or contribute to strategic frameworks for advanced nuclear. These documents outline the role of advanced nuclear energy generation in state policy, programmatic, and regulatory activities. Frameworks provide a detailed analysis of state and regional opportunities and challenges and identify potential actions to accelerate advanced nuclear energy research, development, and deployment (RD&D). State Energy Offices may find these documents helpful as they shape short- and long-term state energy plans, identify and implement different funding opportunities, and make policy recommendations to their governors.

Unlike feasibility studies, which consider whether an investment in a particular resource is "possible, practical, and viable,"[7] or siting studies, which aim to identify optimal sites for the construction of advanced reactors, strategic frameworks take a critical look at the potential of advanced nuclear energy generation to achieve state policy goals and offer specific steps for state agencies and other decision-makers to undertake. Strategic frameworks are also distinct from policy recommendations and technology primers (**Table 2**). Frameworks enable stakeholders to unite around shared goals and understand the ecosystem of organizations that can be involved in nuclear energy deployment.

Frameworks help to align and inform stakeholders about the road ahead. Nuclear plants are complex and costly projects that are dependent on state and federal regulatory approvals, public acceptance, technical considerations such as fuel availability, and other factors. In essence, frameworks help prepare states by helping to answer questions such as:

- How can advanced nuclear energy generation help to achieve state energy policy goals?
- What should be done to improve the likelihood of advanced reactors being located in the state?
- What challenges for advanced nuclear energy deployment exist, and how can state agencies and stakeholders collaborate to overcome them?

Table 2: Contrasting Strategic Frameworks and Other Types of Studies

STRATEGIC FRAMEWORK	FEASIBILITY OR SITING STUDY	POLICY RECOMMENDATIONS	TECHNOLOGY PRIMER
• Is written for a broad variety of audiences (e.g., legislators, utilities, power customers) • Establishes state objectives • Identifies action items for various stakeholders • Builds common understanding of opportunities and challenges • Weighs socioeconomic factors	• Main objective is to recommend an investment • Is written for one actor or small group of decision-makers • Typically considers benefits and drawbacks of specific sites and/or reactor designs • Is technical in nature with limited consideration of socioeconomic factors	• Is written for state legislators and state policy decision-makers • Identifies specific policy actions to achieve a goal • Recommends delegate responsibilities to state agencies	• Summarizes commercially available or near-available technologies • Is intended to aid decision-makers in selecting an optimal technology to support

In 2023, NARUC and NASEO jointly launched the ANSC with membership composed of State Energy Offices and PUCs. By participating in the ANSC, states have the opportunity to share insights into different challenges and exchange success stories and lessons learned. During a meeting of the ANSC, the **Wyoming Energy Authority** (WEA) presented on their strategic nuclear framework, explored in more detail below, and emphasized how the framework helped the state identify solutions to different technical, policy, and regulatory barriers and even accelerated interest from the private sector. To support development of similar resources in other states, this guidance document is designed to provide a starting point, case studies, and information for State Energy Offices and PUCs. This guide will provide information on the benefits and opportunities provided by advanced nuclear energy strategic frameworks, steps other states have taken to complete a similar resource, and what different categories can be explored through a roadmap such as siting and permitting or different use cases. While not exhaustive, this report also includes links to other relevant resources and materials for states wishing to delve deeper into the topic.

Importantly, because every state has a different energy, policy, and regulatory landscape for advanced nuclear energy generation, the actions outlined in this guide should be considered suggestions, and the reader should understand that not every item covered in this document may apply to every state.

A. State Strategic Framework Case Studies

Several states have completed all or parts of a strategic framework. The following section offers an overview of frameworks and other similar resources in Wyoming, Utah, Louisiana, Tennessee, Virginia, and New York. For other states interested in better understanding the landscape for advanced nuclear energy generation in their states, these examples may be helpful reference points.

Wyoming's energy strategy calls on the WEA to develop existing energy industries (i.e., coal, oil, and natural gas) and expand investment in emerging areas such as nuclear, renewables, hydrogen, geothermal, and rare earth elements. In June 2023, the State Energy Office of Wyoming, the **WEA**, as part of the state's broader energy strategy, issued a strategic framework and roadmap for nuclear energy and industrial development. The framework was developed in close coordination with other key stakeholders in the state and Idaho National Laboratory. The framework establishes three primary objectives:

1. Enable key stakeholders to accelerate their efforts to develop the nuclear energy industry in the State of Wyoming.
2. Leverage the combined strengths of key stakeholders to implement an impartial, credible, and rational strategy that develops the nuclear energy industry from Quarter (Q) 2 2023 to Q4 2026.
3. Foster a regional-to-national alignment of efforts and resources to deliver precise and tangible outputs and achieve desired outcomes locally, nationally, and globally.[8]

WEA also noted that the framework could provide reference points and information for stakeholders and promote coalition-building. WEA began the framework by offering a vision encompassing nuclear generation, supply chain, and a value chain to support industrial development and outlining five challenges: federal permitting and regulation, risks inherent to technology development, uncertainty regarding fuel supply for advanced reactors, confusion over where public investments are needed, and high barriers to entry across the nuclear supply chain. WEA identified working group members and supporting and collaborating institutions to achieve the goals set out in the framework and specified initial steps WEA and others could undertake.

The **Utah Office of Energy Development** (OED) undertook a multi-part "Strategic Nuclear Energy Pathway" effort. The first installment in this series, released in July 2024, identified initial steps the state could take to prepare for Utah's first nuclear reactor. OED cited multiple reasons for the office's involvement in this strategy, mainly alignment with Utah's all-of-the-above energy policy and consistency with Utah's energy priorities, established by the state legislature, including adequacy, reliability, dispatchability, affordability, sustainability, security, and cleanliness. OED also noted that nuclear plant construction is a lengthy process, and states looking to attract nuclear firms should develop efficient regulatory frameworks to reduce time and costs associated with development.

OED called on the Utah legislature to take several actions and promised further legislative recommendations in follow-up documents. In this first installment, OED recommended that the legislature update the definition of nuclear energy to align with the definition established by the Nuclear Regulatory Commission (NRC) and Idaho National Laboratory (INL). Further, OED recommended the synchronization of state and NRC permitting requirements to minimize state-specific permitting work nuclear energy generation developers would need to perform. OED also recommended legislation to ensure that utilities consider nuclear energy in long-term resource planning and called for the creation of incentives for nuclear developers such as grants, tax credits, and loan guarantees.[9]

Other sections of the first installment discussed siting considerations and coal-to-nuclear opportunities. OED used Oak Ridge Siting Analysis for Power Generation Expansion (OR-SAGE), a U.S. Department of Energy (DOE) INL-Oak Ridge National Laboratory (ORNL) siting model, to identify three viable coal-to-nuclear conversion sites, and did not preclude the option of greenfield development. OED argued that although not required by the NRC, an early site permit (ESP) should be pursued. OED estimated that an ESP would take three to five years and $50 million to $100 million to procure. The installment concluded with an outline of the sequence of steps necessary to have an operational nuclear plant.

The **Louisiana Public Service Commission** (PSC) opened exploratory docket X-36987 to assess the development of advanced nuclear power technology on September 27, 2023. As part of this docket, commission staff welcomed information from jurisdictional utilities, stakeholders, educational institutions, or other related entities to file information on advanced nuclear related to SMRs, microreactors, and small nuclear reactor configurations. This docket includes study of "all relevant statutes… to determine the barriers, if any, to the entry of such systems into the Louisiana Resource Profile."[10] As part of this docket, the Louisiana PSC staff conducted a technical conference on February 8, 2024, to introduce an effort to develop an advanced nuclear energy strategic framework and explore "how the development of a framework can assist Louisiana as it explores its energy future in relationship to issues surrounding electrical generation, nuclear energy supply chain (manufacturing, components, services, etc.), and value chain (industrial applications of nuclear heat and power) associated with Louisiana's evolving energy landscape."[11]

In October 2024, the *Louisiana Advanced Nuclear Competitive Edge (LANCE) Strategic Framework* was filed in Louisiana PSC's exploratory docket on advanced nuclear. The framework effort was a collaborative approach that included input from key industry stakeholders including reactor designers, electric utilities, state industry representatives, Louisiana State University, Global Strike Command, Cajun Industries, Port of New Orleans, INL's Frontiers Initiative, and the Nuclear Energy Institute. The LANCE Strategic Framework identifies three foundational pillars:

1. Generation: examine opportunities where the state can deploy new advanced nuclear generation to address energy needs and solve emerging concerns;
2. Supply chain: identify opportunities for existing businesses and industry to support the deployment of advanced nuclear energy (which may include component manufacturing and professional services); and
3. Value chain: explore how the state can leverage nuclear energy to drive low-emission, high-value industry development.[12]

Within each pillar, the LANCE Strategic Framework identifies regulatory considerations, potential policy incentives, recommendations, and possible use cases. The framework concludes by identifying next steps for the initial framework document to support continued progress for advanced nuclear energy deployment within the state and an appendix that explores potential use cases for advanced nuclear energy applications. Among the recommendations for next steps are suggestions to:

- Continue to review and update the framework,
- Broaden state government acceptance of the LANCE Strategic Framework and encourage participation from other state agencies and offices,
- Identify and pursue appropriate government incentives and programs for advanced nuclear energy to assist in the development of energy-driven economic opportunities, and
- Explore potential regulatory cost recovery mechanisms such as preapproval of advanced nuclear energy projects, securitization, formula ratemaking, allowing utilities to rate base a portion of power purchase agreements, and performance-based regulation that could align appropriate incentives for advanced nuclear generation deployment.

In November 2024, the **Tennessee Nuclear Energy Advisory Council** released its final report on advancing nuclear energy innovation in the state. The report outlines 19 recommendations around addressing first-of-a-kind (FOAK) costs for SMRs, growing a strong supply chain, and coordinating and enhancing workforce development, regulatory responsiveness, and coalition building. The recommendations include:

- Establishing a Joint Office of Nuclear Advancement to serve as a centralized hub and unified point of contact for the nuclear industry and stakeholders to engage the state for incentives and processes related to nuclear energy, supply chain, and medical isotopes;
- Continuing to grow the Tennessee Nuclear Energy Supply Chain Investment Fund, which has already issued multiple awards related to workforce development, fusion research and development (R&D), uranium enrichment, and more;
- Establishing a Nuclear Energy Workforce Center; and
- Drafting a roadmap that aligns the state's regulatory, emergency preparedness, and workforce strategies.

