ADVANCED NUCLEAR ENERGY COMMITTEE

Section 1 of House Bill 1025 (2025) required the Legislative Management to establish a committee to study the feasibility, siting, and deployment of advanced nuclear power plants in the state. The committee was required to consist of two members representing the energy industry, appointed by the Legislative Management, one member appointed by the Public Service Commission (PSC), one member appointed by the Industrial Commission, one member appointed by the Director of the Department of Water Resources, and legislative members from the House of Representatives and Senate, appointed by the majority leader of each respective house. The study required an evaluation of:

- Siting locations, including potential greenfield and brownfield sites, the identification and assessment of undeveloped land suitable for construction, developed land suitable for rehabilitation and reuse, geographical locations, environmental impacts, proximity to infrastructure, and community acceptance;
- Electric grid connectivity, including the capacity of the electrical grid and integration of a nuclear power plant to the state, necessary upgrades and expansions to ensure reliability, and recommendations adhering to national and state electric standards and regulations;
- Land use considerations, including long-term sustainability of proposed sites, environmental and social factors, land use patterns and zoning regulations, potential impacts on local land use, and proposed mitigation strategies;
- Economic impacts, including potential tax revenue, job creation during construction and operation of a nuclear facility, economic impacts on local and state economies, and investor appeal;
- Temporary and permanent nuclear waste storage, including in-state and out-of-state siting locations;
- Small modular and micro nuclear reactors, including the feasibility of constructing and operating small modular and microreactors to generate power in the state; and
- Provisions of the North Dakota Century Code which place restrictions on advanced nuclear energy development, if any.

The study also required the committee to invite participation from an institution of higher education for assistance in evaluating social interests and community acceptance of potential siting locations. Section 2 of House Bill 1025 provided an appropriation of $300,000 to the Legislative Council for the purpose of contracting for consulting services for the study.

Committee members were Senators Dale Patten (Chairman), Cole Conley, Claire Cory, David Hogue, and Tim Mathern; Representatives Dick Anderson, Macy Bolinske, Ben Koppelman, Alisa Mitskog, SuAnn Olson, Mike Schatz, and Don Vigesaa; and Citizen Members Pam Gorman Prochaska, Reice Haase, Sheri Haugen-Hoffart, Gavin McCollam, and Claire Vigesaa.

BACKGROUND

States across the country are actively engaging in policy discussions related to advanced nuclear energy. As technological demands increase, driven by factors such as rapid growth in artificial intelligence and data center infrastructure, legislatures and government agencies are evaluating the role of advanced nuclear energy as a potential power source to meet long-term energy needs. North Dakota recently joined the growing number of states evaluating the feasibility of deploying advanced nuclear power within its borders.

Advanced Nuclear Energy Overview

History of Nuclear Power

The committee was provided an overview of the history of nuclear power in the United States, including the early decades of nuclear research and development, construction of the world's first nuclear reactor in Chicago in 1942, the transition from a focus on nuclear weapon development for military use to nuclear energy development for peaceful civilian purposes, the rise and fall of nuclear development from the mid-1950s to the early 2000s, and the nuclear energy renaissance in more recent years. Today, nuclear power remains a notable power source in the United States. As of February 2025, the United States' nuclear fleet consisted of 54 nuclear power plants, with each containing one to four operating units. As of 2024, more than 18 percent of electricity in the United States is generated by 94 reactors in 28 states. In 2024, nuclear power plants in the United States generated nearly 782 billion kilowatt-hours of electricity, which is enough electricity to power more than 72 million homes.

Brief Overview of Advanced Nuclear Technologies

Advanced nuclear technology has emerged as a potential solution for the future of nuclear energy in the United States, and has been described by advocates as clean, reliable, affordable, and safe. Advanced nuclear technology differs from traditional nuclear power in a number of ways. The next-generation reactors, often referred to as "advanced reactors," encompass many designs, models, and technologies with unique features and benefits that differ from reactors

used in conventional nuclear plants (i.e., light water reactors). Compared to existing operating reactors, advanced reactors incorporate innovative technologies, including passive safety features, alternative fuel or coolant types, or smaller reactor sizes. These advanced reactors differ in size depending on energy needs. Two common sizes of advanced reactors include:

- **Small Modular Reactors (SMRs)**, with an electricity production capacity of up to 300 megawatts electric, which can connect to other reactors. In contrast to a conventional reactor built onsite at a nuclear power plant, an SMR can be built in a factory and shipped intact or in pieces, which allows for streamlined construction at a lower cost.
- **Microreactors**, which are more compact than SMRs with an electricity production capacity ranging from 1 to 10 megawatts electric. Some microreactor models are highly portable, enabling transport by truck, cargo plane, or helicopter.

