New Nuclear Energy Guide for State Policymakers

August 2026

NIA NUCLEAR INNOVATION ALLIANCE

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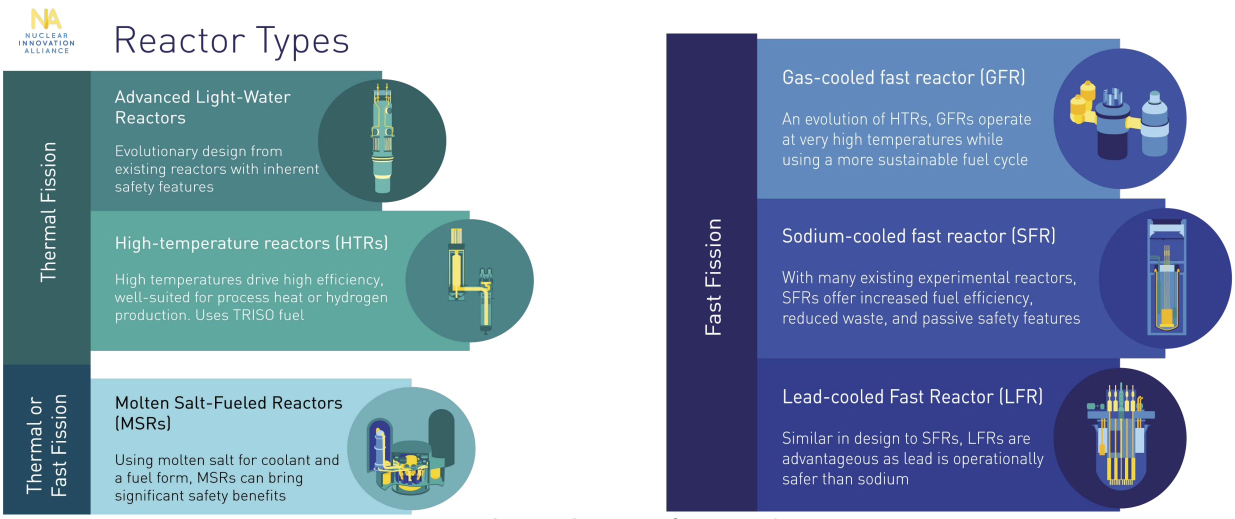
Table of Contents

Executive Summary

State and local policymakers are increasingly taking a role in developing and commercializing new nuclear reactor technology. **This Guide answers the question, "What can states do?"** by highlighting the policies, partnerships, and initiatives that can help advance new nuclear energy projects. These actions include fostering public-private partnerships, developing a nuclear-ready workforce through collaboration with academic and labor institutions, engaging with communities interested in hosting or supporting new projects, and working with neighboring states to share knowledge and coordinate regional strategies. A summary of recommended state actions is provided on page 5. This 2026 edition of the Guide incorporates new developments and policy updates since the 2025 update.



Executive Summary Figure 1: Simple visualization of new nuclear reactors

The first part of this Guide generally describes new reactor technology and its benefits, provides an overview of key enabling federal policies as of August 2026, and reviews state options to incentivize new reactor projects. The second part of the Guide provides case studies of different states and their efforts on new nuclear energy projects. These include:

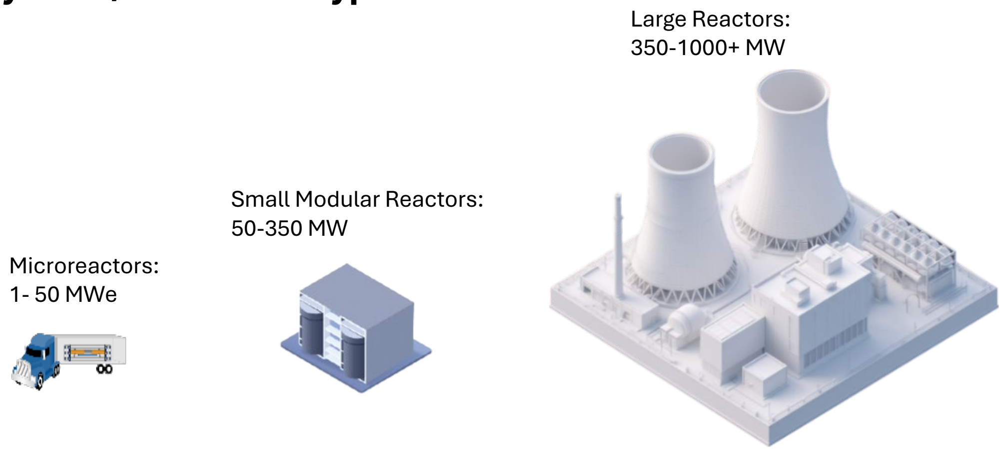
- Tennessee's Nuclear Energy Ecosystem
- Utah's First Steps
- Virginia's New Nuclear Energy Future
- Texas's Role in Pioneering New Nuclear Innovation
- New York Preparing to Scale

The case studies provide valuable insights into the various actions states are considering and implementing to develop new nuclear energy projects. Policymakers and energy officials can draw on these examples to identify strategies that complement and strengthen their own state's approach to nuclear energy deployment.

Finally, the last section of this Guide is a set of fact sheets and briefs that provide more detail on project deployment timelines, economics, nuclear waste, and safety. For those interested in learning more about new nuclear energy, the topical briefs serve as introductory resources.

The Case for New Nuclear Energy

Nuclear energy generates electricity by using energy from splitting atoms (fission) to produce heat, which then boils water to create steam. The steam drives a turbine, which in turn powers a generator and produces electricity. New nuclear energy produces energy the same way as conventional nuclear energy. **The primary differences between conventional nuclear energy and new nuclear energy are power output, fuel form, safety systems, and coolant type.**



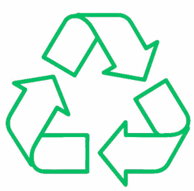
Economic Benefits

Nuclear power plants are typically licensed to operate for 40 years, with opportunities to extend licenses for an additional 20-40 years. Given the long operating lifetime of a nuclear power plant, **nuclear power plants are increasingly seen as assets that will provide benefits to states and communities for decades.** Nuclear energy projects can deliver lasting economic value to host communities by expanding the local tax base, creating high-paying and long-term employment opportunities, attracting investment, supporting local businesses, and providing revenue that helps fund public services and community development.

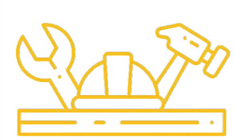
Reliability

Like the existing nuclear reactor fleet, new nuclear reactors generate clean, firm power, regardless of the weather, and perform reliably during peak demand. Nuclear power plants also perform reliably during extreme cold, and support grid stability alongside renewable energy.

New reactors are designed with inherent safety systems that constantly cool reactors



Some new reactors can be designed to reuse spent nuclear fuel



New reactors will utilize modular construction, reducing construction costs over time

Use Cases and Applications

New nuclear energy has a wide variety of use cases. In addition to providing clean, firm power to the grid, new nuclear energy can replace retiring coal power plants or be sited on or near brown-fields, provide high-temperature steam for industrial processes, and power facilities such as data centers or manufacturing facilities.

Replacing Retiring Fossil Fuel Plants

TerraPower Natrium
100 MW – 500 MW

Large Load Generation

Westinghouse
AP1000 1100MW

Data Centers and Large Load Customers

Kairos Power
KP-FHR 140 MW

Remote Location Applications

Radiant Kaleidos
Microreactor 1MW

Industrial Co-generation of Electricity and Process Steam

X-energy Xe-100
80 MW

Conclusion

New nuclear energy projects provide clean, firm power that can help states meet their energy security and clean energy goals. As states continue exploring and developing new nuclear energy, understanding the technology, economic and grid benefits, and various use cases will inform decisions about how states move forward with energy planning.

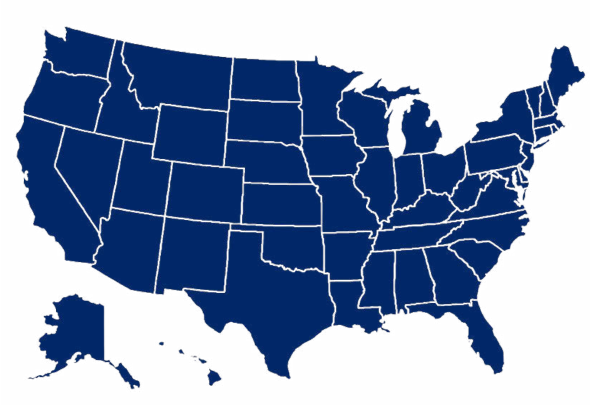
New Nuclear Energy in State-Level Energy Policies

Summary:

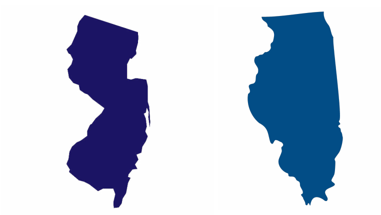
- States are taking an increasing role in deploying new nuclear energy technologies
- New reactors can help states and communities achieve their economic development, energy security and clean energy goals
- There are several policy initiatives states can implement to enable new nuclear energy projects

2026 has been another busy year for state legislatures:

Over 200 bills introduced in state legislatures



States removed nuclear energy restrictions



NJ **IL**

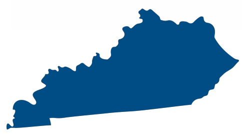
Joint state interest in advanced nuclear