In Virginia in 2013, the Governor of Virginia and the state legislature created the **Virginia Nuclear Energy Consortium Authority** (VNECA),[1] a State Government Entity with the purpose of making Virginia a global leader in nuclear energy by supporting research, workforce development, and business opportunities. The Authority is comprised of representatives from state government, academia, and industry. In the same year, VNECA established the Virginia Nuclear Energy Consortium (VNEC) as a nonprofit organization to identify opportunities to sustain the state's nuclear energy assets to achieve the goals set by VNECA. In 2020, Virginia House Bill 1303 and Virginia Senate Bill 549 required the development of a strategic plan for the role of nuclear energy in Virginia's strategy to reach carbon-free energy goals. The first plan was submitted in October 2020, with updates requested every four years.

VNEC, on behalf of VNECA, developed the first strategic plan for nuclear energy in 2020. Virginia's legislative mandate directed the Virginia Department of Energy (the State Energy Office); the Secretary of Commerce and Trade; and the Secretary of Education in coordination with VNECA and the Virginia Economic Development Partnership authority to develop a strategic plan for nuclear energy[13] on a four-year time horizon.[14] This plan examined the role of Virginia's nuclear industry in advancing economic development, environmental stewardship, and national security—an important consideration given Virginia's Naval Station Norfolk, the world's largest naval station and home to the U.S. Atlantic Fleet's nuclear-powered submarines. VNEC noted a thriving nuclear industry in the state with four nuclear reactors generating nearly all of Virginia's carbon-free

1 The 2013 statute created the Virginia Nuclear Energy Consortium Authority (VNECA), a state agency run through the Virginia Department of Energy with board members appointed by the governor. VNECA established Virginia Nuclear Energy Consortium (VNEC) as its nonprofit "responsible for conducting activities to achieve the goals set by VNECA."

electricity and employing more than 2,000 workers, the state's advanced manufacturing capabilities, and a strong defense industry located in Virginia.

The plan identified five objectives to achieve by 2024. Notably, several of these objectives called on other state agencies and policymakers to consider taking actions to strengthen and grow Virginia's nuclear energy industry and enable it to support state policy objectives as technologies evolve:

1. Develop a roadmap for the deployment of generation and storage technologies to meet growing demand in Virginia as well as the state's carbon-free energy targets.
2. Consider a public-private partnership to site and build an advanced reactor.
3. Invest in education and training to develop a strong nuclear energy workforce.
4. Consider a nuclear generation mandate.
5. Promote diversity and inclusion in science, technology, engineering, and math (STEM) disciplines.

As VNEC develops the next iteration of its strategic plan, many of these objectives have advanced. In his 2022 energy strategy, Governor Glenn Youngkin announced his intent to build an SMR in Virginia by 2032.[15] In 2023, the legislature created a Virginia Power Innovation Fund, with $4 million available for R&D of innovative energy technologies including nuclear energy, and the Virginia Innovative Nuclear Hub to award competitive grants for workforce development, electric generation, supply chain, and advanced manufacturing for nuclear, carbon capture and utilization, and hydrogen.[16] Additionally, the Virginia Clean Energy Innovation Bank was launched within the Virginia Department of Energy's State Energy Office in 2024 and has helped fund a new SMR control room simulator at George Mason University's Arlington campus, supporting workforce development efforts in the nuclear space. Additional projects are in the works which promote the growth of domestic supply chains while accelerating the transition to a diversified portfolio of clean power generation, including advanced nuclear and innovative grid modernization.

In January 2025, the **New York State Energy Research and Development Authority (NYSERDA)** released a *Blueprint for Considerations of Advanced Nuclear Energy Technologies*. The objective of the Blueprint is to outline the scope of the most important opportunities, issues, and questions associated with advanced nuclear including decarbonization and increased energy efficiency and load flexibility. The Blueprint also outlines issues related to technological readiness, environmental and climate justice, waste, cost, and other factors. The document will serve as a starting point for the state's Master Plan for Responsible Advanced Nuclear Development, which is expected to be released in 2026. Some of the studies that will be conducted under the Master Plan will focus on regulatory, safety, and siting issues; technical feasibility and applications; policy options; supply chain, workforce, and economic development; and waste.[17]

Interest in advanced nuclear energy remains strong across states, with numerous PUCs and State Energy Offices being asked to provide information or recommendations to policymakers. To that end, NARUC and NASEO have developed this document to assist states in drafting strategic frameworks.

III. Developing a Strategic Framework

A. Initial Steps and Considerations

For states looking to better understand the process for developing a nuclear energy strategic framework, the following section outlines some of the steps and information to consider. Some of the items highlighted below may already be determined when a strategic framework is started. For example, a framework may be required by the state legislature or governor's office. For states without official direction, they may see the development of a framework as a way to explore advanced nuclear energy as a tool for achieving state energy goals such as decarbonization, economic development, reliability, and affordability. These state energy priorities will most likely already be defined. ***A framework is one avenue for states to see how a certain technology, such as advanced nuclear generation, can help support those priorities or goals. It will also help states get a sense of the landscape for advanced nuclear energy in their states such as potential policy and regulatory barriers and opportunities.*** The framework development process will also help to bring together different stakeholders such as state agencies, universities, local governments, community-based organizations, tribes, investor- and consumer-owned utilities, public power, and the private sector.

State Energy Offices and PUCs are well-positioned to support and/or develop these kinds of resources, particularly to inform their short- and long-term activities and determine some of the policy, programmatic, and regulatory considerations. As a starting point, states may wish to review an existing state framework as an example, such as the WEA's, to better understand the structure and material covered in the document. Understanding the framework development process and major steps will be critical for states prior to any work being done on the document.

There will also need to be an evaluation of key questions that will help to inform the framework. Potential questions that states should be prepared to answer prior to beginning a framework are outlined below.

Box 1: Potential Questions Prior to Framework Development

- What is the objective of the framework? Is this document the best approach to meeting that objective?
- Which state entity will lead the development of the framework?
  - If one agency is the lead, how will other entities be involved in the process?
- Will the framework be drafted in-house, or will a consultant be brought on board?
  - If staff at the state level are developing the framework, how many people are available to work on it?
  - If a consultant is used, what will the Request for Proposal (RFP) process be? What will be included in the scope of work?
  - Could technical assistance from a National Laboratory or non-profit be leveraged?
- What is the timeline for developing the framework?
- What funding is available to draft the framework?
- What information should the framework provide?
- What data or information is needed? How will that information be obtained and analyzed?
- How will a working group or task force be established to support the framework development process?
  - What stakeholders will be part of the working group?
  - How often will the working group meet?
  - How will the working group be funded, and will the working group have access to a consultant for technical assistance?

- What will the stakeholder engagement process look like?
  - Who is considered a stakeholder in this process?
  - When will stakeholders be engaged, and how often?
  - Is compensation available for stakeholders?
  - How can the process for developing the framework be inclusive?
- How will the framework align with existing state plans/goals/legislation/etc.?

Technical Assistance

As part of the framework development process and to answer some of the questions outlined above, State Energy Offices and PUCs may need technical assistance, informational resources, or certain data analysis to support their work. Resources from the Gateway for Accelerated Innovation in Nuclear (GAIN) through INL and ORNL, U.S. DOE, Nuclear Innovation Alliance, Nuclear Energy Institute, the Frontiers Initiative, and others linked in the conclusion section could be utilized. For example, in December 2020, GAIN released a report on *Trends in State Level Energy Markets and Policy* for the state of Wyoming. This sort of analysis can provide pertinent information and help a state better understand the policy and regulatory landscape for advanced nuclear generation in their state or region.

Working Groups and Task Forces

One of the key questions outlined above focuses on the establishment of a working group or task force to support the development of a framework. For framework development, establishing a working group early in the process is important to ensuring a diversity of perspectives are incorporated and getting support from multiple stakeholders within the state government, industry, local government, and community. For example, in **Connecticut**, the state established a task force to study opportunities for hydrogen in the state and submit a report on findings and recommendations.[18] This approach could be replicated in states interested in examining nuclear energy potential. The task force included environmental organizations, state and local government, industry, utilities, labor, and other key entities. Within the task force, there were five working groups focused on five different subtopics (policy and workforce development, funding, hydrogen sources, hydrogen infrastructure, and hydrogen uses). A state developing a nuclear energy framework may wish to identify relevant priorities informed by working groups as well and bring in stakeholders with interest and expertise in that area. Additionally, in **Kentucky**, the State Energy Office led a Nuclear Development Work Group that issued a final report to the legislature in November 2023. This was directed by 2023 Senate Joint Resolution 79. The work group membership was made up of representatives from the State Energy Office, PSC, universities, utilities, state legislature, nonprofits, and other entities. The work group met four times to develop the recommendations outlined in the final report. The barriers the work group examined were related to regulatory, statutory, financial, social, environmental, workforce and education, safety, and security/weapons proliferation considerations. As an outcome of discussions with the work group, it was determined that the state would be able to overcome/address all of these challenges to advance an ecosystem for advanced nuclear energy in Kentucky.