Currently, there are no operating advanced SMRs or microreactors in the United States. However, there are several projects in progress, several of which are in the permitting and development stages.

Federal Executive Support of Advanced Nuclear Energy

The current federal executive administration has expressed consistent support for advanced nuclear energy development, including multiple executive actions in 2025 encouraging expedited advanced nuclear reactor deployment. On the first day of his second term, President Donald Trump issued Executive Order 14154, titled "Unleashing American Energy," which, in part, encouraged the development of nuclear energy resources. Shortly after, the Secretary of Energy issued a February 5, 2025, Secretarial Order, titled "Unleashing the Golden Era of American Energy Dominance," which directed the Department of Energy (DOE) to take immediate action to unleash American energy in accordance with the President's executive orders.

On May 23, 2025, President Trump signed four more executive orders related to nuclear energy, including executive orders related to deploying advanced nuclear reactor technologies for national security, reforming the Nuclear Regulatory Commission (NRC), reforming nuclear reactor testing at the DOE, and reinvigorating the nuclear industrial base.

Federal Legal and Regulatory Framework

The regulation of nuclear energy in the United States is distinct from other forms of energy regulation. In the United States, nuclear reactors and nuclear power facilities are highly regulated at the federal level. Several key federal statutes and regulations form the legal framework for nuclear energy.

Federal Legislation

The committee was provided an overview of the primary statutes governing nonmilitary nuclear energy, including the Atomic Energy Act of 1954 (AEA), the Energy Reorganization Act of 1974, and an overview of more recent legislation supporting or incentivizing advanced nuclear reactors, including the Nuclear Energy Innovation and Modernization Act (NEIMA) and the Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy Act. The NEIMA was passed in 2019 with the primary purpose of modernizing the NRC's functions. The legislation primarily accomplished this purpose by directing the NRC to develop a licensing framework for advanced nuclear reactors within 2 years and to complete an optional technology-inclusive licensing framework by 2027, which is expected to be issued in 2027. The Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy Act built on the successes of NEIMA to further modernize licensing approaches for new reactor technologies, including advanced reactors and microreactors.

Nuclear Regulatory Commission Regulations

The NRC is an independent regulatory agency consisting of five commissioners appointed by the President and confirmed by the Senate for 5-year terms. Pursuant to the authority under the AEA and the Energy Reorganization Act, the NRC promulgates regulations codified in Title 10, Code of Federal Regulations (10 CFR), which govern various regulatory aspects of nuclear energy. The NRC has regulatory authority over the design, construction, and operation of nuclear reactors and nuclear power facilities, and over the handling, storage, and disposal of nuclear fuel and nuclear waste. The NRC exercises its oversight authority over commercial nuclear reactors through federal regulations regarding licensing, operational oversight, and incident response protocols.

A notable regulatory responsibility of the NRC is the licensing of nuclear reactors and power facilities, including the licensing of advanced reactors. Nuclear Regulatory Commission approval is required before a nuclear reactor may be constructed and operated. The NRC currently administers two distinct pathways for nuclear reactor licensing under 10 CFR, parts 50 and 52, and a proposed third pathway is in progress.

- **Construction Permit and Operating License (10 CFR part 50)** - Under this traditional two-step licensing framework, applicants must first secure a construction permit based on preliminary safety and environmental reviews. After construction is complete and the design details are submitted, the applicant may apply for a separate operating license.