New England governors are exploring advanced nuclear energy

Funding for advanced nuclear

TX
$350 million

TN
$95 million

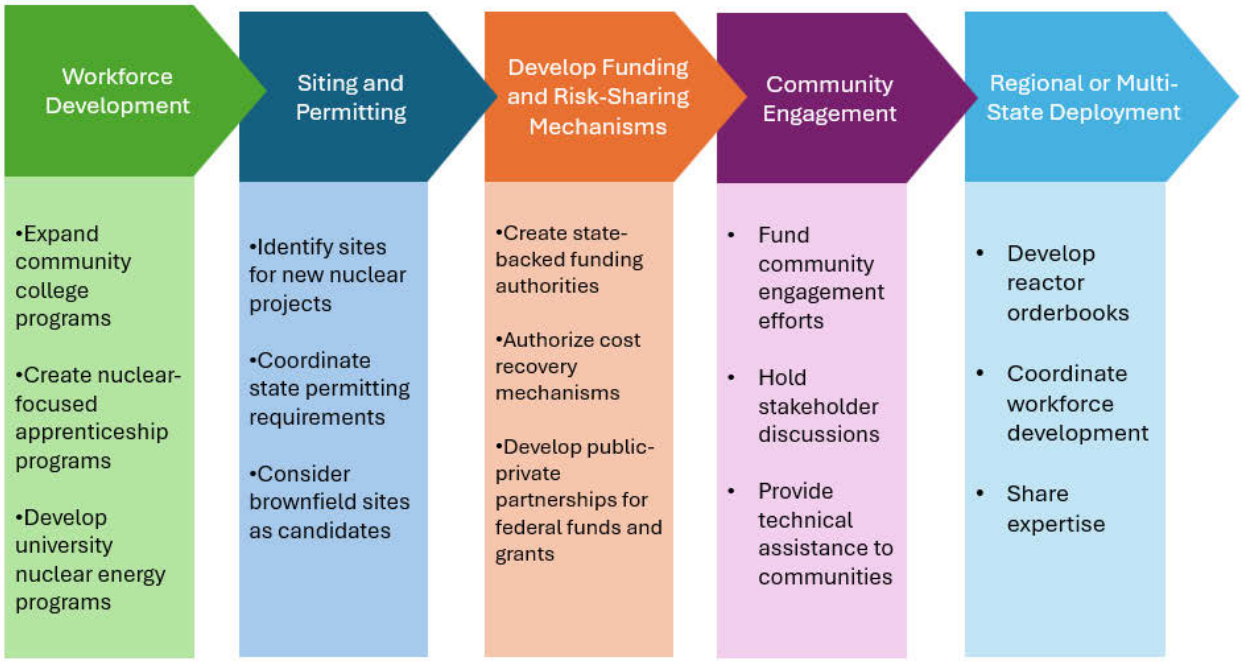


KY
$25 million

Among the plethora of state actions on nuclear energy in 2026, notable developments include over 200 bills introduced in state legislatures throughout the United States. New Jersey and Illinois became the two most recent states to remove restrictions on nuclear power plant construction. The Governors of New England issued a joint statement highlighting their regional commitment to explore advanced nuclear energy technologies, in the face of rising electricity costs and grid strain. Lastly, Texas and Tennessee are serving as national models for funding advanced nuclear energy projects in their respective states.

"What Can States Do?"

As the federal government and nuclear energy developers lead the way for new nuclear demonstrations and fuel cycle investments, there is a portfolio of policy options states can employ to complement broader domestic deployment efforts.



Workforce Development

States planning to deploy new nuclear energy projects need to consider the workforce needs. This is particularly pertinent for planning horizons. If a state wants to build a new nuclear project in the next 5-10 years, investments in workforce development must be made today to build the new reactor projects of tomorrow.

Siting and Permitting

While the Nuclear Regulatory Commission has primary authority over licensing and regulating the safety of nuclear power plants, states play an important role in environmental permitting, water resources, and other non-radiological aspects of project development. Nuclear power plants must comply with federal *and* state air quality requirements, and states are often involved in permitting and regulating facility water use and discharges. States can also align permitting and provide clarity on timelines and requirements to developers by creating a state-wide "one-stop shop" for nuclear energy.

Develop Funding and Risk-Sharing Mechanisms

Creating state-backed funds can enable new nuclear energy projects and attract developers to a state. States like Texas and Tennessee have funds available that support the development and commercialization of the new nuclear energy industry. Tennessee's $70 million fund is focused on expanding the state's nuclear development and manufacturing ecosystem by providing grants and assistance to support nuclear energy business investment, workforce development programs, and site development across Tennessee. Kentucky recently established the Nuclear Reactor Site Readiness Pilot Program, which authorizes grants covering up to one-third of NRC licensing costs—up to $25 million per project—to support early site permits, construction permits, and combined licenses for new nuclear energy projects.

Community Engagement

States developing new nuclear energy frameworks should actively engage with communities in which projects are planned, or where communities express interest. Providing technical assistance and forums for communities to share their interests and concerns, ask questions and learn from developers can help build public trust and lead to a more transparent project development process.

Regional or Multi-State Deployment

One approach for new nuclear project development is partnerships with other states. Pursing a multi-state or regional deployment model can allow states to leverage their own expertise and assets while learning from other states in areas such as workforce or manufacturing. The National Association of State Energy Officials (NASEO) created the Advanced Nuclear First-Movers Initiative in 2025 to accelerate advanced nuclear projects and bring more power to the electric grid for reliability, sustainability, and economic growth. The 11 participating states (NY, IN, KY, TN, WY, LA, MD, PA, UT, VA and WV) are working together to develop public-private partnerships and explore different deployment models among states.

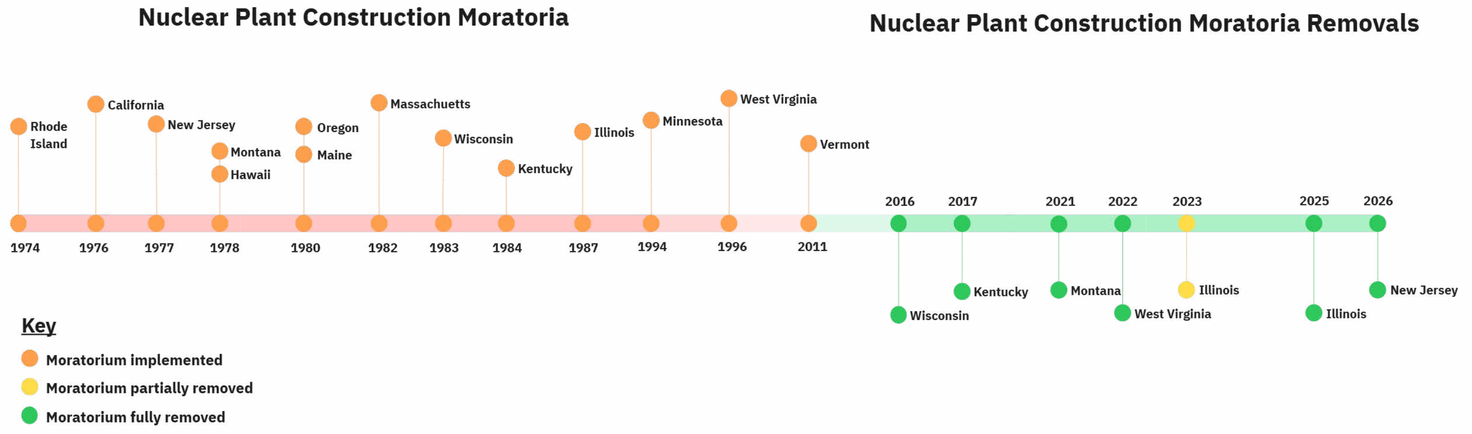
Other Policy Initiatives

Clean or Reliable Energy Standards

Including nuclear in a clean or reliable energy standard allows nuclear generators to earn clean energy credits and be recognized as zero-carbon resources, improving their revenues and competitiveness in electricity markets. It also strengthens long-term policy certainty for existing plants and new builds by signaling sustained state support for nuclear within clean energy goals.

Removing Restrictions

Over the last 10 years, almost half of the states that implemented restrictions on nuclear power plant construction have removed them. States are revisiting earlier restrictions in response to rising electricity demand, decarbonization goals, and the need for clean, firm power. Many states are also seeking to capture economic development opportunities associated with new nuclear technologies. Removing nuclear power plant restrictions allows a state to build new nuclear power plants.



Source: Nuclear Innovation Alliance, *History of Nuclear Power Plant Construction Moratoria*

Innovation Hubs

States can catalyze innovation hubs that align state and local governments, academia, industry, labor, and communities around new nuclear deployment. By supporting workforce training and coordinating closely with nuclear reactor developers and manufacturers, states can help concentrate jobs and economic activity in specific regions. Proactive support for new reactor and nuclear manufacturing projects can also attract private investment and strengthen regional supply chains, positioning communities as long-term centers of advanced nuclear commercialization and industrial growth.

