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The GAIN Resource Kit

The [Gateway for Accelerated Innovation in Nuclear \(GAIN\)](#) Resource Kit is a compilation of publicly available information on advanced nuclear technology and other aspects related to deployment. Advanced nuclear energy is being developed and adopted across the country; this resource kit equips stakeholders with accurate resources to better understand what nuclear energy has done and can do in states across the U.S. Each resource is linked and there's a description below the link to help you better understand how it can serve you.

Part 1: Introduction to Advanced Nuclear

Nuclear 101

- [Advanced Nuclear 101](#) (Third Way)
 - This report presents a basic introduction to the different technologies under development and illustrates the need for further private and public sector research into next-generation nuclear energy.
- [Advanced Nuclear Reactor Technology: A Primer](#) (NIA)
 - The Nuclear Innovation Alliance provides fundamental information on advanced nuclear reactors for the public and stakeholders to familiarize themselves with the achievements and new developments occurring with nuclear technologies.
- [What is operating in the US currently?](#) (NEI Map)
 - The Nuclear Energy Institute (NEI), a non-governmental policy organization of nuclear technologies, has mapped out where the 92 operating nuclear reactors are located today. Select your state's fact sheet to see how nuclear energy benefits your community.
- [Advanced Nuclear and Supply Chain Directory](#) (GAIN)

- GAIN created a directory that provides an inside look into the nuclear energy industry, including a list of developers, suppliers, and national laboratories.
- [How to Reform Nuclear Policy?](#) (ClearPath)
 - Read ClearPath's advice on reforming nuclear policy
- Overview of Nuclear Waste/Spent Fuel
 - Below are the general facts regarding nuclear waste. In a later email, you will learn more about how nuclear waste is being dealt with today.
 - [What is nuclear waste?](#) (NEI)
 - Learn about the fundamentals of nuclear waste
 - [Spent Nuclear Fuel \(SNF\) fact sheet](#)
 - This sheet provides information on spent nuclear fuel from boiling water reactors and pressurized water reactors—two types of commercial nuclear reactors operating in the U.S today.
 - Consider these [five facts](#) about spent nuclear fuel from the Department of Energy.

What's Going On?

- [Milestones in Advanced Nuclear](#)
 - The industry is growing fast. In order to keep up with what's going on, GAIN and Envoy Public Labs have created Milestones in Advanced Nuclear as a one-stop portal to crucial developments in the advanced nuclear energy industry. Sign up for email alerts to stay on top of advanced nuclear milestones.
- Demonstrations
 - [ARDP](#): In 2020, the Department Of Energy (DOE) launched the Advanced Reactor Demonstration Program (ARDP) with the Office of Nuclear Energy to provide \$160 million for initial funding to build two reactors that can be operational within the next five to seven years. DOE [awarded TerraPower](#), Bellevue, WA and [X-energy](#), Rockville, MD \$80 million each in initial funding to build two advanced nuclear reactors within seven years. The awards are cost-shared partnerships with industry.
 - [ARDP Timeline](#): Third Way created this video to help better understand the ARDP timeline
 - [Hydrogen](#): The DOE is investing billions of dollars to reduce the cost and increase the production of clean hydrogen using the country's existing energy resources, such as nuclear power plants.
 - [Nine Mile Point](#)
 - [Davis-Besse](#)
 - [Prairie Island](#)
 - [Palo Verde](#)
 - [Carbon Free Power Project](#): The CFFP, which will be NuScale Power's first small modular reactor (SMR) plant in the U.S to begin operation, will be located near Idaho Falls at the DOE's Idaho National Laboratory.

Part 2: Advanced Nuclear Capabilities

How does nuclear fit in?

- Do the math yourself ([Energy Calculator](#))

- To help communities better understand their energy choices, GAIN developed this Energy Calculator
- [Vibrant Clean Energy Study](#) (NEI)
 - This study, which was commissioned by the Nuclear Energy Institute, examines the potential for advanced nuclear technologies to contribute to a clean and reliable source of electricity in a decarbonized energy system.
- [E3 Study on Energy Northwest](#)
 - This report examines the role of zero-emitting resources in meeting future energy needs under state-based carbon policies.
- [Nuclear Energy as a Keystone Clean Energy Resource](#) (NARUC)
 - This report examines the contributions nuclear energy has made in providing carbon-free, reliable, and economic benefits to states; it cross-examines the setbacks nuclear energy has faced and discusses potential efforts to avoid future setbacks.