- **Combined License (10 CFR part 52)** - In 1989, the NRC improved regulatory efficiency using an alternative licensing process under 10 CFR part 52, which allowed the NRC to issue a combined license that encompasses both the construction permit and operating license.
- **Proposed Risk-Informed, Technology-Inclusive Regulatory Framework (10 CFR part 43)** - Following the passage of NEIMA in 2019, the NRC was required to develop a third pathway designed to more specifically accommodate advanced reactors. The proposed rule would establish an optional technology-inclusive regulatory framework for use by new commercial advanced nuclear reactor applicants and would use methods of evaluation that are flexible and practicable for application to a variety of advanced reactor technologies. The proposed rule was published in the Federal Register for public comment, and the public comment period closed on February 28, 2025. The final rule is expected to be issued no later than the end of 2027, in accordance with NEIMA.

While there may be nuances depending on the specific regulatory activity or pathway, the NRC licensing process generally follows a consistent set of major steps, which include preapplication processes, application submission, review, docketing, safety review, environmental review, various administrative procedures, and application approval.

Radioactive Nuclear Waste Management Laws

Federal Law

The committee was provided an overview of federal laws related to management of radioactive nuclear waste, including the Nuclear Waste Policy Act of 1982, the AEA NRC Agreement State Program, and the Low-Level Radioactive Waste Policy Amendments Act of 1985.

State Law

The committee also received information regarding North Dakota Century Code Chapter 38-23, related to high-level radioactive waste. Section 38-23-01 prohibits the "placement, storage, exploration, testing, or disposal of high-level radioactive waste within the exterior boundaries" of the state. Section 38-23-03 provides the Industrial Commission serves as the point of contact for the DOE on any matter related to the storage or permanent disposal of high-level radioactive waste within the state and authorizes the Industrial Commission to issue a notice of disapproval regarding a proposed high-level radioactive waste facility in accordance with federal law when the Legislative Assembly is not in session. Section 38-23-04 provides for a permitting process and requirements for the testing, exploration, excavation, drilling, boring, or operation of a high-level radioactive waste facility.

Section 38-23-08 created the High-Level Radioactive Waste Advisory Council. Under this section, the council is required to review site suitability and issue reports to the Legislative Assembly or Industrial Commission for any proposed high-level radioactive waste facilities, review and make recommendations to the Industrial Commission regarding rules and standards relating to high-level radioactive waste, consider any other matter related to Chapter 38-23 deemed appropriate, and report its findings biennially to the Industrial Commission and Legislative Management.

State Regulation of Nuclear Energy

Although nuclear reactors and nuclear power facilities are primarily regulated at the federal level, state governments can and have imposed regulations that affect nuclear power plants. However, it is important for states to be mindful of potential federal preemption implications when considering policies that specifically regulate nuclear reactors or nuclear power facilities.

To date, North Dakota has not adopted any policies specifically regulating nuclear reactors or nuclear power facilities. Regulations in other states vary substantially, from minimal regulation to outright prohibition on the construction of new nuclear facilities. Several states maintain statutory or constitutional restrictions on new nuclear power facility construction using mechanisms such as waste disposal requirements, voter or legislative approval requirements, or complete bans. In 2024, 25 states took "pro-nuclear" action and public utility commissions in 7 states approved orders or took action in support of nuclear energy. Recent policy trends include the formation of task forces, commissions, studies, and state energy plans; the creation of financing and tax incentives; programs focused on increasing the value of carbon-free electricity generation; repeal of laws prohibiting nuclear development; and adoption of regulations or regulatory action to increase state regulatory responsibility in support of new or existing nuclear development.

Significant North Dakota Legislation

The committee reviewed recent legislation related to nuclear energy, including legislation approved by the 68th and 69th Legislative Assemblies.

In 2023, the Legislative Assembly passed two resolutions related to nuclear energy: one urging the federal government to recognize natural gas and nuclear energy as environmentally sustainable economic activities, and the other recommending a study including evaluation of the feasibility of advanced nuclear energy development and transmission in the state. The study was assigned to the 2023-24 interim Energy Development and Transmission

Committee, and as the study progressed, the committee determined that evaluating the topic was a larger undertaking than anticipated and should continue into the next interim.

In 2025, in addition to the bill directing the committee's study, the Legislative Assembly enacted House Bill 2159, which allowed the State Energy Research Center to research or pursue projects that will result in the exploration, storage, treatment, or disposal of high-level radioactive waste aboveground in the state with Industrial Commission approval and in consultation with the High-Level Radioactive Waste Advisory Council.