Local Engagement

In addition to facilitating or leading working groups and task forces that may include a diverse array of stakeholders, State Energy Offices and PUCs should also consider the immense value of community engagement within the strategic framework process. Community-based organizations and local governments can be invited to join framework development working groups or task forces. There may also be an opportunity for states to release drafts of the document for public comment or hold informational sessions. These are important pathways for communities to help inform the development of the final document. For example, in December 2024, the **Indiana Office of Energy Development** released a report prepared by Purdue University on SMR technology and its impact on Indiana. A section on community engagement was included in the report based on feedback from focus groups and surveys to determine public opinion on nuclear. The survey included questions such as:

- What types of knowledge and opinions do decision-makers and residents currently possess about nuclear technology, specifically SMRs?
- How do decision-makers and residents perceive land use siting for SMRs?
- What are decision-makers' and residents' considerations for electricity production?
- What types of technical resources do decision-makers and residents need for SMRs?[19]

Collecting information directly from communities and incorporating it into the framework can help states get a better sense of the landscape for new nuclear on the local level. Some of the recommendations Indiana outlined based on the community outreach and communications included the need for the state to develop policy guidance for emergency response plans, risk assessments, and siting in coordination with trusted experts for communities to better understand risk and risk management. It will also be important for the state to have a plan for long-term education and engagement with communities as projects evolve.[20]

Kentucky also included community engagement recommendations and opportunities specifically related to a state Nuclear Energy Development Authority in their final work group report. One focus area was on providing communities with accurate information to help inform their decision making about potential projects. Recent legislation in Kentucky has set up a nuclear-ready community designation, which allows communities to self-select as ready to host new nuclear development. In order for communities to achieve this designation, they would need to: (1) hold a public education meeting, (2) identify available sites, and (3) adopt resolutions from the county and localities or a successful ballot initiative to demonstrate readiness and interest.[21]

Other states developing frameworks can explore similar methods of community engagement and coordination. There are a lot of different ways of approaching this, from doing stakeholder meetings and information sessions to including community representatives in framework advisory groups. Frameworks can also be an avenue to provide recommendations on future community engagement and coordination such as approaches like Kentucky is taking with the designation program.

Framework Pathway

As State Energy Offices and PUCs explore pertinent questions, identify technical assistance opportunities, and facilitate stakeholder coalitions, they might leverage a traditional approach to drafting a strategic framework. Frameworks often take the following path:

1. Establish a requirement or scope.
2. Convene a team or working group.
3. Develop vision for the framework.
4. Collect and analyze data and information.
5. Garner public input and feedback.
6. Recommend actions and goals to meet the vision.
7. Draft the framework.
8. Finalize, adopt, and implement the framework.
9. Conduct outreach and education.
10. Monitor progress and make updates to the framework.[22]

Once completed, state frameworks can produce recommendations to open the market for advanced nuclear energy and highlight action items, barriers to be overcome, and next steps for State Energy Offices, PUCs, and other partners. Additionally, when obtaining federal funding, forming a public-private partnership, or other financial mechanisms, a framework helps to demonstrate that a state is prepared and understands what is needed to move projects forward.

B. Framework Categories

A key component of a nuclear energy strategic framework are the topical categories and priorities explored within the document. State nuclear energy frameworks examine a variety of complex topics of interest to a specific state or region and allow for a deep dive into challenges and opportunities. These topics may be identified through legislation, an executive order, a working group, or other means.

The following section highlights some of the topics that states have commonly explored, with an emphasis on particular questions, resources, partners, and opportunities associated with that topic. This list is not exhaustive, and State Energy Offices and PUCs can reference other state frameworks (discussed in Section II.A) and resources listed in Section V.

The themes discussed below include clean energy goals; cost/funding; economic development and community impacts; federal policy and regulatory environment; industry coordination/business models; resource adequacy; siting and permitting; spent fuel/safety/risk mitigation; state policy and regulatory environment; supply chain and workforce development; and technological applicability for state use cases.

1. Clean Energy Goals

Key Questions to be Addressed in Framework	• How can advanced nuclear energy support state clean energy goals? • What types of state-level policy options exist that can allow advanced nuclear energy to access incentives or other support already available to other clean energy resources?
Starting Resources	Examining Supply-Side Options to Achieve 100% Clean Electricity by 2035, 2022, National Renewable Energy Laboratory Scenarios of Nuclear Energy Use in the United States for the 21st Century, August 2022, U.S. Department of Energy, Pacific Northwest National Lab Coal to Nuclear Repowering: Considerations for State Energy Offices and Public Utility Commissions, 2024, NARUC-NASEO Advanced Nuclear State Collaborative Nuclear Energy as a Keystone Clean Energy Resource, 2022, Energy Ventures Analysis for NARUC
Example State and Federal Activities	**Michigan SB 271 The Clean Energy Future Bill:** This bill established a 100% clean energy standard for Michigan. By 2040, Michigan will produce all its energy from clean sources. Under this legislation, nuclear energy is considered a clean energy resource.[23]
Common Challenges	• Timing—advanced nuclear energy is needed in the near-future in order to meet clean energy goals amid load growth forecasts.
Opportunities	• Nuclear power plants provide zero-emission power and critical grid reliability attributes.
Data Gaps	• Additional information on the impact of industrial use cases on hard to decarbonize sectors of the economy.

2. Cost/Funding

Key Questions to be Addressed in Framework	• What do FOAK[2] to NOAK cost estimates look like for different nuclear technologies? • What federal- and state-level funding support is available for fast follower deployment support after FOAK plant deployment? • Are available funds for supporting early advanced nuclear power deployment perceived as accessible to developers/utilities? • What financing models exist to reduce first-mover risk, and is there a role for state support? • What are the decision points related to state-level approval of nuclear power construction costs, and what policy opportunities exist to support advanced nuclear? • Are alternative methods for calculating the costs associated with nuclear construction (such as levelized cost of system) useful for considering the benefits of nuclear construction wholistically?
Starting Resources	Meta-Analysis of Advanced Nuclear Reactor Cost Estimations, July 2024, Idaho National Laboratory A Tool to Quantify Capital Cost Reduction Pathways for Advanced Nuclear Reactors, June 2024, Idaho National Lab, Argonne National Lab, and Massachusetts Institute of Technology
Example State and Federal Activities	**State-Level Grants and Loan Programs:** • **Tennessee Nuclear Fast Track Fund:** This fund established a nuclear energy development and manufacturing ecosystem built for the future of Tennessee by providing $50 million in grants and assistance to support nuclear power-related businesses that choose to relocate or grow in the state. An additional $10 million in funding was allocated in both the FY2025 and FY2026 budgets towards the Fund.[24]

2 First-of-a-kind (FOAK) is an expression that describes the first item or generation of items created using a new design or technology. In engineering economics, the first items are often more expensive than later items, which are called "Nth of a kind" (NOAK).

Example State and Federal Activities	**State-Level Grants and Loan Programs:** • **Texas Energy Fund (TEF):** The TEF was initially funded at $5 billion and will provide grants and loans to finance the construction, maintenance, modernization, and operation of electric facilities in Texas. The Texas PUC was directed by the Texas legislature to create and administer the fund.[25] • **Virginia Power Innovation Fund:** This funding is to be used solely for the purposes of R&D of innovative energy technologies, including nuclear, hydrogen, carbon capture and utilization, and energy storage.[26] • **Duke Energy Carolina's 2024 Carbon Plan Integrated Resource Plan (CPIRP):** CPIRP identifies new infrastructure needed to meet the Carbon Plan's goal of carbon neutrality by 2050. Among the new infrastructure needs identified was 600 MW of advanced nuclear. The commission authorizes Duke to incur project development costs for advanced nuclear resources, at a system level, up to $75 million through 2024, which was authorized by the commission in the Initial Carbon Plan Order, plus an additional $365 million through 2026.[27] • **The Inflation Reduction Act (IRA)**, which was signed into law in 2022, provides two options for advanced nuclear energy producers: a technology-neutral production tax credit of $25 per MW-hour for the first 10 years of plant operation or a 30 percent investment tax credit on new zero-carbon power plants placed into operation in 2025 or after.[28] Additionally, the IRA provided $700 million to the high-assay low-enriched uranium (HALEU) Availability Program. • **Loan Programs Office (LPO)** serves as a bridge to bankability for breakthrough projects and technologies and de-risking them at early stages of investment, so they can be developed at commercial scale and achieve market acceptance. LPO can finance innovative projects across the advanced nuclear energy supply chain.[29] • The **Civil Nuclear Credit Program** is a $6 billion strategic investment through the IIJA to help preserve the existing U.S. reactor fleet and save thousands of high-paying jobs across the country. Under the program, owners or operators of commercial U.S. reactors can apply for certification to bid on credits to support their continued operations.[30]
Common Challenges	• Difficulty in understanding true costs of FOAK technology until advanced reactors come online. • Cost overrun risks during construction create the potential for significant impact to ratepayers and discourage first movers in vertically integrated states. • In restructured states, cost overruns may create a risk that incentives are no longer available if project timelines are extended, or projects are abandoned. • Due to the high costs of these projects, delays can have severe consequences for cost overruns.
Opportunities	• Knowledge-sharing collaborations between first movers and utilities considering advanced reactors allow utilities to collect valuable lessons learned from the construction process to reduce costs on future builds.
Data Gaps	• Construction costs of FOAK and NOAK reactors. • Shared best practices/lessons learned from early advanced reactor projects

3. Economic Development and Community Impacts

Key Questions to be Addressed in Framework	• How will different advanced nuclear reactor technologies impact state economic development and workforce considerations? • What relationship do state economic development agencies currently have with State Energy Offices and PUCs? • What information can State Energy Offices and PUCs share with communities interested in nuclear? • What challenges will communities interested in attracting and supporting new nuclear power development face, and how can State Energy Offices and PUCs help communities to overcome them?
Starting Resources	Facilitating Equitable Community Engagement to Support the Deployment of Advanced Nuclear (webinar recording), 2023, NARUC-NASEO Advanced Nuclear State Collaborative Nuclear Energy: What Does the Public Think? (webinar recording), 2022, NARUC Investigating Benefits and Challenges of Converting Retiring Coal Plants into Nuclear Plants, September 2022, U.S. Department of Energy
Example State and Federal Activities	**Texas Advanced Nuclear Reactor Working Group** (report released in November 2024): This working group was established August 16, 2023, at the direction of Governor Greg Abbott and operates under the leadership of then-Texas PUC Commissioner Jimmy Glotfelty. The working group evaluated how advanced nuclear reactors could provide safe, reliable, and affordable power for Texas and considered how to make the state a national leader in the deployment of nuclear power. Areas of study include financial incentives, state and federal regulatory impediments to growth, Texas electric market impacts, technical challenges, and additional factors necessary to foster growth of nuclear energy in Texas.[31] **KY SB 198: "Nuclear Ready Community" Designation**. This law requires the Kentucky Nuclear Energy Development Authority to develop criteria for a nuclear-ready community designation.[32]
Common Challenges	• Matching—how do nuclear power plant developers identify and connect with communities interested in hosting nuclear power plants or other parts of the nuclear energy supply chain? • Communicating the benefits of nuclear power effectively to potential host communities. • In communities with coal plant closures that are considering coal-to-nuclear, how can the local workforce be retained and re-trained?
Opportunities	• Public support for nuclear energy is at a record high.[33] • Nuclear power plants significantly contribute to local employment and tax revenue.
Data Gaps	• Information about tax and workforce implications for different types of proposed advanced nuclear reactor technologies. • Information about nuclear power benefits, operations, and workforce impacts written for non-experts.