Electric and Non-Electric Applications

- Electricity
 - [Coal Transitions](#)
 - Nuclear reactors can be sited at a retired coal power plant; this is called a coal-to-nuclear transition. This report presents a case study and evaluates the impacts and outcomes of a coal-to-nuclear transition.
- [Non-Electric](#): Nuclear power can be used beyond generating electricity. Learn about the other implications nuclear energy can have below.
 - [Hydrogen and Nuclear](#)
 - [Heat-Intensive Industry](#)
 - [Integrated Energy Systems](#)
 - [Advanced Manufacturing](#)

Part 3: Exploring Nuclear

Show Me the Money: Federal Funding Avenues

- [Vouchers](#)
 - The U.S Department of Energy's Office of Nuclear Energy (DOE-NE) vouchers provide funds to assist applicants seeking access to the world-class expertise and capabilities available at DOE's national laboratories.
- [Technology Commercialization Fund \(TCF\)](#)
 - Established through the Energy Policy Act of 2005, the TCF aims to promote promising energy technologies for commercial purposes. The TCF is overseen by the Office of Technology Transitions (OTT).
- [Loan Program Office \(LPO\)](#)
 - The Department of Energy's Loan Program Office finances large-scale energy infrastructure projects; explore the technology sectors the LPO has helped support.
- [Advanced Research Projects Agency-Energy \(ARPA-E\)](#)

- The ARPA-E advances high-potential, high-impact energy technologies that are too early for private-sector investment. Explore the programs and projects on their website linked above.
- [Interagency Working Group on Coal & Power Plant Communities & Economic Revitalization](#)
 - Short for “Energy Communities IWG”, the interagency working group initiative targets federal engagement and investment to help communities revitalize their economy. Funding opportunities are compiled into categories and are updated weekly.
- [EDA Distressed Area Recompete Pilot Program](#)
 - The US Economic Development Administration’s (EDA) Recompete Pilot Program “aims to meet communities where they are by offering grant opportunities” to forgotten communities “that ensure sustainable and equitable economic growth across the United States.”

The Policy Options

- [NEI Policy Options](#)
 - This document identifies policy tools already in use or being considered by state decision-makers to achieve energy goals through the deployment of advanced nuclear technologies.
 - [Advanced Reactors for State Policymakers, In Brief \(NIA\)](#)
 - This Brief describes advanced reactors, the benefits, and existing federal policies enabling their existence. It also provides case studies of emerging state leaders in advanced reactor technology, and lastly, provides a compendium of topics like reactor safety and waste remediation.
- [Advanced Nuclear Technology Taxonomy](#)
 - To help understand the complex definitions of advanced reactors, GAIN, along with a group of stakeholders, developed this guide.
- [NARUC/DOE-NE Partnership](#)
 - The National Association of Regulatory Utility Commissioners (NARUC) launched a five-year Nuclear Energy Partnership with support from the U.S Department of Energy. The educational partnership identifies the possibilities for the U.S nuclear fleet and the barriers associated with the technology and provides analysis on regulatory issues, which leads to workshops and forums at NARUC’s state membership. The partnership website is above, and more details can be found in [this press release](#).
- [NGA’s Nuclear Learning Collaborative Series](#)
 - The National Governors Association (NGA), in collaboration with the Department of Energy Office of Nuclear Energy (DOE-NE), is hosting a four-part educational series for Governors’ advisors to explore different aspects of nuclear opportunities, policy options, and lessons learned.
- [ECA’s New Nuclear Initiative](#)
 - The Energy Communities Alliance (ECA) Board of Directors created a self-funded initiative to define the role of local governments in supporting the development of new nuclear technologies. Local governments have filled vital roles, like establishing U.S-based supply chains and promoting training programs at local colleges around nuclear sites.

- [NCSL Nuclear Legislative Working Group](#)
 - The National Conference of State Legislatures conducts policy research across 1,400 issue areas. NCSL's Nuclear Legislative Working Group provides legislative members with opportunities to learn about nuclear energy issues, federal nuclear weapons production and research facilities, and transportation and storage of radioactive waste.
- [State Nuclear Regulatory Dashboard](#)
 - There's been a growing number of states that have passed laws or are considering legislation on nuclear energy. GAIN and [Envoy Public Labs](#) have created this dashboard to keep track of nuclear-related policy at the state level.

Addressing Nuclear Waste

- [Consent-Based Siting](#)
 - The DOE is ultimately responsible for the management of the nation's nuclear waste and is committed to a consent-based approach that focuses on the needs and concerns of people and communities
- Recycling the waste: Nuclear reprocessing/recycling is the chemical separation of fission products and actinides from spent nuclear fuel. Click the links below to learn about how the U.S is approaching spent fuel recycling.
 - [Policy principles for recycling spent fuel](#)
 - [PNNL - Research on spent fuel recycling](#)
 - [World Nuclear Organization - Detailed Overview on reprocessing spent nuclear fuel](#)

Part 4: Resources for Exploring Nuclear

By now, you've been presented with introductory information and current ongoings regarding advanced nuclear energy; here, you will find ongoing initiatives, important contexts, recognized organizations, and more. Having explored the resources, you can reach out to GAIN if you see advanced nuclear technology as a possible fit in your state; as a Department of Energy initiative, GAIN will remain a resource for you when it comes to advanced nuclear technology. Please [fill out this form](#) if you have any questions about the resources.