TESTIMONY AND COMMITTEE CONSIDERATIONS

General Information

The committee received testimony from a representative of the Gateway for Accelerated Innovation in Nuclear, a DOE initiative that helps states, developers, and other stakeholders access the expertise and resources of the national laboratories while supporting state engagement in nuclear energy. According to the testimony, nuclear power can help communities meet rapidly increasing electricity demand driven by artificial intelligence, data centers, and cryptocurrency operations, while providing long-term employment opportunities and economic growth. A single uranium fuel pellet has as much energy as 17,000 cubic feet of natural gas, 149 gallons of oil, and 1 ton of coal. The representative also noted that interest in nuclear energy is growing throughout the region, with varying levels of engagement in Colorado, Iowa, Minnesota, Montana, Nebraska, Saskatchewan, South Dakota, and Wyoming.

The committee received an overview of the nuclear power industry from a representative of the Nuclear Energy Institute (NEI), the policy and membership organization for the nuclear industry, which represents over 350 members across 17 countries. Testimony indicated the United States currently operates 94 nuclear reactors at 53 nuclear plant sites, which generate 43.4 percent of the nation's clean electricity and about 20 percent of total electricity generation. The nuclear energy industry contributes federal, state, and local tax revenue, provides high-paying jobs, and plays a significant role in the nation's economic growth. Industry members are planning for new nuclear power investments, with opportunities for 100 gigawatts of new nuclear capacity identified by the 2050s, which is equivalent to roughly 300 SMR-scale facilities. Numerous advanced reactor technologies are under development or licensing review, and testimony indicated as many as 530 reactors could be operating in North America by the early 2030s.

The committee received information from several representatives of the Idaho National Laboratory (INL) regarding a variety of advanced nuclear energy topics. The INL is 1 of 17 DOE national laboratories with a mission to discover, demonstrate, and secure innovative nuclear energy solutions, other clean energy options, and critical infrastructure. The INL site includes 4 operating reactors, 49 radiological facilities, 114 miles of high-voltage transmission and distribution lines, 8 substations with interfaces to 2 power providers, and 3 fire stations. In addition to conducting nuclear technology research and development, INL also is exploring the intersection of artificial intelligence with nuclear energy, research and development related to critical minerals and materials, and use of integrated energy systems to integrate nuclear energy with other energy sources.

Consultant Selection

The Legislative Council issued a request for proposals for consultant services related to the committee's study of advanced nuclear energy. Nine organizations submitted proposals to the Legislative Council in response to the committee's request for consultant services, and the committee selected Nucleon Energy Inc. (Nucleon) to provide consultant services for the committee. Nucleon provided five reports to the committee, a final report and four independently issued companion reports, each of which addressed certain topics required to be evaluated for purposes of the study.

Electric Grid Connectivity and Siting and Land Use Considerations

Nucleon Siting and Land Use Report

Representatives of Nucleon presented a report evaluating siting and land use considerations for advanced nuclear development, including an evaluation of statewide conditions, the screening and scoring of potential nuclear siting areas, and a framework for future siting efforts and stakeholder engagement. Using a subset of NRC criteria for siting nuclear projects, the consultants identified seven areas of interest which appear to be technically capable of supporting SMR development under current conditions. The report identified areas of interest in northwestern North Dakota, near Killdeer, southwestern North Dakota, northeastern North Dakota, near Jamestown, near Tower City, southeastern North Dakota, and eastern North Dakota.

The areas of interest were selected based on a combination of land availability, transmission strength, water resources or cooling alternatives, access to logistical infrastructure, and workforce availability. The analysis suggested each identified area could support at least two 100-megawatt reactors, and a subset of the areas of interest could support two 300-megawatt reactors. Several regions, particularly in eastern North Dakota, may be capable of supporting larger reactor deployments if the state's utilities or private developers determine additional capacity is warranted.

The consultants emphasized community acceptance and early stakeholder engagement are critical components of the siting process. Although the screening identified locations that appear technically suitable for nuclear development, the analysis did not assess local support, community preferences, or other social considerations that may influence siting decisions.

Electric Grid Capacity and Demand

The committee received testimony from a representative of the Industrial Commission regarding the large-load impact study the commission conducted with the Energy and Environmental Research Center. The study examined the effects of additional large electrical loads on the state's transmission system and identified the top 10 binding constraints requiring system upgrades to accommodate new large electrical loads. The study results indicated adding large loads without corresponding electric generation would increase congestion and locational marginal prices. The study also suggested strategic infrastructure planning could provide new economic opportunities for the state.