Federal Nuclear Energy Landscape

Summary:

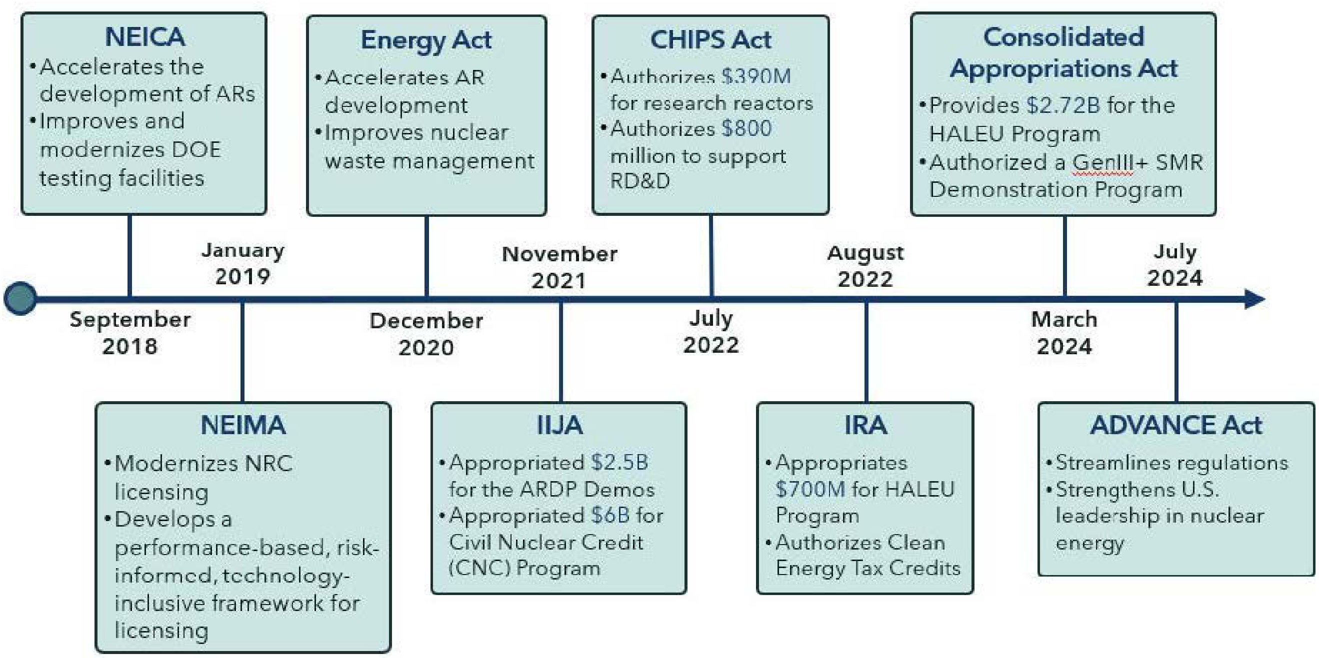
- There is substantial, bipartisan, and sustained support for new nuclear reactor technologies at the federal level. States must understand the federal landscape to inform effective state policies.
- Federal policies are helping accelerate new nuclear deployment. The Nuclear Regulatory Commission (NRC) is modernizing its regulations, Congress is passing legislation, the White House is signing executive orders, and U.S. Department of Energy (DOE) is engaging in public-private partnerships.
- Federal programs, incentives, and investments in new reactor technologies and demonstration projects provide a foundation for U.S. development and commercialization.

The current federal policy landscape presents a major opportunity to help unlock the potential of clean, safe, firm nuclear energy. Recent federal legislation and executive actions seek to accelerate new nuclear deployment, strengthen domestic fuel and supply chains, encourage exports, and expand the use of nuclear energy for grid reliability and national security purposes. These actions are a result of substantial, sustained bipartisan support for new reactor innovation in Congress and across administrations.

States should be aware of the federal nuclear energy landscape to help inform their approach to state-level policies. Informed states can leverage federal support for nuclear energy with complementary policies and programs and capitalize on emerging opportunities for nuclear investment and deployment. Therefore, the current federal nuclear energy landscape is summarized below.

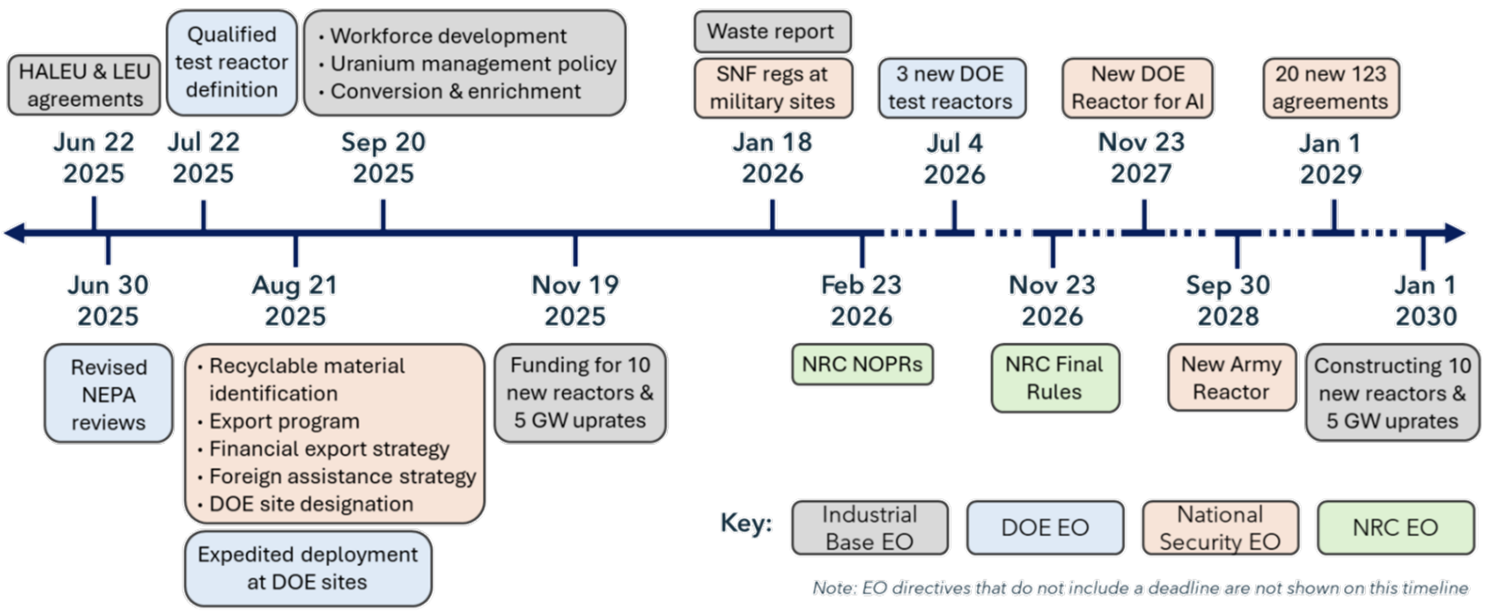
Congress:

Over the last decade, Congress has strengthened U.S. nuclear energy leadership through a series of major pieces of legislation (see the figure below). Key accomplishments include: (1) enactment of several clean energy tax credits; (2) major appropriations for new reactor demonstrations and fuel production; and (3) NRC reform. Congress is continuing to introduce bills that accelerate new reactor deployment, such as the Accelerating Reliable Capacity (ARC) Act of 2026.



Executive Orders:

On May 23, 2025, President Trump signed four Executive Orders (EOs) intended to strengthen U.S. nuclear energy leadership and facilitate increased deployment of new nuclear reactor technologies. Overall, the EOs send a strong support signal for new nuclear energy, with ambitious EO goals of quadrupling nuclear energy capacity to 400GW by 2050; making the Nuclear Regulatory Commission (NRC) more effective and efficient; increasing public investment and public-private partnerships in nuclear reactors, fuels, and supply chains; increasing U.S. technology exports; and implementing a whole-of-government approach to achieving U.S. nuclear energy leadership. (see NIA's EO timeline below, and NIA's EO fact sheet for more details).



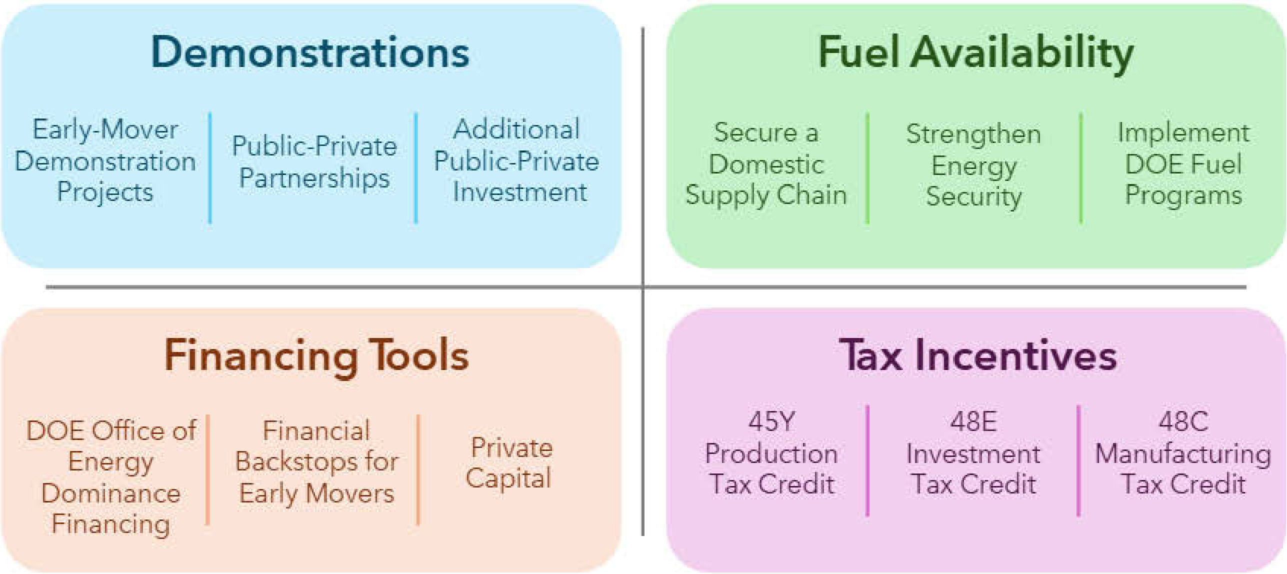
Nuclear Regulatory Commission:

The NRC is responsible for the licensing and regulatory oversight of nuclear reactors in the United States and providing reasonable assurance of adequate protection for workers, the public, and the environment. The NRC has been making progress on regulatory reform since the enactment of NEIMA in 2019, and especially over the last year and a half with direction from the 2024 ADVANCE Act and 2025 Executive Orders. Over the last five years, the NRC has been making licensing more risk-informed, performance-based, technology-inclusive, and efficient. *(see NIA's brief on the Urgency for NRC Reform to learn more).*

Of note, the NRC has been conducting a wholesale rewrite of their regulations in line with EO 14300. The NRC was instructed to perform this rewrite within 18 months of the signing of the EO's and is currently in the middle of that process. NIA is tracking the implementation of this rule rewrite (see NIA's expected NRC rulemaking timeline).