4. Federal Policy and Regulatory Environment

Key Questions to be Addressed in Framework	• Are there federal sites within the state that might be leveraged to expedite nuclear energy deployment? • Are there opportunities to leverage federal financing or funding opportunities to support the deployment of advanced nuclear reactor projects within the state?
Starting Resources	Updated Pathways to Commercial Liftoff: Advanced Nuclear Commercial Liftoff, October 2024, U.S. Department of Energy, Loan Programs Office
Example State and Federal Activities	**The ADVANCE Act** of 2024 directs the NRC to reduce certain licensing application fees and authorizes increased staffing for NRC reviews to expedite the process. The act also introduces prize competitions that the DOE can award to incentivize deployment of advanced nuclear.[34] **The IRA** incentivized advanced reactor deployment through a technology-neutral production tax credit of $25 per MW-hour for the first 10 years of plant operation or a 30-percent investment tax credit on new zero-carbon power plants placed into operation in 2025 or later. The act also provided $700 million to support the development of a domestic supply chain for HALEU.[35] **The Infrastructure Investment and Jobs Act (IIJA)** of 2021 included support for advanced nuclear energy by establishing continued funding for the ARDP, authorizing assistance for feasibility studies for siting advanced reactors, and a requirement that at least one Regional Clean Hydrogen Hub demonstrate the production of clean hydrogen from nuclear energy.[36] **Risk-Informed, Technology-Inclusive Regulatory Framework for Advanced Reactors:** The NRC is proposing to revise the NRC's regulations by adding a risk-informed, performance-based, and technology-inclusive regulatory framework for commercial nuclear power plants in response to the Nuclear Energy Innovation and Modernization Act (NEIMA). The NRC accepted comments through February 2025 and expects to have a final rule by 2027.[37]
Common Challenges	• Concerns over the time and cost required for the NRC review process. • States want the federal government to provide some form of guarantee to ensure cost overruns are not born by customers for FOAK projects.
Opportunities	• Considerable federal and state funding have been made available in the past few years for pilot projects and first-movers.
Data Gaps	• Committed orderbook of planned U.S. projects so state and federal agencies can plan appropriately to meet project licensing needs.

5. Industry Coordination/Business Models

Key Questions to be Addressed in Framework	• Are there any existing state-level legal or regulatory barriers that might discourage utilities from collaborating to learn about, design, and build advanced nuclear power projects? • Are there examples from other large infrastructure construction projects of effective business strategies for regional risk sharing and risk reduction?
Starting Resources	Updated Pathways to Commercial Liftoff: Advanced Nuclear, October 2024, U.S. Department of Energy, Loan Programs Office
Example State and Federal Activities	**Power Purchase Agreements (PPAs):** Holtec Palisades Energy, LLC and Wolverine Power and Cooperative signed a long-term PPA in which Wolverine committed to purchase up to two-thirds of the carbon-free power generated by Palisades for its Michigan-based member rural electric cooperative.[38] Google, Microsoft, and Nucor released a Request for Information (RFI) in March 2024, to identify specific projects that the companies might be interested in engaging with and ultimately, procuring clean energy via this demand aggregation model.[39] The companies expect to complete their first round of PPAs in early 2025.[40]

Example State and Federal Activities	**Serial development of multiple projects with a common design:** U.S. DOE has highlighted the value of establishing a committed orderbook of 5–10 deployments of a single reactor design. This could be achieved through an agreement with multiple sponsors or through independent project developers with commitments from multiple offtakers.[41] Hitachi Nuclear Energy (GEH), Tennessee Valley Authority (TVA), Ontario Power Generation (OPG), and Synthos Green Energy (SGE) have established a collaboration agreement through which, TVA, OPG, and SGE will invest in the development of the BWRX-300 standard design. As part of this agreement, each contributor has agreed to fund a portion of the overall costs and will form a Design Center Working Group with the purpose of ensuring the standard design is deployable in multiple jurisdictions.[42] **Project Developer Models:** In a project developer model, an entity outside of a traditional utility is responsible for coordinating a project from site selection, through licensing and construction. In an integrated electric utility, the project developer is frequently the offtaker. However, the project developer can also develop the project with the intent to sell the output or the project to someone else.[43] In the past few years, several companies have emerged that are interested in serving as "matchmaking companies" in this capacity. These include: The Nuclear Company, Shepherd Power, Elementl Power, and Entra1 (a partner of NuScale).[44]
Common Challenges	• Financial risks to ratepayers associated with cost overruns. • Uncertainty associated with FOAK nuclear power plant construction and timelines.
Opportunities	• PPAs and committed orderbook models help communicate advanced demand by offtakers.
Data Gaps	• Firm commitments for FOAK and Nth-of-a-kind (NOAK) projects.

6. Resource Adequacy

Key Questions to be Addressed in Framework	• How would advanced nuclear power plants impact resource adequacy on a short- and long-term time horizon? • What opportunities exist for increasing electric capacity through uprating existing nuclear power plants?
Starting Resources	The Future of Resource Adequacy: Solutions for Clean, Reliable, Secure, and Affordable Electricity, April 2024, U.S. Department of Energy Explained: Fundamentals of Power Grid Reliability and Clean Electricity, January 2024, National Renewable Energy Laboratory
Example State and Federal Activities	**Civilian Nuclear Credit Program**, established through the IIJA provides a strategic investment of $6 billion to support preservation of the existing U.S. reactor fleet.[45]
Common Challenges	• Will advanced nuclear power projects be completed in time to support increased load growth and planned coal plant closures? • Ensuring advanced nuclear fuel supply chain security.
Opportunities	• Nuclear energy can provide critical reliability attributes to the grid.
Data Gaps	• Information on advanced nuclear energy's reliability attributes during extreme weather events and natural disasters.

7. Siting and Permitting

Key Questions to be Addressed in Framework	• Are there opportunities to build SMRs at existing power plants, and how would doing so impact planning and construction costs? • How do emergency planning zones differ from traditional nuclear reactor technology to SMRs? • What process should states use to engage in siting conversations with relevant stakeholders? • Are there interconnection standards and/or regulations at the state or federal level that can accommodate new co-location nuclear energy projects? • How do Public Utility Regulatory Policies Act (PURPA) rules impact opportunities for co-location with advanced nuclear projects? • How can states better understand the split between the federal siting authority and state permitting?
Starting Resources	Opportunities for AP1000 Deployment at Existing and Planned Nuclear Sites, 2024, Idaho National Laboratory Emergency Preparedness for Small Modular Reactors and Other New Technologies, November 16, 2023, Nuclear Regulatory Commission
Example State and Federal Activities	**18 AAC 87: Microreactor Siting Permit Regulations Authorized Under Alaska Statute (AS) 18.45**, amended August 2023, Alaska Department of Environmental Conservation has developed microreactor siting permit regulations.[46] **Emergency Planning Zones for Small Modular Reactors:** In December of 2023, the NRC issued a final rule providing an alternative avenue for SMRs and advanced reactors to satisfy emergency preparedness requirements. The final rule amends 10 of the Code of Federal Regulations (CFR) § 50.33 to establish a scalable approach to determine the size of an emergency planning zone (EPZ), which accounts for safety features in newer reactor designs. This rule employs a consequences-oriented approach to determine the size of the EPZ.[47, 48]
Common Challenges	• Current NRC rules require reactor sites to be at least 20 miles from population centers, which may limit options for future plants. • Coordinating timely grid interconnection with existing backlog. • Some project developers view National Environmental Policy Act[3] (NEPA) requirements as a potentially costly and time-consuming effort. • Ensuring that there is an adequately trained pool of workers to construct, operate, and maintain nuclear power plants.
Opportunities	• Siting SMRs on repurposed coal plants or co-locating SMRs with existing nuclear power plants would reduce the need for new transmission build-out.
Data gaps	• Data on existing or retired power plant sites where there are opportunities for additional nuclear power plants to be constructed and areas with transmission headroom. • State/federal guidance on microreactor siting, specifically for reactors at non-permanent sites (i.e., microreactors for enhanced oil recovery).