A representative of the PSC provided testimony regarding projected electricity demand growth and the potential role of advanced nuclear energy in the state's energy portfolio. According to the testimony, retail energy sales in the state increased by 243 percent between 1998 and 2023, largely attributable to commercial and industrial customers, and utility companies are forecasting significant increases in demand. Considerations related to nuclear energy development include spent fuel storage, higher construction costs and longer development timelines compared to other generation types, and the limited ability of nuclear facilities to quickly adjust output compared to coal or natural gas facilities. The representative also emphasized the importance of the commission's duty to ensure decisions regarding new large-load developments do not harm existing ratepayers.

The committee received testimony from representatives of two major regional transmission organizations, the Midcontinent Independent System Operator (MISO) and the Southwest Power Pool (SPP), regarding electric grid capacity and considerations for planning and implementing grid-connected projects.

A representative of MISO testified that nuclear generation represents about 6 percent of installed generating capacity in the MISO region and produces about 14 percent of the region's energy. Although additional nuclear generation is beginning to come onto the system, few SMR projects are being developed in the region. Load growth across the MISO region has remained relatively flat between 2015 and 2025; however, projections indicate a significant increase in load growth driven by various factors, the most significant of which include industry development and reshoring, electric vehicles, and data centers. The testimony also indicated MISO typically does not weigh in on siting decisions for new nuclear generation because the decisions are made by the state regulatory commissions and load-serving entities in each state.

A representative of the SPP testified electricity demand is rising nationwide and is driven by new sources of electricity demand, including data centers, cryptocurrency mining, oil and gas production, and electric vehicles. As coal and gas generators retire, the region increasingly relies on renewable energy resources, which offer cleaner and lower-cost power, but also bring challenges because of its variability. The SPP region has two operating nuclear facilities, one in Nebraska and another in Kansas, neither of which are scheduled for retirement. Resource planners have noted small-scale nuclear facilities are beyond the 10-year planning horizon, primarily due to concerns regarding cost-effectiveness.

Representatives of three shareholder-owned utilities and three electric cooperatives provided testimony related to core questions regarding the utilities' projected load growth over the next 10 years, the utilities' anticipated generation portfolio to meet the projected load growth, the potential role of nuclear generation, and planned transmission investments to accommodate load growth. All but one electric utility indicated nuclear energy is not a part of the utility's generation portfolio, citing reasons including the high costs associated with nuclear development and the emerging nature of the technology, with some utilities indicating that nuclear power will be evaluated in resource planning as an emerging technology.

Economic Impacts and Financing

Nucleon Economic Impacts and Financing Report

Representatives of Nucleon presented a report evaluating the economic impacts of and private-sector financing considerations for advanced nuclear development. The report examined potential employment and local business impacts, state and local revenue, factors related to attracting investors, and the state's role in supporting early nuclear-ready work.

The report included an economic impact analysis of 200-megawatt and 600-megawatt SMR facility options. The report indicated a 200-megawatt SMR facility is expected to require a peak construction workforce of about 500 individuals during a 3-year construction cycle, while a 600-megawatt SMR facility would require roughly 1,000 workers, with exact staffing numbers dependent on detailed engineering plans. Estimated capital investments range from $1.2 billion for a 200-megawatt SMR facility to $3.6 billion for a 600-megawatt SMR facility. Once operational,

a 200-megawatt SMR facility is expected to employ approximately 80 to 100 direct employees, and a 600-megawatt SMR facility would employ an estimated 220 to 260 workers. The analysis further indicated each direct job could support an additional 2.5 to 3.5 jobs in the broader economy through supply chain activity and household spending, depending on the degree of in-state supply chain participation and other factors.

The report noted nuclear facility operations require a diverse workforce, including licensed control room and field operators, maintenance technicians and trades, engineering support staff, radiation protection, chemistry and environmental specialists, security and emergency preparedness personnel, and employees responsible for administration, training, procurement, and other support.