U.S. Department of Energy:

Over the past several years, DOE has made major progress in partnering with private industry to work towards the successful deployment of first-of-a-kind new nuclear energy technologies. In particular, DOE's Office of Nuclear Energy (NE), which supports research, development, and commercialization of nuclear technologies across the U.S. energy system, and the DOE's loan office (now called the Office of Energy Dominance Financing (EDF)), have successfully implemented a wide range of initiatives that have strengthened U.S. nuclear technology capabilities and commercialization readiness, as shown in the image below.



One of NE's most significant achievements has been the progress made under the Advanced Reactor Demonstration Program (ARDP), which provides funding and support for multiple commercial advanced reactor demonstration projects. Another major accomplishment is the Reactor Pilot Program, established under Executive Order 14301, which set an ambitious goal of bringing three reactors to criticality by July 4, 2026. NE not only met this target but exceeded it, with four companies successfully achieving reactor criticality. To view company progress, including companies part of NE's ARDP and Reactor Pilot Program, see NIA's U.S. nuclear energy project tracker.

Outside of ARDP and the Reactor Pilot Program, DOE continues to advance several programs, including the Generation III+ SMR Program, fuel line pilot programs, and ongoing efforts to support fuel qualification, materials testing, spent fuel recycling, and other R&D across the national laboratories.

Case Study: Tennessee's Nuclear Energy Ecosystem

Tennessee has a storied history as a center for nuclear energy innovation and research. Oak Ridge National Laboratory has played a key role in developing new reactor technologies for decades. Today, Tennessee is developing some of the nation's first new nuclear projects, enabled by its political environment, laboratory and academic capacities, and skilled trade workers.

There are several major new projects are under development in Tennessee:

GE Vernova's BWRX-300
Clinch River, TN

Source: GE Vernova Hitachi

Kairos Power's Hermes 2 Demonstration Plant
Oak Ridge, TN

Source: Kairos Power

X-energy's TRISO-X Fuel Fabrication Facility
Oak Ridge, TN

Source: X-energy

Oklo's Fuel Recycling Facility
Oak Ridge, TN

Source: Oklo

The Tennessee Valley Authority (TVA) is a quasi-federal entity combining federal ownership with a corporate governance structure, meaning it can enter into contracts, develop its own mission statement, and issue debt. TVA currently owns and operates seven reactors across three sites. Given its functionality and operational experience, TVA is uniquely positioned to act as an early mover and customer for advanced nuclear technologies.

In 2025, TVA submitted a construction permit application (CPA) for GE-Vernova Hitachi's BWRX-300 SMR at Clinch River, Tennessee. TVA is an ideal entity to develop first-of-a-kind (FOAK) projects because of its in-house project development experience, ability to finance and build long-term projects, and capacity to take on project risk.

TVA and Kairos signed a Power Purchase Agreement (PPA) in 2025 to deliver up to 50 megawatts (MW) of reliable, 24/7 energy to the TVA grid that powers Google data centers. The agreement is an example of a novel deployment model that aligns efforts from a new reactor developer, a utility, and a hyperscaler.

Oak Ridge National Laboratory

Oak Ridge National Laboratory (ORNL) is a Department of Energy (DOE) research facility focusing on materials science, nuclear science, research and energy innovation. In addition to serving as a renowned research institution, ORNL is developing Tennessee's nuclear workforce through partnerships with universities, community colleges, industry, and utilities. ORNL supports nuclear workforce training programs, internships and fellowships while working with institutions such as Pellissippi State, Roane State, and the University of Tennessee to prepare students and professionals for careers in reactor operations, fuel cycle technologies, manufacturing, and construction.

A prime example of ORNL's workforce development initiatives is its partnership with Pellissippi State Community College, where Pellissippi State will offer a chemical radiation technology pathway as part of its Applied Science in General Technology degree. Two of the classes are taught by ORNL staff members. This kind of partnership allows students to learn from experts in the field, while giving them internships and potential employment opportunities at ORNL. This is an example of a workforce development initiative that creates the necessary talent pipeline to demonstrate and commercialize new nuclear energy projects.

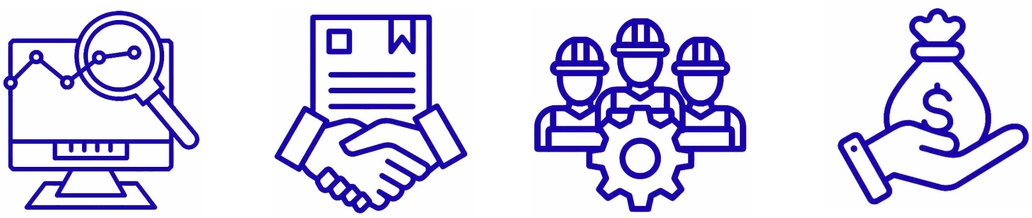
ORNL also participates in DOE's Community College Internships (CCI) program, which encourages community college students to pursue technical careers by providing technical and engineering training experiences.

Tennessee Nuclear Fund

In 2023, Governor Lee and the Tennessee General Assembly created the **Tennessee Nuclear Fund**. The fund, currently at $95 million, is focused on expanding the state's nuclear development and manufacturing ecosystem by providing grants and assistance to support nuclear energy business investment, workforce development programs, and site development across Tennessee. Since its creation, the fund has attracted companies like X-energy, Oklo, Radiant, BWXT, and Orano to expand or locate operations in the state. In addition to nuclear energy technology and fuel developers, the fund has also awarded funds to academic institutions for workforce development. The Tennessee Nuclear Fund is an example of a state policy that successfully builds out a state's nuclear energy ecosystem.

Conclusion

Tennessee is an example of how states can accelerate new nuclear projects and demonstration by combining research, operational expertise, workforce development, and state policy to create the conditions for successful nuclear project development.



Case Study: Utah's First Steps

While Utah has no operating nuclear reactors, it has historical experience in the nuclear fuel cycle, particularly uranium mining and milling. Like many states, Utah is facing an energy deficit. Amidst retiring fossil fuel plants and rising demand, Utah Governor Spencer Cox unveiled Operation Gigawatt in 2024.

The goals of Operation Gigawatt are to:

- Increase transmission capacity
- Expand and develop more energy production
- Enable nuclear and geothermal power development through policy
- Invest in innovation and research
- Bridge state-level and local development goals through education

Following the launch of Operation Gigawatt, Holtec International, Hi Tech Solutions, and the State of Utah entered a strategic partnership to support Holtec's SMR-300 deployment, create talent pipelines and workforce, and build a nuclear training facility by 2028 in collaboration with Utah's higher education institutions.

In 2025, building on Operation Gigawatt, TerraPower (an advanced reactor developer), Utah's Office of Energy Development, and Flagship Companies, signed an agreement to explore the potential siting of a Natrium reactor and energy storage plant in Utah. Flagship Companies will provide access to relevant land data and assist in identifying and evaluating potential sites for the Natrium reactor.

Two notable developments occurred in Utah so far in 2026: Holtec's SMR-300 was also chosen as the preferred technology to power the Green River Advanced Nuclear Project. And, Valar Atomics achieved criticality with its Ward250 small modular reactor, marking a key milestone in new nuclear deployment under a federal Reactor Pilot Program. This pilot program provides Valar with the opportunity to test and validate its reactor design at a smaller scale to accelerate commercialization of more reactors.

Valar Atomics facility in Orangeville, UT
Source: Deseret News

In the short timespan since Operation Gigawatt's launch, Utah has attracted advanced reactor developers, facilitated agreements to develop a nuclear supply chain, and created a plan to build out a talent pipeline to support energy projects.

Utah's Policy Sphere

Nuclear Energy Consortium

With HB 0249, Utah created a state nuclear energy consortium in 2025. The consortium is providing knowledge and expertise on nuclear energy technologies, safety, and project development. The consortium will also develop policy recommendations pertaining to nuclear energy development.

Energy Council

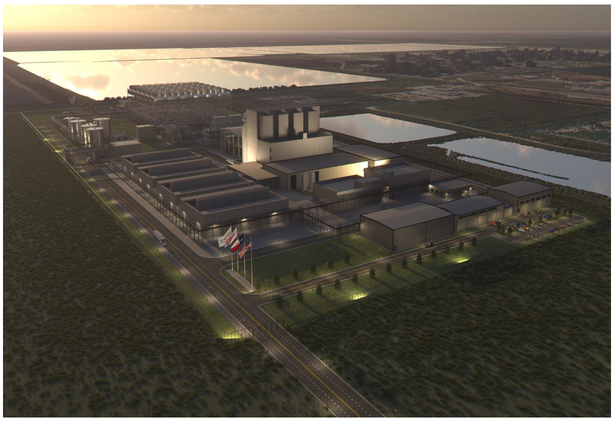
In addition to the nuclear energy consortium, Utah also created an energy council, whose purpose is to develop baseload electrical energy generation and transmission projects within the state.