3 NEPA requires project developers and the government to identify the environmental impacts of major proposed infrastructure projects, such as nuclear plants, and to create a publicly reviewable record ahead of project decisions

8. Spent Fuel/Safety/Risk Mitigation

Key Questions to be Addressed in Framework	• How can states best interact with the NRC? (e.g., Agreement State program, State Liaison Officer program, memorandums of understanding) • Are there opportunities (and local communities interested) in participating in the U.S. DOE's collaboration-based siting process?
Starting Resources	Agreement State Regulation Toolbox, February 2025, Nuclear Regulatory Commission Evaluating Nuclear Waste and Safety Considerations for Advanced Nuclear Deployment (webinar recording), 2023, NARUC-NASEO Advanced Nuclear State Collaborative Merits and Viability of Different Nuclear Fuel Cycles and Technology Options and the Waste Aspects of Advanced Nuclear Reactors, 2023, National Academies of Sciences, Engineering, and Medicine Civilian Nuclear Waste Disposal, 2021, Congressional Research Service
Example State and Federal Activities	The **Connecticut Nuclear Energy Advisory Council** was established by the Connecticut General Assembly and is tasked with holding regular public meetings to discuss issues related to safety and operations; work with federal, state, and local agencies and nuclear plant operators to ensure public health and safety; and discuss proposed changes in or problems arising from the operation of the plant.[49] The **New York State Energy Research and Development Authority (NYSERDA)** is required by Section 7-101 of New York State Energy Law to coordinate state programs related to atomic energy activities to protect the health and safety of the public; and to advise and assist the governor and legislature on such issues. NYSERDA's president also serves as a State Liaison Officer to the NRC to maintain open communication and coordination.[50] The **Collaboration-Based Siting Program**, established through the U.S. DOE Office of Nuclear Energy, supports efforts to facilitate inclusive community engagement and elicit public feedback on collaboration-based siting, management of spent nuclear fuel, and federal consolidated interim storage.[51] **Maryland SB 536:** An act concerning Environment – Nuclear Power Plants – Emergency Preparedness.[52] This law requires the Department of the Environment to serve as an off-site response organization and the lead state agency for all nuclear incidents within the state, requiring the Department of the Environment to prepare a technical emergency radiation response plan, respond to emergencies involving a nuclear power plant, participate in a certain federal program, and procure certain specialized equipment. **U.S. DOE's Spent Nuclear Fuel Package Performance Demonstration** is making preliminary plans to conduct physical demonstrations on a rail-sized spent nuclear fuel transportation cask, inspired by a history of similar testing endeavors worldwide and recommended by the National Academy of Sciences and the Blue Ribbon Commission on America's Nuclear Future.[53] The **U.S. NRC** facilitates a Reactor Oversight Process framework.[54, 55]
Common Challenges	• Previous efforts to establish a permanent nuclear spent fuel repository at Yucca Mountain have stalled, and an alternative permanent nuclear spent fuel facility has not been identified.56 • Efforts to establish interim nuclear used fuel storage in Texas and New Mexico have faced protracted legal challenges. • Public perception of nuclear spent fuel is colored by negative portrayals in media and existing legacy sites.
Opportunities	• Other countries such as Finland and Canada have made progress in taking a consent-based siting approach to identifying a location for long-term nuclear spent fuel storage and are able to share "lessons learned" from their process.

Opportunities	• U.S. DOE laboratories have conducted valuable materials research to identify designs for safe long-term storage. • Fuel reprocessing presents the opportunity to reduce the volume of nuclear spent fuel that requires long-term storage if the United States decides to pursue this strategy.
Data Gaps	• Identifying accessible resources and salient talking points for state officials to share with constituents who are interested in or concerned about nuclear power plants.

9. State Policy and Regulatory Environment

Key Questions to be Addressed in Framework	• How have other states incorporated advanced nuclear power into their state energy plans? • What initial steps could states considering advanced nuclear energy take to learn more and prepare? • Where is state, regional, and national coordination possible, or what coordination efforts are already taking place to support advanced nuclear power project development? • How do incentives differ between vertically integrated and restructured markets (are there other regional considerations that impact decisions to pursue advanced nuclear energy deployment)? • What steps can our PUC and State Energy Office take to ensure a state is prepared to consider upcoming nuclear generation projects? • Are there existing state-level moratoriums or restrictions on building new nuclear?
Starting Resources	Nuclear Generation in Long-Term Utility Resource Planning, 2023, NARUC NARUC-NASEO Advanced Nuclear State Action Tracker: The Advanced Nuclear State Action Tracker provides an overview of state activities that may impact states' advanced nuclear energy efforts (advanced nuclear energy is defined as Gen III+ and Gen IV technologies). This tracker focuses on highlighting advanced nuclear energy activities and partnerships involving state government entities (i.e., PUCs, State Energy Offices, state legislatures, and governors' offices).[57]
Example State and Federal Activities	**Feasibility Studies:** A significant number of states legislatures have tasked state bodies with conducting a study to assess the feasibility of incorporating advanced reactors into the states' resource mix. Several states have completed studies as of 2024 and shared these reports publicly, including: • Michigan: Final Michigan Nuclear Feasibility Study (conducted by a working group coordinated through the PUC, released March 2024).[58] • Virginia: SMR Site Feasibility Study (funded by the Virginia Department of Energy Growth & Opportunity (GO) Virginia Region One, released May 2023).[59] • Montana: Advanced Reactors: SJ3 Study of Nuclear Generation (conducted by the legislative Energy and Telecommunications Interim Committee, released July 2022).[60]
Common Challenges	• States want the federal government to provide some form of guarantee to ensure cost overruns are not born by customers for FOAK projects. • Unlike other generation technologies, to develop nuclear energy in a state requires a new level of federal engagement and that means dedicated staff to coordinate with federal agencies.
Opportunities	• Several states including Tennessee, Texas, and Virginia have established dedicated funding to support advanced nuclear energy pilot projects and first-movers.
Data gaps	• Committed orderbook of planned projects so states can plan appropriately to meet project regulatory review needs.

10. Supply Chain and Workforce Development

Key Questions to be Addressed in Framework	• What involvement does the state currently have in the supply chain (e.g., fuel, components, workforce, etc.) for current or advanced nuclear? How could those capabilities be leveraged for additional nuclear power? • Where is fuel for existing in-state nuclear power plants sourced, fabricated, and enriched? Is supply sufficient? • Where would fuel for planned in-state nuclear power plants be sourced, fabricated, and enriched? Is supply confident? • Are there active or retired in-state coal plants that appear on U.S. DOE's list of potentially eligible nuclear repowering sites? • What workforce opportunities are presented by advanced nuclear, and how do these opportunities vary based on advanced nuclear technology choice? • What training do trade schools, colleges, and universities offer for a nuclear workforce?
Starting Resources	Nuclear Energy: Supply Chain Deep Dive Assessment, February 24, 2022, U.S. Department of Energy Coal to Nuclear Repowering: Considerations for State Energy Offices and Public Utility Commissions, April 2024, NARUC and NASEO Advanced Reactor Roadmap (workforce development section), 2023, EPRI and Nuclear Energy Institute Reactor: Supply Chain Assessment, 2023, Gateway for Accelerated Innovation in Nuclear The Economic Impact of the Nuclear Industry in the Southeast United States: A Regional and State-Level Analysis, February 2024, E4 Carolinas The Nuclear Workforce Development Forum Report, 2025, E4 Carolinas
Example State and Federal Activities	**Kentucky SB 198 creates a new section of Subchapter 12 of KRS Chapter 154**, and includes a requirement that the Kentucky Nuclear Energy Authority conduct a study to identify the workforce needs to develop and support the nuclear energy ecosystem and submit its findings to the governor and legislature by December 1, 2024.[61] **Mississippi SB 2928: An Act to Establish a Partnership with the Energy Industry:** Authorizes the Board of Trustees of the Vicksburg Warren School District and the Claiborne County Board of Education to establish a partnership with the Entergy Grand Gulf Nuclear Station, Warren County, and the Mississippi Development Authority for a Nuclear Energy High School Academy.[62] **Advanced Reactors University Research** programs include: • Microreactor Demonstration Project at Urbana-Champaign in collaboration with Ultra Safe Nuclear Corporation.[63] • Abilene Christian University collaboration with Natura Resources LLC to design, license, and build a molten salt research reactor.[64] **Nuclear Safety Training and Workforce Development Program**: In September 2024, the U.S. DOE announced $100 million in funding to establish a nuclear power safety training and workforce development program. Funding is available for demonstration and implementation of reactor safety training and establishing or enhancing industry-recognized nuclear reactor safety training projects and targeting the development of training, curriculum, and faculty in higher education.[65]
Common Challenges	• Institutional knowledge about construction and operation of nuclear plants is diminishing as seasoned workers retire. • Not all states have the necessary workforce/training opportunities.

Common Challenges	• Ban on imports of Russian uranium. • Aging workforce of nuclear power engineers with nuclear plant construction experience.
Opportunities	• Congress has authorized $2.7 billion in funding to expand domestic production of nuclear fuel.[66]
Data Gaps	• What resources and/or best practices are available to states on coal to nuclear workforce transition? • Are current nuclear power educational and training programs adequate to meet future workforce demands? And if not, what types of skills training will help ensure this demand can be met?

11. Technological Applicability for State Use Cases

Key Questions to be Addressed in Framework	• What are potential industrial and energy use cases for advanced nuclear power? • What reactor size would best fit the use case needs identified? • When will advanced reactor technologies for state-level industrial use cases be ready for deployment?
Starting Resources	Milestones in Advanced Nuclear, September 2023, Gateway for Accelerated Innovation in Nuclear Advanced Nuclear Reactor Technology: A Primer, November 2024, Nuclear Innovation Alliance Advanced Reactor Deployment Map, November 2024, Nuclear Innovation Alliance Advanced Reactor Deployment Timelines, August 2024, Nuclear Innovation Alliance The NEA Small Modular Reactor Dashboard, March 13, 2024, Nuclear Energy Agency Energy and Industrial Use Cases for Advanced Nuclear Reactors, October 2024, NARUC and NASEO
Example State and Federal Activities	**U.S. DOE's Advanced Reactor Demonstration Program (ARDP)** works to speed the demonstration of advanced reactors through cost-shared partnerships with U.S. industry. ARDP has distributed $160 million in funding to TerraPower LLC and X-energy through a cost-sharing partnership model to fund the construction of two advanced nuclear reactors that can be operational within seven years.[67] **Gen III+ Small Modular Reactor Pathway to Deployment** through the U.S. DOE Office of Clean Energy Demonstrations and Office of Nuclear Energy reissued a Funding Opportunity Announcement in April 2025 to focus DOE and non-federal resources on a credible and sustainable pathway to fleet-level deployment of Gen III+ SMRs. To spur this momentum, DOE plans to award $900 million in funding for projects in two tiers. Tier 1 will provide $800 million to support a first-mover team, and Tier 2 will provide $100 million to spur fast follower deployment support by addressing key gaps that have hindered the nuclear energy industry.[68] **Advanced Research Projects Agency-Energy (ARPA-E)** projects such as Nuclear Energy Waste Transmutation Optimized Now (NEWTON),[69] Converting Used Nuclear Fuel Radioisotopes Into Energy (CURIE),[70] and Optimizing Nuclear Waste and Advanced Reactor Disposal Systems (ONWARDS)[71] support the R&D of technologies to facilitate a reduction in advanced reactor waste volume generation or repository footprint; reduce the impact of nuclear waste storage in permanent disposal facilities; and enable secure, economical recycling of the nation's used nuclear fuel.
Common Challenges	• Timing—will advanced nuclear energy be able to deploy efficiently to meet projected demand from load growth forecasts?