Nuclear Energy Industry Workforce

Representatives of NEI provided testimony related to workforce issues in the nuclear energy industry. The committee was informed the DOE estimates up to 376,000 new workers may be needed to support new nuclear deployment required to meet anticipated energy demand. The NEI, together with industry members and allied organizations, is participating in a workforce working group to develop a national strategic plan to address the nuclear industry's workforce needs through 2050. Advanced nuclear workforce challenges relate to the availability of skilled trade workers for construction, workforce limitations, adaptability of academic institutions, and differing staffing needs associated with various reactor technologies.

The committee received testimony from the Mayor of the City of Red Wing, Minnesota, regarding the community's experience hosting a nuclear energy facility, including nuclear waste considerations and economic impacts. Red Wing hosts the Prairie Island Nuclear Plant, operated by Xcel Energy Inc., which is among the area's largest employers, provides high-wage jobs, and pays approximately 42 percent of the city's property taxes. The facility also supports the community in a variety of ways and maintains its own fire department and police force, which coordinate with local agencies and share equipment and training resources to ensure preparedness for a range of potential incidents. The city has not experienced significant concerns related to hosting a nuclear plant and has not reported any issues related to onsite dry cask storage of spent nuclear fuel while the city awaits a permanent, long-term waste storage solution.

The committee also heard from representatives of two institutions of higher education regarding nuclear energy education and workforce development opportunities available at each institution.

According to testimony from a representative of the North Dakota State University (NDSU) College of Engineering, to meet the expected increase in demand for nuclear engineers in the coming years, the college launched a 12-credit undergraduate certificate program in the fall of 2026 consisting of courses related to nuclear reactor theory and design, radiation shielding and safety, nuclear plant design and operations, and nuclear waste handling and disposal. The NDSU College of Engineering also is exploring development of additional certificates and a Bachelor of Applied Science in Nuclear Engineering Technology Program. Graduates of the certificate program may find employment opportunities with nuclear energy manufacturers, utilities operating nuclear power plants, or construction companies involved in nuclear energy development.

A representative of Bismarck State College testified to the college's significant experience offering energy education for over 50 years, including the Nuclear Power Technology Program, which has been offered since 2003. The Nuclear Power Technology Program is an associate degree program designed to prepare operators and technicians for employment in the nuclear industry through coursework in nuclear theory, plant systems, instrumentation, operations, and safety. Bismarck State College is the only academic institution authorized to offer the Nuclear Uniform Curriculum Program Certificate online. The program uses an online full-fidelity simulator to model supervisory control and data acquisition systems and a generic pressurized water reactor, which allows students to perform realistic operator activities, including startups, shutdowns, and normal operating procedures. Enrollment in the program increased by more than 30 students for fall 2026, and Bismarck State College works with numerous industry partners to connect students with potential employers.

A representative of the Department of Commerce provided testimony related to the potential economic impacts of nuclear development in the state. The committee was informed that given the United States Navy's foundational role in developing pressurized water reactor technology, expansion of the nuclear industry in the state could create opportunities for veterans of the Navy's nuclear programs to return to the state and apply their expertise in the civilian nuclear workforce.

Advanced Nuclear Energy Project Financing

Related to the advanced nuclear energy financing landscape, a representative of NEI discussed financing considerations for advanced reactor deployment. Reactor designs vary in sizes and features to meet diverse market needs, and investors assess federal and state policy signals, including available incentives and the policy direction supported by elected officials, when making investment decisions. Early movers in the nuclear development industry

face challenges with scaling supply chains, building a qualified workforce, navigating a new regulatory environment, and financing first-of-a-kind projects. Traditional project financing is challenging for early movers. Industry participants generally target overnight capital costs of about $3,500 per kilowatt to remain competitive with natural gas generation; however, first-of-a-kind projects are expected to cost $8,000 to $10,000 per kilowatt, with costs anticipated to decline over time as additional projects are deployed. The representative also noted bipartisan federal support for nuclear energy across recent administrations has strengthened investor confidence in the nuclear industry.