Licensing Regulation

- [IAEA Milestones Approach](#)
 - The Milestones Approach assists countries considering or planning their first nuclear power plants to understand the commitments and obligations associated with developing a nuclear power program.
- [Duke Public-Facing Timeline](#) (Pgs. 12-13)
 - Duke illustrates the steps required to build an advanced nuclear facility and have it online by mid-2032 in the utility's carbon-reduction plan.
- Nuclear Regulatory Commission 101
 - [History 101](#)
 - [Background on the Nuclear Power Plant Licensing Process](#)
- [What is an agreement state?](#)
 - [Facility Locator](#)

- Use the following pages to find operating power reactors and major nuclear fuel facilities licensed by the U.S. Nuclear Regulatory Commission (NRC), as well as sites undergoing decommissioning.
- Alaska's New Regulation on Nuclear Facility Siting
 - Alaska's Department of Environmental Conservation has adopted regulations to create a new chapter in its Administrative Code to provide nuclear facility siting permit regulations. [This Responsiveness Summary](#) responds to the public comments they received and also provides background on what prompted the policy change. The final code the department issued can be found [here](#).

Useful Reports

- [Pathways to Commercial Liftoff: Advanced Nuclear](#) (DOE)
 - The DOE's Pathways to Commercial Liftoff offers insights to both public and private sector investors with potential timelines and methods for widespread commercial integration of different technologies. The Liftoff report is a "living document" and will be updated to reflect evolving prospects to capture the dynamic landscape of advanced nuclear technology.
- [EPRI Siting Guide PDF](#) ([video](#))
 - To build and operate a new commercial nuclear energy facility, organizations must obtain approval from the relevant regulatory authority and choose a site that meets both business and regulatory requirements. This report guides organizations on conducting studies for both business and regulatory reviews of a proposed site for a new nuclear plant.
- [EPRI Technology Assessment Guide](#)
 - This report contains guidance on selecting technologies for review, and then ultimately settling on a design to pursue. It provides a process framework for systematically reviewing the available reactor technologies to identify the ones that best fit an owner-operator's goals, and then delving into a more detailed review of individual designs.
- [EPRI Economic-Based Research and Development Roadmap for Nuclear Power Plant Construction](#)
 - This report identifies methods and technologies that could enable a reduction in cost for new nuclear plants and develops a cost estimation tool that can be used to determine the main cost drivers. Drivers for both first-of-a-kind (FOAK) and Nth-of-a-kind (NOAK) construction are considered, but the cost estimation tool is based on NOAK.
- [E3 Pacific Northwest Zero-Emitting Resource Study](#)
 - This report was commissioned by Energy Northwest, a community-owned utility located in Washington, to explore the potential of multiple clean-energy resources to meet the state's 100% clean energy goal. This report shows that without new nuclear construction in the state, utilities in Washington are going to have to extremely overbuild renewable energy capacity to achieve full decarbonization.
- [ACEP Small Scale Nuclear Power: An Option for Alaska?](#)
 - This report was put together by the Alaska Center for Energy and Power at the University of Alaska Fairbanks and looks at the possibility of replacing the highly volatile diesel fuel that supplies much of the electricity and heat in Alaska with a series of new nuclear microreactors.

- [INL Global Market Analysis of Microreactors](#)
 - This report was put together by folks at Idaho National Laboratory to assess the unique capabilities of microreactors and assess potential deployment in specific global markets in the 2030-2050 timeframe, with consideration for regulatory limits.
- [ORNL Integrated Energy System Investigation of an Eastman Chemical Company Facility](#)
 - The Eastman Chemical Company facility in Kingsport, Tennessee provides all of the facility's steam and most of the electrical needs through a series of 17 coal and natural gas boilers. This report looks at the possibility of decarbonizing processes at the facility through the use of new nuclear construction.
- [X-energy Feasibility Assessment and Economic Evaluation: Repurposing a Coal Power Plant Site to Deploy an Advanced Small Modular Reactor Power Plant](#)
 - Funded under a grant from the Maryland Energy Administration, X-energy and Frostburg State University performed this report to study the technical and economic feasibility of replacing an unnamed coal plant in Maryland with X-energy's high-temperature, gas-cooled reactor.

Organizations

- Federal
 - Department Of Energy
 - [Office of Nuclear Energy \(NE\)](#)
 - [Office of Clean Energy Demonstrations \(OCED\)](#)
 - [Gateway for Accelerated Innovation in Nuclear \(GAIN\)](#)
 - [National Reactor Innovation Center \(NRIC\)](#)
- Research Organizations
 - [Electric Power Research Institute \(EPRI\)](#)
 - [Advanced Nuclear Technology Program \(ANT\)](#)
 - The ANT Program aims to improve efficiency by creating technical products and tools that reduce the risks and uncertainties involved in deployment and operation. R&D efforts focus on addressing the challenges of deploying nuclear power plants of all types and designs."
- Trade Associations
 - [United States Nuclear Industry Council \(USNIC\)](#)
 - [Nuclear Energy Institute \(NEI\)](#)
 - [American Nuclear Society \(ANS\)](#)
- NGOs
 - [ClearPath](#)
 - [Clean Air Task Force \(CATF\)](#)
 - [ThirdWay](#)