Common Challenges	• The current number of advanced nuclear reactor concepts—it is difficult to reach economies of scale and modularity goals if companies are building different types of FOAK nuclear power plants.
Opportunities	• Load growth forecasts over the next decade will require additional clean, firm power. • Industrial use cases for thermal heat produced through advanced nuclear reactors has the potential to play a critical role in re-shoring industry while reducing carbon emissions in traditionally hard-to-abate sectors of the economy.[72]
Data Gaps	• Are industrial manufacturers considering advanced nuclear power for production needs? If so, how does advanced nuclear energy compare to other low-emission technologies? • Lessons learned from early adopters of advanced nuclear power for industrial processes.

IV. Incorporating Advanced Nuclear Energy into Existing Plans/ Alignment with Existing Plans

States are responsible for developing and implementing a variety of energy focused plans. Many of these involve the State Energy Office and PUC. For example, State Energy Offices lead or support the development of State Comprehensive Energy Plans and other more topical plans related to clean energy, economic development, or regional markets. Likewise, many PUCs oversee integrated resource planning and related efforts with utilities and resource adequacy and siting with regional transmission organizations.

Strategic frameworks for nuclear energy are an important piece of a state's energy strategy but can be made exponentially more valuable through collaboration with other forward-looking recommendations and projections impacting state energy landscapes. This section explores three avenues in which nuclear energy strategies can be additive: load growth forecasts, state energy plans, and integrated resource plans.

Coordination between the development of strategic frameworks and **load growth forecasts** (i.e., expected changes in electricity demand) is helpful to determine how much of a need a state will have for new energy generation. In recent years, electrification efforts, re-shoring of advanced manufacturing, and rapid growth in the popularity of artificial intelligence tools has led to a soaring forecast for related infrastructure. Data centers and advanced manufacturing require high levels of reliability for computing, manufacturing, and cooling needs. Even brief outages can lead to high costs and the need for equipment repair or replacement. Data center customers, many of whom have ambitious corporate clean energy goals, look to nuclear energy as one serious option for zero-carbon firm power. Amazon and Microsoft provide illustrative examples of the high demand for nuclear power. In March 2024, Amazon paid $650 million to build a data center adjacent to Susquehanna Steam Electric Station, a 2,500 MW nuclear plant in Pennsylvania participating in the PJM interconnection.[73] The data center had an interconnection service agreement (ISA) for 300 MW of the plant's output. Three months later, Amazon requested an increase of 180 MW. Load-serving entities Exelon and American Electric Power filed a protest with the Federal Energy Regulatory Commission, arguing the increased ISA would shift costs onto other PJM customers who would have to buy power from other, costlier sources.[74] In September 2024, Microsoft signed an $800 million power purchase agreement to purchase the entirety (835 MW, approximately 7 million MW-hours annually) of nuclear energy output from Crane Clean Energy Center, formerly Three Mile Island Unit 1, over a 20-year period beginning in 2028, assuming plant owner Constellation Energy can successfully restart the unit by then.[75]

After years of incentives for data centers and advanced manufacturing, and the economic growth that comes with them, states are now taking a closer look at their impact on grid reliability and clean energy. Proposed legislation in Connecticut may require the Public Utilities Regulatory Authority (PURA) to study the impact of data centers on grid reliability.[76] Concerns exist related to grid impacts centered around the potential for competition for generation from the state's only nuclear power plant, Millstone Power Station, between data center customers and the state's utility customers. Millstone provides 37 percent of Connecticut's electricity and 94 percent of its zero-carbon power.[77] In informational testimony on the proposed legislation, PURA noted that data centers represent a unique customer type for the state and commented, "there may be an opportunity to evaluate the impact of data centers on system reliability, particularly focused on the configuration and interconnection profile of the specific resource."[78] A 2024 utility regulatory reform bill SB1 in Maryland required the PSC to study "co-located load configuration."[79] Again, this consideration was driven by concerns that a data center might co-locate near Maryland's only nuclear power plant, Calvert Cliffs Nuclear Power Plant, to outbid the state's utility customers for portions of the site's 1,790 MW of clean firm power. Calvert Cliffs currently provides 83 percent of Maryland's zero-carbon power.[80]

State energy plans and the planning process overall help to guide and build consensus among stakeholders in moving toward a shared goal of meeting future energy needs in a cost-effective and sustainable manner. A well-constructed state energy plan provides an assessment of current and future energy supply and demand, examines existing energy policies, and identifies emerging energy challenges and opportunities.81 For example, Virginia's [2022 State Energy Plan] outlines opportunities for nuclear energy in the state and the potential for developing a commercial SMR in Virginia. Additionally, as part of the Utah state energy planning process, the Utah Office of Energy Development, in collaboration with Governor Spencer Cox, launched Operation Gigawatt in October 2024. Operation Gigawatt was launched to tackle the gap between energy supply and demand while protecting the state's natural resources. Some of the key efforts related to nuclear energy under the initiative include aligning Utah policies with the Nuclear Regulatory Commission and forming an authority and consortium to build a Utah nuclear program.[82]

Integrated resource plans (IRPs) and other state energy planning documents also provide opportunities to align states' planning goals for advanced nuclear. An IRP sets out utilities' long-term expectations on how they will procure sufficient generation to meet future demand while satisfying state policies around decarbonization, the use of in-state resources, economic development, and other factors. Public utility commissions have oversight of IRP filings for the investor-owned utilities serving approximately three-quarters of the country.[83] IRPs provide one opportunity for utilities to communicate early interest in advanced reactors to their state regulators and explore how advanced nuclear might fit into different energy portfolio scenarios.

North Carolina provides one example of how advanced nuclear planning activities can be meaningfully incorporated into Integrated Resource Plans. In Duke's 2022 Carbon plan and subsequent 2024 Carbon Plan Integrated Resource Plan (CRIRP), Duke Energy identifies the potential to develop two sites with small modular reactors to deploy 600 MW of nuclear energy. In the Commission's 2022 Order, the Commission authorizes Duke Energy Carolinas to incur project development costs for advanced nuclear resources, at a system level, up to $75 million through 2024, which was authorized by the commission in the Initial Carbon Plan Order, plus an additional $365 million through 2026.[84] States can also incorporate some of the takeaways and information outlined in a nuclear energy strategic framework into these existing plans or look at addressing action items from an existing plan in a strategic framework. Advanced nuclear energy supports many state policy objectives and priorities around resiliency, economic development, and clean energy, and it is important to consider this when developing cross-cutting short- and long-term state plans.

V. Conclusion and Other Resources

As State Energy Offices and PUCs explore opportunities to develop advanced nuclear energy strategic frameworks, this guidance document can serve as a starting point and a resource for some of the key considerations and lessons learned from other states. Once the framework is developed, states will likely monitor progress for any suggested recommendations or next steps to assess accomplishments or needed modifications. This is especially important as new data becomes available or policy/regulatory changes arise. Advanced nuclear energy will be an important tool to support decarbonization, economic development, and reliability for states and a framework will be one avenue to better understand the different challenges and opportunities, and how it fits within state plans, goals, and needs. Additional resources to support states are included in **Table 3**.

Table 3: Technical Assistance Resources Available to States

Program	Resources Available/Types of Projects Eligible	Additional Information
Gateway to Accelerated Innovation in Nuclear (GAIN)	GAIN is a single point of access to nuclear energy expertise and state-of-the-art research facilities across the U.S. DOE's national lab complex. Whether you are a developer requiring support to accelerate your technology toward market readiness or a leader who is in need of counsel on the applications and benefits of nuclear, GAIN can help you.	https://gain.inl.gov/industry-support/regulatory-support/
The Frontiers Initiative	Idaho National Laboratory (INL) organized the Frontiers Initiative to help first movers in advanced nuclear energy deployment leverage their early adoption of strategic advantage for economic development. The initiative works to catalyze powerful partnerships and to help develop leadership-class capacity to deploy and lead in the new frontier of economic competition.	https://ema.inl.gov/frontiers/
U.S. DOE, Office of Nuclear Energy Technical Assistance (NE)	NE supports the advancement of nuclear power as a resource capable of making major contributions in meeting our nation's energy supply, environmental, and energy security needs. Additionally, NE provides technical assistance to states and communities as they develop strategic energy plans.	NECorrespondence@Hq.Doe.Gov
Oak Ridge Siting Analysis for Power Generation Expansion (OR-SAGE)	The OR-SAGE tool provides a methodology to evaluate power plant siting. Based on selected input parameters, the OR-SAGE tool employs a wide array of GIS data sources to identify candidate areas for SMR technology application. Specific sites, such as retired coal plants with significant electrical infrastructure, are also evaluated.	https://www.ornl.gov/division/projects/evaluation-small-modular-reactor-plant-siting
Siting Tool for Advanced Nuclear Development (STAND)	Use STAND to identify and examine potentially feasible sites where advanced nuclear facilities might be welcomed by host communities. STAND is designed to explore and provide insight on socioeconomic, proximity, and safety data; generate county reports; review regulatory data; and complete a comparative analysis across multiple sites.	https://nric.inl.gov/stand-tool/

Endnotes

1 J.D. Wilson and Z. Zimmerman, December 2023, "The Era of Flat Power Demand is Over," Clean Grid Initiative, https://gridstrategiesllc.com/wp-content/uploads/2023/12/National-Load-Growth-Report-2023.pdf.

2 U.S. Energy Information Administration, August 24, 2023, "Nuclear Explained: U.S. Nuclear Industry," https://www.eia.gov/energyexplained/nuclear/us-nuclear-industry.php.