Conclusion

Although Utah is newer to the advanced nuclear space, its ambitious goals and efforts to develop manufacturing, workforce, and projects in the state are creating partnerships and policies that will enable future deployment. Utah is proactively creating the conditions for success through strategic planning and stakeholder engagement.

Case Study: Texas's Role in Pioneering Nuclear Innovation

The state of Texas has a rich history in nuclear energy production, but as energy demands continue to escalate, the Public Utility Commission of Texas and policymakers face an increasing urgency to find a solution to the strain on its electrical grid. The demand for reliable, flexible, and scalable energy solutions has never been higher, but nuclear energy, with its proven track record in Texas and potential as a unique energy solution, emerges as a strategic avenue to meet these growing needs. Furthermore, Texas's large industrial sector could benefit from the process heat supplied by certain advanced reactor designs.



Rendering of Abilene Christian University's Molten Salt Reactor Project; and Dow and X-energy's Advanced Reactor Demonstration Program Project; Source: ACU and Dow

The flagship nuclear project in Texas is planned for Dow Chemical Company's Seadrift facility, where X-energy and Dow will build the first commercial-scale advanced reactor at an American industrial facility through the U.S. Department of Energy's Advanced Reactor Demonstration Program. Announced in May of 2023, the project represents a growing public-private partnership between industrial companies and nuclear technology companies to find technologies that can provide highly reliable, high-temperature process heat along with electricity to replace existing fossil-fired co-generation assets. The advanced reactor deployed at Dow's Seadrift facility will be a co-generation unit used to produce both process steam and electricity to power the plant's manufacturing operations, and is expected to be completed by 2033.

In August 2023, Texas Governor Greg Abbott directed the Texas PUC to establish the Texas Advanced Nuclear Reactor Working Group (TANRWG). The Working Group, comprised of experts and leaders in the policy, environmental, safety, grid operation, and investment arenas, is evaluating how advanced nuclear reactors can provide safe, reliable, and affordable energy for Texas, including how to make the state a national leader in the deployment of nuclear power to take advantage of the economic benefits nuclear energy projects provide to states and local communities. The Working Group comes at a time where Texas is already demonstrating its leadership in nuclear innovation as two non-traditional players, Abilene Christian University (ACU) and Dow, are expecting to deploy new reactors. ACU expects to start option of their research reactor in 2028, and Dow/X-energy will complete their reactor in the early 2030s.

At the end of 2024, the TANRWG finalized their report to the Governor and proposed seven legislative recommendations that target critical nuclear industry issues and aim to accelerate advanced nuclear reactor projects in Texas. Through ACU's Nuclear Energy eXperimental Testing Laboratory (NEXT Lab) and a partnership between three major universities (Georgia Tech, UT-Austin, and Texas A&M), ACU is working with commercial reactor developer Natura Resources to design, license and construct a molten salt research reactor on their campus. The project is a trailblazer as it marked the first university advanced research reactor project to submit their Construction Permit (CP) application in late 2022. The Nuclear Regulatory Commission (NRC) accepted the application for review and, in September of 2024, issued a construction permit to build the Natura MSR-1, the first liquid salt-fueled reactor licensed by the NRC in American history.

In February of 2025, Texas A&M University Chancellor, John Sharp, offered land near Texas A&M University campus to host four nuclear reactor companies. Kairos power, Natura Resources, Terrestrial Energy and Aalo Atomics will work with the A&M system to bring reactors to Texas A&M's RELLIS campus as part of a project called "The Energy Proving Ground". The land will provide these companies with the space to build the latest small modular reactors and bring commercial-ready advanced nuclear reactor technologies to Texas.

In March of 2025, X-energy and Dow submitted a construction permit application to the NRC for their project in Seadrift, Texas. Three months later, in June of 2025, the NRC announced it will complete the review of Dow and X-energy's application in 18-months. For context, most construction permit applications take 24 months to review.

Texas A&M's "energy proving ground" at the RELLIS campus
Source: CannonDesign

Texas is also home to the Groves Isotope Test Reactor, a new reactor under development by Oklo (an advanced reactor developer) near Lockhart, Texas. The Groves Isotope Test Reactor will be used to establish a stronger domestic supply chain for critical isotopes used in cancer diagnosis and treatment, advanced manufacturing, scientific research, space exploration, and national security applications. The Groves Isotope Test Reactor achieved criticality in August 2026, less than a year after construction commenced. Although the milestone was achieved under the U.S. Department of Energy's Reactor Pilot Program, the state of Texas provided a supportive private-sector site and development ecosystem that allowed DOE's Reactor Pilot Program to be demonstrated outside a national laboratory.

In June 2025, the Texas House of Representatives passed HB14, which created the Texas Advanced Nuclear Energy Office and **invests $350 million into the nuclear energy sector, marking the largest state commitment to nuclear power in the nation**. The bill also establishes a nuclear development fund and includes workforce development programs to train the future nuclear energy workforce to support the development and commercialization of advanced nuclear energy. Texas' legislative actions, particularly the provision of $350 million for advanced nuclear energy projects, will create the conditions necessary to foster new nuclear projects within the state and provide energy security and grid reliability. Texas has also directly appropriated $120 million for a molten salt reactor development initiative involving Natura Resources, Texas Tech University, and ACU.

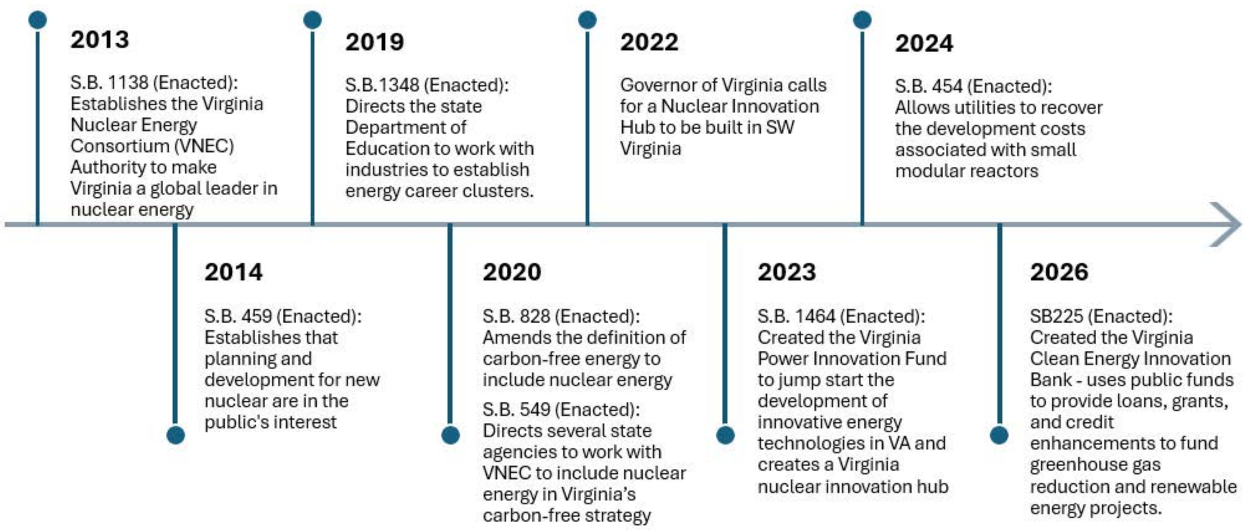
Conclusion

Texas has rapidly emerged as one of the nation's most ambitious states for advanced nuclear development. Through the creation of TANEO and the Texas Advanced Nuclear Development Fund, support for deployment hubs such as Texas A&M RELLIS, advancement of industrial projects like X-energy's Seadrift facility, and growing interest from large-load users and advanced reactor developers, Texas is building the policy, financing, workforce, and project ecosystem needed to become a national leader in advanced nuclear energy deployment.

Case Study: Virginia's New Nuclear Energy Future

Virginia's reputation as a national leader in nuclear energy is the result of more than a decade of coordinated policy development, industry engagement, and strategic planning paired with a 70-year history with nuclear energy that dates back to the first nuclear electricity delivered to the grid. Rather than a single initiative, the Commonwealth has built a comprehensive nuclear ecosystem through sustained collaboration among the General Assembly, the Governor's Office, the Virginia Nuclear Energy Consortium Authority (VNECA), the Virginia Nuclear Energy Consortium (VNEC), utilities, universities, manufacturers, and reactor developers.

Since its creation, VNEC has served as the Commonwealth's coordinating organization for advancing Virginia's nuclear industry. Bringing together utilities, reactor developers, suppliers, universities, national laboratories, and economic development partners, VNEC has helped shape state policy, identify strategic opportunities, and position Virginia as a national center for advanced nuclear deployment, manufacturing, workforce development, and research. In 2025, VNEC published the second four-year blueprint for Virginia's nuclear industry. The Virginia Is Nuclear Strategic Plan 2025-2029 (the first strategic plan was provided to the Commonwealth in 2020), provides a statewide roadmap for reactor deployment, workforce development, supply chain expansion, innovation, and economic growth.