The committee also received testimony from a representative of the DOE's Office of Energy Dominance Financing regarding financing programs available through the DOE to support nuclear energy development. The office provides financing tools for new nuclear development projects of all types and sizes, and the use of loans from the office is a powerful lever for improving nuclear affordability. The office has over $250 billion in lending authority under the Title 17 Clean Energy Financing Program to support new nuclear projects and supply chain investments, offering up to 30-year loans that can cover 80 percent of project costs at highly competitive interest rates. Examples of support provided through the program include $11.5 billion for Vogtle Units 3 and 4 in Georgia, up to $1.5 billion to restart the Holtec Palisades reactor in Michigan, and $1 billion to Constellation Energy Generation, LLC to help restart the Crane Clean Energy Center, formerly known as the Three Mile Island Unit 1 reactor, in Pennsylvania.

Representatives from the Industrial Commission and the Bank of North Dakota provided information regarding state financing programs that may be relevant to advanced nuclear development. A representative of the Industrial Commission testified the Clean Sustainable Energy Fund has a cash balance of just over $17.8 million, with approximately $10.3 million in uncommitted cash available. The Renewable Energy Program also may be relevant to advanced nuclear development, but legislative changes may be necessary to use the program for nuclear projects. A representative of the Bank of North Dakota testified that the Bank and the state have limited capacity to support large-scale projects, particularly those with capital costs exceeding $2 billion. Financing programs that potentially could support advanced nuclear development include the Match Program, a joint structure between a loan program and the North Dakota Development Fund, and in-state investments under the Legacy Fund. The committee was informed that financing an advanced nuclear development project likely would require legislative input and direction.

Nuclear Waste

Nucleon Nuclear Waste Storage Assessment Report

Representatives of Nucleon presented a report evaluating nuclear waste management considerations associated with SMR deployment. The report was intended to help the state understand onsite interim storage and regulatory compliance requirements across federal, state, and plant owner roles. The report described the life cycle of nuclear fuel, noting spent fuel is initially stored in water-filled cooling pools before being transferred to sealed dry cask storage systems located at the facility site, pending the development of a permanent national repository.

The report also outlined the respective roles of federal agencies related to nuclear waste regulation. The NRC, DOE, and the United States Environmental Protection Agency oversee aspects of the safety, storage, transportation, and eventual disposal of nuclear waste. Even though regulatory responsibilities are primarily federal, the report noted the state may have an interest in addressing practical, long-term stewardship considerations that exist regardless of when a permanent disposal solution becomes available. These considerations include those related to long-term oversight responsibilities, emergency planning coordination, and maintaining institutional continuity through potential facility ownership and workforce changes.

The report also highlighted the state's general prohibition on placement, storage, exploration, testing, or disposal of high-level radioactive waste. The report identified Wyoming's high-level radioactive waste legislation as a model for how a state can maintain a protective stance while still allowing the onsite storage needed for nuclear generation facilities operating in the state. Under Wyoming law, onsite storage of high-level radioactive waste or spent nuclear fuel produced by an operating nuclear power plant is permitted if the storage facility is operated on the site of, and to store high-level radioactive waste or spent nuclear fuel produced by, a nuclear power generation facility operating in the state.

Nuclear Waste Storage

A representative from the Energy Communities Alliance provided testimony regarding storage of high-level radioactive waste and used nuclear fuel. The committee was informed nuclear waste can be sorted into several classifications, including spent nuclear fuel, high-level radioactive waste, transuranic waste, and low-level radioactive waste. The United States is estimated to have up to 180,000 metric tons of commercial used nuclear fuel. States interested in nuclear development also can learn from international experience, including European approaches to reprocessing and long-term waste strategies and Canadian practices related to indigenous engagement and SMR deployment.

A representative of NEI provided additional information related to the used nuclear fuel industry and storage of used nuclear fuel in the United States. According to the testimony, used nuclear fuel stored inside a nuclear plant is kept under more than 20 feet of water and used nuclear fuel stored outside a nuclear plant is secured in robust, dry cask storage systems. The dry cask storage systems are designed to contain solid ceramic fuel with zirconium cladding inside an engineered interior basket, sealed within a welded stainless steel canister with walls approximately 0.5 to 0.625 inches thick, and enclosed in a concrete overpack typically 20 to 30 inches thick. Research and development efforts are investigating deep borehole disposal technologies, which could enable a reactor to dispose of its waste on site using directional drilling. The representative also emphasized the importance of considering nuclear waste management when deciding whether to pursue nuclear energy in the state, as well as the importance of community engagement as it relates to nuclear energy, including waste management issues and concerns.