3 "Officials Celebrate Vogtle-3 and -4, Hint at Future Unit 5," June 3, 2024, Nuclear Newswire, https://www.ans.org/news/article-6089/officials-celebrate-vogtle3-and-4-hint-at-future-unit-5/.

4 U.S. Energy Information Administration, May 1, 2024, "Plant Vogtle Unit 4 Begins Commercial Operation," https://www.eia.gov/todayinenergy/detail.php?id=61963.

5 Nuclear Innovation Alliance, May 13, 2024, "Advanced Reactor Deployment Timelines," https://nuclearinnovationalliance.org/advanced-reactor-deployment-timelines.

6 Nuclear Energy Institute, January 2025, "State Legislation and Regulations Supporting Nuclear Energy," https://www.nei.org/resources/reports-briefs/state-legislation-and-regulations.

7 International Atomic Energy Agency, 2014, "Preparation of a Feasibility Study for New Nuclear Power Projects," IAEA Nuclear Energy Series (No. NG-T-3.3), https://www.iaea.org/publications/10505/preparation-of-a-feasibility-study-for-new-nuclear-power-projects.

8 Wyoming Energy Authority, June 5, 2023, "Nuclear Energy – Industrial Development: Strategic Framework and Roadmap," https://wyoenergy.org/wp-content/uploads/2023/07/08_31_23-Nuclear-Energy-strategic-framework-1.pdf.

9 Ibid.

10 Louisiana Public Service Commission, September 27, 2023, "Docket No. X-____," https://lpscpubvalence.lpsc.louisiana.gov/portal/PSC/ViewFile?fileId=Uxz5%2B2Nqlwk%3D.

11 Louisiana Public Service Commission, February 15, 2024, "Docket No. X-36987," https://lpscpubvalence.lpsc.louisiana.gov/portal/PSC/ViewFile?fileId=XeW9FiUyhvM%3D.

12 Louisiana Public Service Commission, October 18, 2024, "Re: Docket No. X-36987," https://lpscpubvalence.lpsc.louisiana.gov/portal/PSC/ViewFile?fileId=%2FjrkLkkAQE4%3D.

13 Virginia Nuclear Energy Consortium, 2020, "Virginia Is Nuclear: 2020–2024 Strategic Plan," https://www.commerce.virginia.gov/media/governorvirginiagov/secretary-of-commerce-and-trade/va-nuclear/1-13-21-Virginia-is-Nuclear-Strategic-plan-2020-2.pdf.

14 VNEC is currently engaged in an update to the plan.

15 Virginia Department of Energy, 2022, "The Commonwealth of Virginia's 2022 Energy Plan," https://energy.virginia.gov/energy-efficiency/documents/2022_Virginia_Energy_Plan.pdf.

16 Virginia Energy, "Nuclear Energy: Virginia's Energy Safety Net," https://www.energy.virginia.gov/renewable-energy/Nuclear.shtml.

17 New York State Energy Research and Development Authority, "Advanced Nuclear Energy," https://www.nyserda.ny.gov/All-Programs/Advanced-Nuclear-Energy.

18 E. Childs, L. Backer, C. Smith, J. Goodenbery, J. Gorman, N. Hebel, J. Walderman, J. Ahern, E. Animas, and H. Fasching, January 2023, "Connecticut Hydrogen Task Force Study," Strategen and Connecticut Green Bank, https://www.ctgreenbank.com/wp-content/uploads/2023/01/Connecticut-Hydrogen-Task-Force-Study-FINAL-20230114.pdf.

19 S. Kim, October 31, 2024, "Study on Small Modular Reactor Technology and Its Impact for Indiana," Indiana Office of Energy Development, https://www.in.gov/oed/files/IOED-SMR-Report_Final_2024.pdf.

20 Ibid.

21 Section 164.2804 - Nuclear-ready community designation - Criteria - Application process - Award by the authority, Ky. Rev. Stat. § 164.2804. https://apps.legislature.ky.gov/law/statutes/statute.aspx?id=55432

22 National Association of State Energy Officials, "Roadmapping: A Tool for States to Advance Load Flexibility and Grid-Interactive Efficient Buildings," NASEO-NARUC Grid-Interactive Efficient Buildings Working Group, https://naseo.org/data/sites/1/documents/publications/NASEO-GEB-Roadmapping-Final.pdf.

23 State of Michigan 102nd Legislature, November 29, 2023, "Enrolled Senate Bill No. 271," https://www.legislature.mi.gov/documents/2023-2024/publicact/pdf/2023-PA-0235.pdf.

24 Tennessee Office of the Governor, May 16, 2023, "Gov. Lee Issues Executive Order to Advance Nuclear Energy Innovation & Investment," https://www.tn.gov/governor/news/2023/5/16/gov--lee-issues-executive-order-to-advance-nuclear-energyinnovation---investment.html. See also Tennessee Office of the Governor, "The Budget: Fiscal Year 2025-2026," February 10, 2025, p. B-357, https://www.tn.gov/content/dam/tn/finance/budget/documents/2026BudgetDocumentVol1.pdf.

25 Texas Energy Fund Online, "Welcome to the Texas Energy Fund Portal!," https://www.txenergyfund.texas.gov/TEFPortal/.

26 Virginia General Assembly, 2023, "SB 1464: Virginia Power Innovation Fund and Program," https://lis.virginia.gov/cgi-bin/legp604.exe?231+sum+SB1464.

27 Order accepting stipulation, granting partial waiver of commission rule R8-60A(d)(4), and providing further direction for future planning; Docket No. E-100, Sub 190, November 1, 2024, North Carolina Utilities Commission, p. 127, https://starw1.ncuc.gov/NCUC/ViewFile.aspx?Id=cfc6d586-12e4-447f-a552-757d6e73c30e.

28 U.S. Department of Energy, Office of Nuclear Energy, September 8, 2022, "Inflation Reduction Act Keeps Momentum Building for Nuclear Power," https://www.energy.gov/ne/articles/inflation-reduction-act-keeps-momentum-building-nuclear-power.

29 U.S. Department of Energy, Loan Programs Office, "Overview," https://www.energy.gov/lpo/overview.

30 U.S. Department of Energy, Grid Deployment Office, "What is the Civil Nuclear Credit Program?," https://www.energy.gov/gdo/civil-nuclear-credit-program.

31 Public Utility Commission of Texas, November 18, 2024, "Report: Deploying a World-Renowned Advanced Nuclear Industry in Texas," Texas Advanced Nuclear Reactor Working Group, https://www.puc.texas.gov/industry/nuclear/.

32 Kentucky General Assembly, 2024, "Senate Bill 198: An Act Relating to Nuclear Energy Development," https://apps.legislature.ky.gov/record/24rs/sb198.html.

33 "Public Support for Nuclear Stays at Record Highs, but Misconceptions Remain a Problem," June 7, 2023, NuclearNewswire, https://www.ans.org/news/article-5070/public-support-for-nuclear-stays-at-record-highs-but-misconceptions-remain-a-problem/.

34 U.S. Department of Energy, Office of Nuclear Energy, July 10, 2024, "Newly Signed Bill Will Boost Nuclear Reactor Deployment in the United States," https://www.energy.gov/ne/articles/newly-signed-bill-will-boost-nuclear-reactor-deployment-united-states#:~:text=The%20ADVANCE%20Act%20directs%20the,can%20award%20to%20incentivize%20deployment.

35 U.S. Department of Energy, Office of Nuclear Energy, September 8, 2022, "Inflation Reduction Act Keeps Momentum Building for Nuclear Power," https://www.energy.gov/ne/articles/inflation-reduction-act-keeps-momentum-building-nuclear-power.

36 Nuclear Regulatory Commission, October 31, 2024, "Risk-Informed, Technology-Inclusive Regulatory Framework for Advanced Reactors," Federal Register 89(211), https://www.govinfo.gov/content/pkg/FR-2024-10-31/pdf/2024-23434.pdf?utm_campaign=subscription+mailing+list&utm_medium=email&utm_source=federalregister.gov

37 U.S. Nuclear Regulatory Commission, March 4, 2025, "Part 53 – Risk Informed, Technology-Inclusive Regulatory Framework for Advanced Reactors," https://www.nrc.gov/reactors/new-reactors/advanced/modernizing/rulemaking/part-53.html.

38 Holtec International, September 12, 2023, "Holtec and Wolverine Ink Historic Power Purchase Agreement for the Palisades Power Plant," https://holtecinternational.com/2023/09/12/holtec-and-wolverine-ink-power-purchase-agreement-for-palisades/.

39 Google, Microsoft, and Nucor, March 2024, "Advanced Clean Electricity RFI," https://www.advancedcleanelectricity.com/.

40 Ibid.

41 Nuclear Innovation Alliance, June 2024, "Catalyzing Commitments to Advanced Nuclear Energy Projects," p. 7, https://nuclearinnovationalliance.org/catalyzing-commitments-advanced-nuclear-energy-projects.

42 Tennessee Valley Authority, March 23, 2023, "Tennessee Valley Authority, Ontario Power Generation, and Synthos Green Energy Invest in Development of GE Hitachi Small Modular Reactor Technology," https://www.tva.com/newsroom/press-releases/tennessee-valley-authority-ontario-power-generation-and-synthos-green-energy-invest-in-development-of-ge-hitachi-small-modular-reactor-technology.

43 S. Greene, June 3, 2024, "Catalyzing Commitments to Advanced Nuclear Energy Projects," Nuclear Innovation Alliance, p. 5, https://nuclearinnovationalliance.org/catalyzing-commitments-advanced-nuclear-energy-projects.

44 J. Sondgeroth, August 19, 2024, "The Rise of the US Nuclear Newbuild Matchmakers," Energy Intelligence, https://www.energyintel.com/00000191-5629-d88e-a7fd-ff798ffd0003.

45 U.S. Department of Energy, Grid Deployment Office, "What is the Civil Nuclear Credit Program?," https://www.energy.gov/gdo/civil-nuclear-credit-program.

46 Alaska Department of Environmental Conservation, August 23, 2023, "18 AAC 87: Nuclear Facility Siting," https://dec.alaska.gov/media/zfofd2q5/18-aac-87.pdf.