Virginia's current position is built on a series of legislative and policy actions adopted over the past decade. Starting in 2013 with the creation of the Virginia Nuclear Energy Consortium Authority (VNECA) and VNEC, the Commonwealth has steadily built its nuclear framework through legislation that defined nuclear as a clean energy source, directed strategic planning for nuclear development, and established workforce pipelines through education initiatives. In the 2023 Governor's Energy Plan, the Commonwealth supported the nuclear industry in Virginia and the deployment of SMRs. Most recently, 2024 legislation authorized utilities to recover development costs associated with small modular nuclear. These policies collectively mirror many of the recommendations presented throughout the strategic plan and demonstrate how states can create durable conditions for private investment.

Dominion Energy is actively exploring developing SMRs at its North Anna Power Station. In 2024, Dominion issued an RFP to solicit proposals from advanced reactor developers to build new nuclear projects at Dominion's site.

In January 2025, Appalachian Power announced that it had applied for a DOE grant to support early site permitting activities for a potential advanced reactor at its Joshua Falls site in Campbell County, Virginia. The company is seeking $35 million to offset early development costs while continuing site evaluation, community engagement, and the regulatory review process for a potential future SMR project.

Reactor Technology Companies

- BWXT (reactor and fuel developer)
- GE-Hitachi (reactor and fuel developer)
- Lightbridge (fuel developer)
- Newport News Shipbuilding
- Holtec International
- NuScale (reactor developer)
- X-energy (reactor developer)
- Kairos Power (reactor developer)
- NANO Nuclear (reactor developer)
- TerraPower (reactor developer)

Utilities and Industry

- Dominion Energy (power plant operator)
- Appalachian Power Company
- Bechtel (engineering, procurement and construction firm

Universities

- Virginia Tech
- Virginia Commonwealth
- Liberty University
- University of Virginia
- James Madison University
- George Mason University

Key Policy Milestones

- Establishment of the VNECA and subsequently the creation of VNEC as the Commonwealth's coordinating organizations for nuclear strategy and industry collaboration.
- Recognition of nuclear energy as a clean energy resource within Virginia's energy policy framework.
- Support for nuclear workforce development, including Virginia's Energy Career Cluster and a vehicle for a Nuclear Education Grant Fund and Program
- Development of the Virginia Nuclear Strategic Plan to guide statewide deployment, workforce, supply chain, and innovation efforts.
- Development of the Virginia Innovative Nuclear (VIN) Hub
- Establishment of statutory cost recovery mechanisms that allow Virginia utilities to recover certain prudently incurred Small Modular Reactor (SMR) project development costs, subject to Virginia State Corporation Commission review and approval.

Conclusion

Virginia’s sustained leadership in nuclear energy reflects the power of long-term collaboration rather than any single policy, administration, or organization. The Commonwealth’s success has been built through years of bipartisan legislative support, strategic leadership from the Virginia Nuclear Energy Consortium (VNEC), strong partnerships among state and local governments, economic development organizations, utilities, universities, and industry stakeholders, as well as continued support from successive governors. Together, these efforts have created one of the nation’s most comprehensive ecosystems for advanced nuclear deployment, workforce development, research and innovation, supply chain growth, and commercialization.

Case Study: New York Preparing to Scale

Building on the Draft Blueprint for the Consideration of Advanced Nuclear Technologies released in 2024, Governor Hochul announced the start of the Master Plan for Responsible Advanced Nuclear Development in New York (Master Plan), as well as the Nuclear Reliability Backbone, an initiative to build an additional 5 GW of new nuclear in New York. The New York State Energy and Research Development Authority (NYSERDA), along with the New York Power Authority (NYPA) and the New York Department of Public Service (DPS) are advancing a coordinated strategy that will contribute to the buildout and scaling of nuclear energy in New York State. To help meet climate, energy and economic goals, New York State is embarking on systematic approach to scale its nuclear energy sector as a complement to its growing renewables portfolio.

Figure 1: (Image on left) Nine Mile Point Nuclear Station. Source: U.S. Department of Energy; (image on right) NYSERDA's Blueprint for Advanced Nuclear Technologies. Source: NYSERDA

State Agency Leadership

NYSERDA, along with other state agencies are leading the buildout of New York's nuclear sector. In addition to leading the Master Plan, NYSERDA is supporting Constellation Energy's efforts to assess whether Constellation's Nine Mile Point Clean Energy Center can accommodate new nuclear capacity. Supported by a $17.3 million U.S. Department of Energy (DOE) grant and a $12.5 million contribution from NYSERDA, Constellation will pursue licensing activities with the U.S. Nuclear Regulatory Commission (NRC) to secure an Early Site Permit (ESP) for potential advanced nuclear development at Nine Mile Point. NYSERDA's work with Constellation is an important catalyst because licensing activities are an expensive process for developers. Reducing costs to developers through public-private partnerships is one way states can enable new nuclear projects.

Shortly after Constellation received its grant from DOE, NYSERDA and the New York DPS published the Advanced Nuclear Policy Options Paper. The paper is the first publication as part of the Master Plan and outlines the possible policy mechanisms available to help make new nuclear projects commercially viable in New York. The paper also identifies and assesses barriers to deployment, highlights potential funding mechanisms, and analyses different development strategies. In its entirety, the Master Plan will cover key topics like waste, regulatory & safety, supply chain, workforce development, siting and environmental justice to help guide New York's preparation to scale and develop new nuclear projects.

NYPA is also playing a central role in scaling New York's nuclear energy capacity through their advancement of Governor Hochul's directive to the Authority to develop 1 GW of advanced nuclear in upstate New York. NYPA and Ontario Power Generation (OPG) signed a Memorandum of Understanding (MOU) to share expertise in developing new nuclear technologies, educating communities and the public about the economic and environmental benefits of new nuclear, and collaborate on workforce development initiatives to create jobs in both Canada and New York State.

In addition to NYPA's international collaboration, NYPA issued a series of Requests for Information (RFI) to engage developers and identify potential project procurement and identify prospective host communities for their 1GW project and invest in workforce development. To strengthen New York's nuclear workforce, NYPA announce a $40 million investment over four years that will be managed through the NextGen Nuclear New York Initiative. NextGen Nuclear New York, an all-of-state initiative, will engage schools, colleges, unions and manufacturers to access resources like those provided by NYPA and build up a skilled talent pipeline ready to support new nuclear projects in the state.

New York also co-chairs the National Association of State Energy Officials (NASEO) First Mover Initiative. The initiative aims to accelerate advanced nuclear energy projects on the state level by exploring opportunities to reduce financial and technology risks, developing policies that enable nuclear energy development, creating public private partnerships, and solidifying firm "orderbooks" - a set of multiple orders for the same reactor - by aligning on one or two standardized reactor technologies. This collaboration enables states to share lessons learned, and better positions the states to meet their climate, energy security and economic goals.

New York will build on the strong roots of its long-standing state nuclear coordination program. Established in state legislation and housed at NYSERDA, the program will be taking on new life to help facilitate navigation of projects through New York's regulatory system.

Executive Action

With Governor Hochul's 2025 directive for NYPA to develop at least 1 GW of new nuclear generation and the expansion of this goal with the Nuclear Reliability Backbone, led by DPS, **New York is preparing to scale its nuclear generating capacity to over 8 GW**. This targets more nuclear generation than has been built anywhere in the US in the last 30 years.

The Master Plan, Nuclear Reliability Backbone and other New York actions combine to establish a clear state-level commitment to new nuclear development and demonstrate how executive leadership can translate long-term energy planning into concrete steps toward project deployment.

Conclusion

New York State's approach shows how it is possible to combine a systematic and methodical planning approach to new nuclear development with tangible, near-term project development action that recognizes both the importance of taking a considered approach and the urgency of the State's economic, decarbonization, and energy goals. With executive leadership, state agency planning and coordination, and public-private partnerships, New York is creating the conditions necessary to deploy new nuclear energy projects.

NUCLEAR INNOVATION ALLIANCE

Advanced Reactor Deployment Timelines

Multiple advanced reactor developers have announced domestic demonstration projects in the 2020s and early 2030s, including demonstrations of non-light water reactors (non-LWRs), commercial small modular light water reactors (SMRs), demonstration and test microreactors, and university research microreactors (Figure 1).

Reactor developers are engaging with customers, state and local governments, and the NRC to secure the regulatory approvals necessary for construction, commissioning and operation. These early-mover projects will provide the licensing, construction, and operational experience that enable rapid commercial deployment of new nuclear energy in the 2030s. To get the most up-to-date information on advanced nuclear reactor developers, check out [NIA's Nuclear Energy Project Tracker.]