47 C. Murray, November 2023, "Performance-Based Emergency Preparedness for Small Modular Reactors, Non-Light-Water Reactors, and Non-Power Production or Utilization Facilities," U.S. Nuclear Regulatory Commission, https://www.nrc.gov/docs/ML2322/ML23226A036.pdf.

48 Patrick R. Pennella, Jame Accomando, and Alex Polonsky, November 27, 2023, "NRC Provides Emergency Preparedness Flexibility for SMRs and Advanced Reactors," Morgan Lewis, https://www.morganlewis.com/blogs/upandatom/2023/11/nrc-provides-emergency-preparedness-flexibility-for-smrs-and-advanced-reactors.

49 Connecticut General Assembly, Office of Legislative Research, January 3, 1996, "Re: Nuclear Energy Advisory Council," https://www.cga.ct.gov/PS97/rpt/olr/htm/97-R-0065.htm.

50 New York State Energy Research and Development Authority, "Advanced Nuclear Energy," https://www.nyserda.ny.gov/All-Programs/Advanced-Nuclear-Energy.

51 U.S. Department of Energy, Office of Nuclear Energy, "Consent-Based Siting Consortia," https://www.energy.gov/ne/consent-based-siting-consortia.

52 Maryland Senate Bill 536, 2024, "Environment – Nuclear Power Plants – Emergency Preparedness (Radiation and Emergency Preparedness and Protection Act)," https://legiscan.com/MD/text/SB536/id/2998093/Maryland-2024-SB536-Chaptered.pdflegiscan.com/MD/text/SB536/id/2998093/Maryland-2024-SB536-Chaptered.pdf.

53 U.S. Department of Energy, January 7, 2025,"Spent Nuclear Fuel Package Performance Project (PPP)," https://curie.pnnl.gov/DOE-PPD.

54 U.S. Nuclear Regulatory Commission, June 20, 2024, "Reactor Oversight Process (ROP) Framework," https://www.nrc.gov/reactors/operating/oversight/rop-description.html.

55 Ibid.

56 Travis Bubenik, "Fight Over West Texas Nuclear Waste Plan to Hit U.S. Supreme Court," Texas Tribune, October 9, 2024, https://www.texastribune.org/2024/10/09/us-supreme-court-west-texas-nuclear-waste-plan/.

57 NARUC-NASEO Advanced Nuclear State Action Tracker, https://www.naruc.org/core-sectors/electricity-energy/nuclear-energy/naruc-naseo-advanced-nuclear-state-action-tracker/.

58 ENERCON Services East and Michigan Public Service Commission, 2024, "Michigan Nuclear Feasibility Study Report," https://www.michigan.gov/mpsc/-/media/Project/Websites/mpsc/workgroups/nuclear-feasibility-study/Michigan-Nuclear-Feasibility-Study_030124.pdf?rev=8ac6a8ed4d9a4ba2a599c55e0d305db6&hash=CC64BA038530116B4B2234DE95E03DE1.

59 C. Marks, J. Koza-Reinders, C. Hoying, and N. Craft, April 2023, "SMR Site Feasibility Study for LENOWISCO," Dominion Engineering, Inc., https://energy.virginia.gov/renewable-energy/documents/FINAL%20LENOWISCO%20SMR%20Feasibility%20Study%20-%20DEI%2020230520%20.pdf.

60 Trevor Graff, July 2022, "Advanced Reactors: SJ3 Study of Nuclear Power Generation," Energy and Telecommunications Interim Committee, https://leg.mt.gov/content/Committees/Interim/2021-2022/Energy-and-Telecommunications/2022SeptMeeting2/SJ3AdvancedReactorStudy.pdf.

61 Kentucky General Assembly, 2024, "Senate Bill 198: An Act Relating to Nuclear Energy Development," https://apps.legislature.ky.gov/record/24rs/sb198.html.

62 Mississippi Legislature, 2019, "Senate Bill 2928: The Energy Academy Act," https://billstatus.ls.state.ms.us/documents/2019/html/SB/2900-2999/SB2928PS.htm.

63 Caleb S. Brooks, Tomasz Kozlowski, Clive Townsend, James F. Stubbins, and Rizwan-uddin, April 2022, "New Reactor on Campus? UIUC's Choice for Research, Education, and Training," NuclearNews, https://www.ans.org/pubs/magazines/download/article-1281/.

64 Abilene Christian University, "NEXT Lab: Natura Resources," https://acu.edu/research/next-lab/next-lab-research-natura/.

65 U.S. Department of Energy, Office of Nuclear Energy, September 30, 2024, "Department of Energy Launches $100 Million Nuclear Safety Training and Workforce Development Program," https://www.energy.gov/ne/articles/department-energy-launches-100-million-nuclear-safety-training-and-workforce.

66 Brian Martucci, May 6, 2024, "Congress Passes Russian Uranium Import Ban, Unlocking $2.7B to Expand US Nuclear Fuel Production," Utility Dive, https://www.utilitydive.com/news/congress-passes-russian-uranium-import-ban-haleu-nuclear-fuel-advanced-reactors/715256/.

67 U.S. Department of Energy, Office of Nuclear Energy, October 13, 2020, "U.S. Department of Energy Announces $160 Million in First Awards under Advanced Reactor Demonstration Program," https://www.energy.gov/ne/articles/us-department-energy-announces-160-million-first-awards-under-advanced-reactor.

68 U.S. Department of Energy, April 1, 2025, "Opportunity: Generation III+ Small Modular Reactor Pathway to Deployment," FedConnect, https://www.fedconnect.net/FedConnect/default.aspx?ReturnUrl=%2fFedConnect%2f%3fdoc%3dDE-FOA-0003485%26agency%3dDOE&doc=DE-FOA-0003485&agency=DOE.

69 Advanced Research Projects Agency-Energy, July 16, 2024, "NEWTON: Nuclear Energy Waste Transmutation Optimized Now," https://arpa-e.energy.gov/technologies/programs/newton.

70 Advanced Research Projects Agency-Energy, October 21, 2022, "U.S. Department of Energy Awards $38 Million for Projects Leading Used Nuclear Fuel Recycling Initiative," https://arpa-e.energy.gov/news-and-events/news-and-insights/us-department-energy-awards-38-million-projects-leading-used-nuclear-fuel-recycling-initiative.

71 Advanced Research Projects Agency-Energy, May 19, 2021, "ONWARDS: Optimizing Nuclear Waste and Advanced Reactor Disposal Systems," https://arpa-e.energy.gov/technologies/programs/onwards.

72 K. Kline, October 2024, "Energy and Industrial Use Cases for Advanced Nuclear Reactors," NARUC and NASEO, https://pubs.naruc.org/pub/09F52BB1-D92E-9CB4-C9E8-172331A1A9A5?_gl=1*xrqild*_ga*MTMxMDQwNzU1NC4xNjY2NjQ1MDE5*_ga_QLH1N3Q1NF*MTczMzc4MTE4My43OTguMC4xNzMzNzgxMTgzLjAuMC4w.

73 Andrew Moseman, August 12, 2024, "Amazon Vies for Nuclear-Powered Data Center," IEEE Spectrum, https://spectrum.ieee.org/amazon-data-center-nuclear-power.

74 Federal Energy Regulatory Commission eLibrary, "Protest of Exelon Corporation and American Electric Power Service Corporation Re the Non-conforming Interconnection Service Agreement Filed by PJM Interconnection, L.L.C., et al. under ER24-2172," https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20240624-5207&optimized=false.

75 Constellation, September 20, 2024, "Constellation to Launch Crane Clean Energy Center, Restoring Jobs and Carbon-Free Power to The Grid," https://www.constellationenergy.com/newsroom/2024/Constellation-to-Launch-Crane-Clean-Energy-Center-Restoring-Jobs-and-Carbon-Free-Power-to-The-Grid.html; Brian Martucci, September 20, 2024, "Constellation Plans 2028 Restart of Three Mile Island Unit 1, Spurred by Microsoft PPA," Utility Dive, https://www.utilitydive.com/news/constellation-three-mile-island-nuclear-power-plant-microsoft-data-center-ppa/727652/.

76 State of Connecticut General Assembly, February 2024, "Raised Bill No. 299," https://www.cga.ct.gov/2024/TOB/S/PDF/2024SB-00299-R00-SB.PDF.

77 U.S. Energy Information Administration, "Connecticut," https://www.eia.gov/state/?sid=CT#tabs-4.

78 Connecticut Public Utilities Regulatory Authority, March 7, 2024, "Raised S.B. 299 – An Act Concerning Data Centers," https://www.cga.ct.gov/2024/etdata/TMY/2024SB-00299-R000307-Gilett,%20Marissa,%20Chairman-PURA--TMY.PDF.

79 Maryland General Assembly, 2024, "Senate Bill 1," https://mgaleg.maryland.gov/2024RS/bills/sb/sb0001E.pdf.

80 U.S. Energy Information Administration, "Maryland," https://www.eia.gov/state/?sid=MD#tabs-4.

81 State Energy Planning | NASEO

82 Utah State Strategic Energy Plan - Office of Energy Development

83 K. Kline, S. Stephens, and K. Zitelman, November 2023, "Nuclear Generation in Long-Term Utility Resource Planning: A Review of Integrated Resource Plans and Considerations for State Utility Regulators," National Association of Regulatory Utility Commissioners, https://pubs.naruc.org/pub/7CE3939B-F659-0270-21D7-7456B16F6F2E

84 Order accepting stipulation, granting partial waiver of commission rule R8-60A(d)(4), and providing further direction for future planning; Docket No. E-100, Sub 190, November 1, 2024, North Carolina Utilities Commission, p. 127, https://starw1.ncuc.gov/NCUC/ViewFile.aspx?Id=cfc6d586-12e4-447f-a552-757d6e73c30e.

NASEO

National Association of
State Energy Officials

1300 North 17th Street • Suite 1275 • Arlington, Virginia 22209
www.naseo.org • (703) 299-8800

NARUC
National Association of Regulatory Utility Commissioners

1101 Vermont Ave, NW • Suite 401 • Washington, DC 20005
www.naruc.org • (202) 898-2200