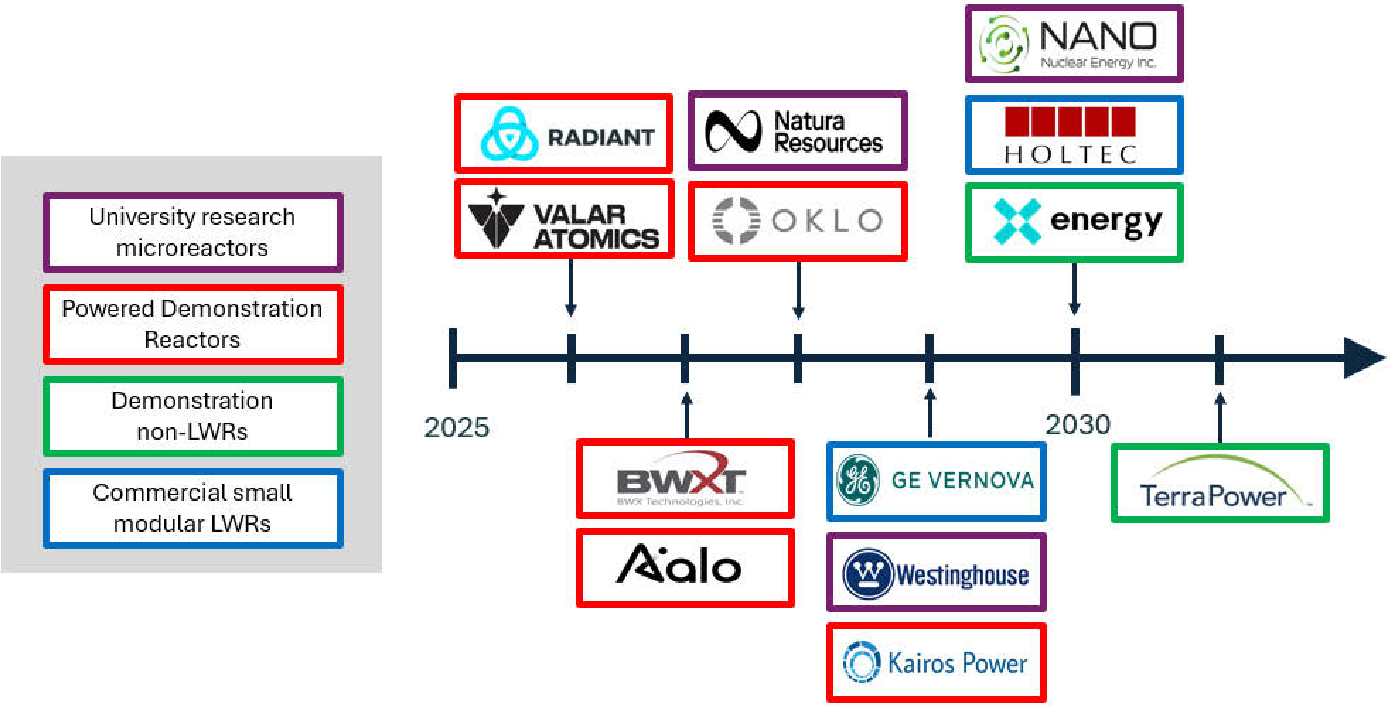


Figure 1: Announced Deployment Timeline for Selected Advanced Reactors Projects in the United States

Demonstration Non-LWRs: The U.S. Department of Energy Advanced Reactor Demonstration Program (ARDP) made demonstration reactor cost-share awards to X-energy and TerraPower. X-energy and Dow Chemical Company will build four Xe-100 reactors at Dow's Seadrift site to provide high-quality steam and electricity to power the plant's operations, and TerraPower is building their Natrium reactor to support clean repowering of a retiring coal facility in Kemmerer, Wyoming.

Commercial Small Modular LWRs: GE-Hitachi announced commercial partnerships with the Tennessee Valley Authority and Ontario Power Generation, and plans to deploy the BWRX-300 reactor technology at the Clinch River Site in Tennessee and the Darlington site in Canada. Holtec has announced plans to build the SMR-300 reactor technology alongside the restarting large LWR reactor at the Palisades Nuclear Power Plant in Michigan.

Powered Demonstration Reactors: Oklo and Aalo have both announced plans to construct and operate commercial demonstration reactors at the Idaho National Laboratory (INL). BWXT is also slated to deploy the Project Pele demonstration microreactor for the U.S. Department of Defense at INL. Kairos Power has started construction on their Hermes test reactor in the East Tennessee Technology Park and is currently licensing two additional test reactors on the site.

University Research Microreactors: Several advanced reactor developers are working with universities as sites and partners for their initial research microreactors. NANO Nuclear is partnering with the University of Illinois at Urbana Champaign on a high-temperature gas microreactor. Natura Resources is partnering with the NEXT Lab at Abilene Christian University (ACU) on a molten on a molten salt research reactor, and Westinghouse is partnering with Penn State University to begin the application process for building an eVinci microreactor at Penn State's new research facility.

Economics of New Nuclear Energy

Summary

- While the first new reactor projects will be expensive, repeated projects and "orderbooks" can help reduce costs over time, making each project less costly
- New reactors are designed to be economically competitive and reduce investor risks associated with construction.
- Nuclear reactors can economically provide energy over very long lifetimes, making them sound long-term investments.
- Levelized cost of energy (LCOE) estimates exclude system and firming costs such as new transmission and storage.
- Most analyses of decarbonization pathways confirm that **including firm energy sources such as nuclear energy decreases the overall cost of decarbonization.**
- **Host communities find nuclear power plants valuable** because they provide well-paying union jobs, investments, support the local tax base, and stimulate local economies.
- Recent interest demonstrates that new nuclear energy is particularly attractive as an option to power large load users and industrial operations

New reactor designs were developed with a specific focus on cost-competitiveness, and reducing construction complexity and risk compared to conventional nuclear plants. New reactors are designed for modular construction with reduced capital investment, and less construction complexity. **Modular construction allows major reactor and plant components to be manufactured in factories and assembled on-site, with the goal of reducing construction risk, shortening project schedules, and enabling repeatable deployment of advanced nuclear reactors.**

While the first deployments of advanced reactors will be expensive, repeated deployments can help reduce overnight capital costs by 40%, according to the DOE.

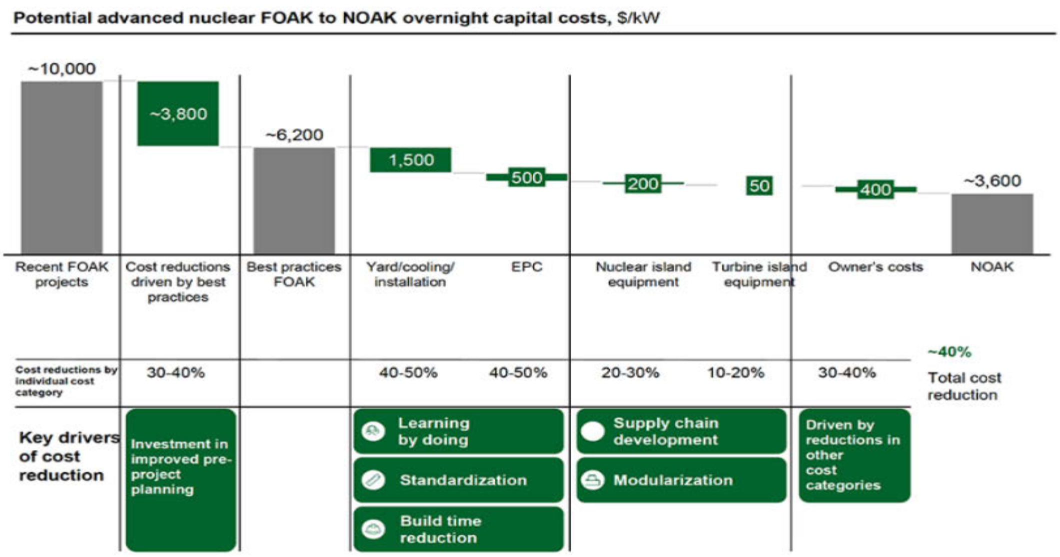


Figure 1: Impact of overnight capital costs on nuclear energy levelized cost of electricity. *Source: DOE Updated Advanced Nuclear Liftoff Report*

Nuclear power plants have the longest lifetime operation among energy sources. Nuclear power plants are typically designed to operate upwards of 60 years. The Nuclear Regulatory Commission (NRC) issues initial operating licenses for commercial power reactors to operate up to 40 years. These licenses can be extended for an additional 20 years at a time after an initial license, and many nuclear power plant operators are seeking or have been approved for a second license extension. Out of 94 operating commercial nuclear reactors in the United States, 90 have been granted their first license renewal, and 25 have been granted their second license renewal. Most advanced nuclear reactors are also expected to operate from 60 to 80 years or more.

LCOE estimates are often cited to compare the economics of power generation options. However, **the LCOE calculation has many limitations**, such as exclusion of transmission cost and firming capacity, and should be used in combination with other metrics and factors to give a more comprehensive view of the economic and environmental impact of specific generating technologies over their lifetime.

Including nuclear power gives the states the best chance to address decarbonization goals and energy security. Princeton University's Net Zero America study analyzed the ability and affordability of five distinct technological pathways, all using technologies known today, to decarbonize the U.S. economy. Out of the five pathways, all but one used nuclear energy and the pathway that used the largest amount of nuclear energy was also the most affordable. While it is impossible to predict the exact energy mix necessary to fully meet the world's needs for reliable, affordable and clean energy by 2050, nuclear energy will likely play a significant part.

Building new nuclear plants will allow communities to retain well-paying union jobs and a significant tax base. Beyond competitively priced power, nuclear energy brings significant economic benefits to individuals, local communities, and states. Each year, a typical commercial U.S. reactor generates tens of millions of dollars in state and local tax revenue, stimulating local economies through local infrastructure buildout and maintenance. Construction of new nuclear power plants also benefits local and regional suppliers of design, engineering, procurement, construction and consulting services. These are well-paying jobs with high union rates that will allow communities the opportunity to retain workforces as power plants retire and energy demand grows.

New nuclear energy can also re-power retiring fossil fuel sources. A September 2022 U.S. Department of Energy report on coal-to-nuclear feasibility found that advanced nuclear energy could play a major role in communities with retiring coal facilities. The DOE found that 80% of retired and operating coal power plant sites could host an advanced nuclear reactor. New reactors can also be sited on brownfield sites or near retiring fossil fuel plants. Siting on or near a retiring fossil fuel plant can allow a nuclear plant to repurpose infrastructure such as transmission lines, transformers, or switch-yard equipment. A coal-to-nuclear conversion could increase regional economic activity and add new, high-paying, permanent jobs to the region.

New reactors have the potential to supply low-cost, zero-carbon energy for data centers, industrial and other energy needs. Many new reactor designs will be able to operate at and produce high-temperature heat that can be used for industry, hydrogen production, desalination, and similar applications. This is why companies, like Dow Chemical, are exploring using high-temperature gas reactor technology to decarbonize some of their industrial processes. Furthermore, hyper-scalers like Google, Amazon and Meta are all incorporating new nuclear energy into their portfolio because of its ability to provide can supply clean, firm power for their energy intensive data center operations.

"What about the Waste?"

The U.S. nuclear power industry has safely and effectively managed nuclear waste and spent nuclear fuel (SNF) for decades. SNF is currently stored at facilities on nuclear power plant sites. Given the relatively small quantity of SNF compared to the energy generated, it is feasible to expand nuclear energy production and project development while safely and effectively managing spent fuel.

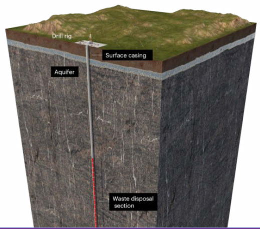
To summarize:

- **Safety**: Commercial SNF has been stored safely in the United States for decades.
- **Quantity**: The total amount of SNF produced in the United States is very small compared to the amount of energy it produces. In over 65 years of operation, the entire U.S. nuclear industry produced around 95,000 metric tons of SNF. For context, the amount of SNF generated from an individual's lifetime electricity consumption of nuclear-generated electricity would only fill a soda can.
- **Management**: SNF is currently stored safely at reactor sites across the United States in dry casks or in wet storage, and it is precisely tracked and managed. The nuclear energy industry is the only industry that is completely responsible for monitoring and managing every aspect of its waste and ensuring it does not negatively affect the public or environment.

There are several approaches to dispose of SNF:
While the current SNF management system in the United States is safe and robust, it is meant to only be an interim solution. Under the original Nuclear Waste Policy Act (NWPA), the U.S. Department of Energy (DOE) is responsible for taking waste from commercial reactor sites and putting it into long-term storage. However, DOE has yet to fulfill this responsibility. SNF will eventually need to be placed in a permanent storage facility. Alternative approaches are being developed, and more are being explored by innovators, to help safely and permanently dispose of SNF.

Geological Repositories

A geological repository is an underground facility designed for safe permanent disposal of SNF. Geological repositories are being implemented in several countries, including Finland and Sweden through successful consent-based siting implementation.



Deep Boreholes

Deep borehole technology would use advanced drilling techniques to safety store SNF deep underground in multiple boreholes. These boreholes could be easier to site and can be placed much deeper underground than mined repositories. Companies like Deep Isolation are already exploring this innovative solution.

Recycling

DOE is investing into two SNF recycling programs to reduce the volume needed to be stored and to provide fuel for advanced reactors. These include Optimizing Nuclear Waste and Advanced Reactor Disposal Systems (ONWARDS) and Converting SNF Radioisotopes Into Energy (CURIE). Combined, these programs were awarded $74 million in funding.

Innovative Policy Proposals

In 2026, the DOE issued a Request for Information (RFI) seeking state interest in hosting Nuclear Lifecycle Innovation Campuses. These campuses will serve as hubs that can support fuel fabrication, enrichment, advanced reactor deployment, spent fuel recycling, and waste management. 26 states responded and 9 states showed interest in hosting a repository or interim storage site. This signals a national interest in federal-state cooperation, not only on advanced reactor deployment, but on developing a more complete end-to-end strategy for managing spent nuclear fuel.

SNF from Advanced Reactors

Advanced reactors offer opportunities to change the conversation about SNF. **The characteristics of advanced reactor waste will vary depending on the reactor design**. The fuel cycle of advanced reactors varies, too, which affects the SNF generated. Additionally, advanced reactor designs generally offer greater efficiency and better utilization of nuclear fuel, which can reduce the rate at which SNF is generated per unit of nuclear energy produced.

The NIA report, From Reactors to Repositories: Disposal Pathways for Advanced Reactor Wastes characterizes the various waste streams that will be generated by advanced nuclear reactors and examines both interim storage and permanent disposal pathways. The graphic below summarizes these SNF forms. For more information on these SNF forms, along with details regarding their interim storage and permanent disposal considerations, see the full report or its summary for policymakers.

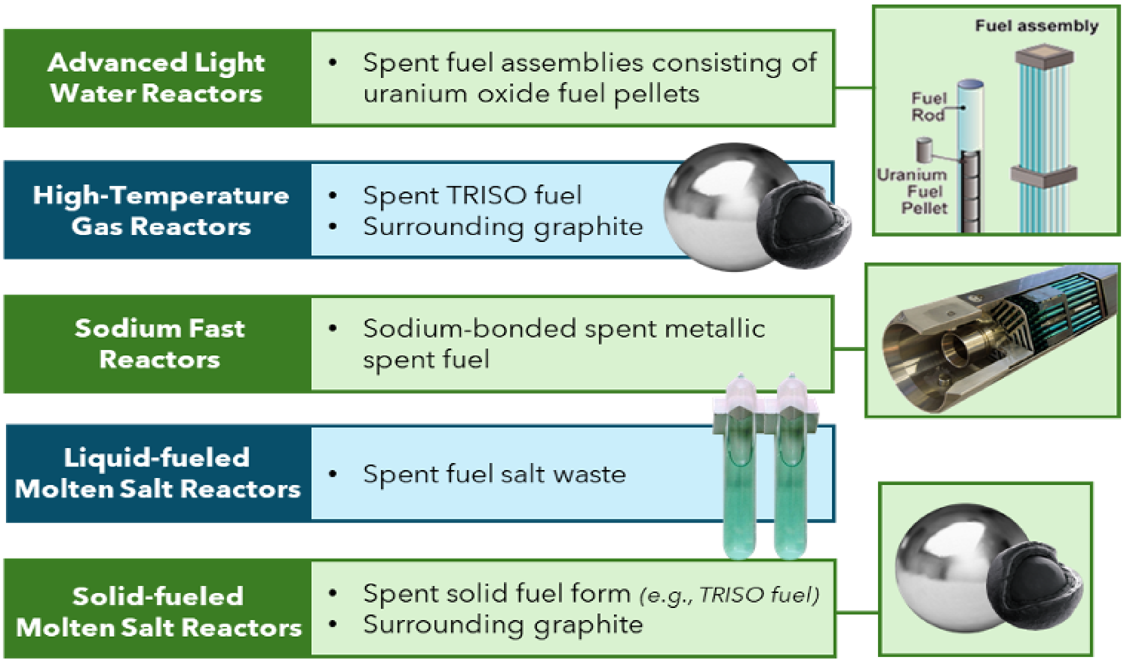


Figure 1: Spent nuclear fuel generated by several advanced reactor technologies. Source: NIA

Certain advanced reactor designs and fuel cycles can turn highly radioactive elements in SNF with extremely long half-lives into elements with much shorter half-lives. As a result, these designs could produce SNF that is radioactive for shorter time periods, which would significantly simplify the design and siting requirements for SNF disposal facilities. The SNF generated by different advanced reactor types will vary. The United States is well-positioned to manage advanced reactor waste in the near and intermediate term, but a permanent repository is still needed.

Conclusion

- SNF is safely stored at existing nuclear power plant sites across the United States.

- Recent studies suggest SNF from advanced nuclear reactors will be generally comparable to SNF generated by the existing nuclear reactors in terms of quantity, but there will be physical differences based on reactor technology.

- Broadly speaking, waste management of advanced reactor waste will generally look similar to conventional reactors, but the specific waste management strategies must be tailored to the specific waste being managed.

- The United States has a long history of safely managing SNF, and our current waste management system is well equipped to handle SNF from advanced nuclear reactors as they are deployed towards the end of this decade, and beyond.

Safety of New Nuclear Energy

Summary:

New nuclear reactors build upon the experience and lessons learned from the existing fleet of nuclear reactors and incorporate innovations that promote even safer operations. Nuclear energy remains one of the safest forms of energy production available. Based on operational experience and lessons, advanced reactors feature innovations that further reduce the risks and consequences of accidents. These can include:

- Additional inherent and passive safety designs
- Reduced inventory of radioactive material
- New and more robust fuel forms
- Operating at reduced or atmospheric pressure
- Underground plant structures to limit operational and security risks

Today, the NRC is rigorously evaluating the safety functions of new reactor designs. New designs may achieve these safety functions through combinations of passive and inherent safety features that rely on fundamental physical principles rather than active systems requiring operator action or electrical power. These features aim to enhance safety by eliminating or reducing dependence on active systems that can fail during accidents. The NRC uses a technology-inclusive, risk-informed, and performance-based approach to assure that developers incorporate a balance of passive and active systems to optimize safety performance.

To prepare for advanced reactor deployment, the NRC is modernizing its licensing framework and developed new review approaches that allow innovative technologies to be evaluated while maintaining the same high standards of public health and safety. Recent NRC actions, including updated emergency planning requirements for certain advanced reactors, reflect the agency's assessment that some designs may pose lower off-site risks than today's operating reactors.

Figure 1: Example of TRISO fuel developed by advanced nuclear reactor companies NANO Nuclear and X-energy

New Fuel Forms

Several new reactors will utilize fuel forms that are safer and accident tolerant. These new fuel forms, such as liquid fuel, and TRISO fuel (shown above), are designed to withstand higher temperatures, corrosion, and neutron irradiation. New fuel forms, combined with other inherent and safety features of new reactors, will ensure that nuclear energy continues to be one of the cleanest and safest forms of energy generation.