Nuclear Fuel Supply Chain

An INL representative provided testimony regarding the nuclear fuel supply chain and spent nuclear fuel. The committee reviewed the nuclear fuel cycle, which consists of mining and milling uranium, enriching uranium, converting the enriched uranium into fuel, using the fuel in reactors, and storing or recycling spent fuel. The committee also reviewed various uranium fuel types used in nuclear reactors, including low-enriched uranium, enriched from 3 to 5 percent for use in existing commercial reactors; high-assay low-enriched uranium, enriched from 5 to 20 percent for use in many advanced reactors; and highly enriched uranium, enriched above 20 percent for use in naval reactors.

In regard to nuclear fuel availability, the committee was informed uranium purchases originate from several countries, including 8 percent from the United States, 33 percent from Canada, 22 percent from Kazakhstan, 15 percent from Australia, and 22 percent from other countries. To help fuel advanced reactors, the DOE has invested about $3.5 billion to incentivize the expansion of long-term domestic capacity to produce high-assay low-enriched uranium from conventional feedstock and several companies are exploring fuel reprocessing using various technologies.

An example of a company exploring fuel reprocessing technology in the United States is Oklo Inc., an SMR developer. A representative of Oklo Inc., provided an overview of the company's advanced nuclear energy technologies for recycling used nuclear fuel. The committee was informed the company is developing the Aurora Powerhouse, which is a sodium fast reactor strategically designed at under 100 megawatts to primarily serve data center clients. More than 95 percent of the used nuclear fuel in the United States can be recovered through recycling, some of which can be used to fuel Aurora Powerhouse reactors. The company is designing and planning to license, build, and operate a commercial-scale recycling facility to produce uranium and transuranic materials, which could reduce fuel costs by up to 80 percent and generate significant new revenue streams. The representative also made clear that while a nuclear fuel recycling facility has a risk profile distinct from advanced reactor technologies, the facility still must meet NRC licensing standards.

The State Geologist testified regarding uranium exploration and mining efforts and provided an extensive overview of historical mining efforts in the state. The committee was informed the first reported widespread uranium exploration in the state took place in 1948 and 1949, and between 1950 and 1967, between 9 and 14 uranium mines operated in the state. The majority of uranium mining activity occurred between 1962 and 1967, and most of the activity took place in Billings County.

Department of Energy Nuclear Lifecycle Innovation Campuses

A representative of NEI briefed the committee on the DOE's request for information (RFI) seeking input from states interested in hosting Nuclear Lifecycle Innovation Campuses. The RFI posed 23 questions to interested states, targeted potential deployment in 2027, and expressed a preference for states pursuing ambitious timelines. The RFI is part of the DOE's effort to wrap up the disposition of used nuclear fuel, including the potential exploration of used fuel recycling technologies.

According to the testimony, 26 states submitted responses to the RFI, and approximately half of those responses included a proposal that supported the broader mission of addressing used fuel management needs through the development of innovation campuses. The DOE subsequently narrowed the RFI responses to 5 states: Utah, Tennessee, Oklahoma, Idaho, and Louisiana. Each of those states entered a memorandum of understanding (MOU) with the DOE. According to the testimony, the MOUs establish a framework for negotiating potential host agreements with the DOE and require participating states to be willing to accept used nuclear fuel from out of state. After September 30, 2026, either party may void the MOU if a host agreement is not reached. A resulting host agreement must address funding for the innovation campuses and likely will be contingent on legislative outcomes necessary to implement the agreements.

Testimony indicated the DOE's RFI is an important step toward initiating the national discussions necessary to identify long-term nuclear waste storage solutions.

Advanced Nuclear Reactor Technology

Nucleon Small Modular Reactor Technology and Feasibility Report

Representatives of Nucleon presented a report evaluating advanced nuclear technologies that may be suitable for North Dakota, including small modular and microreactor systems. The report assessed relative maturity and deployment readiness of a range of advanced nuclear technologies, examined potential uses for the technologies to support electric reliability, industrial development, and economic growth in the state, and reviewed fuel needs and waste considerations associated with each technology.

The report identified light-water SMRs as the clearest benchmark for near-term utility-scale deployment because the reactor type builds on the same light-water technology used in most commercial nuclear power plants operating today. The report also evaluated other advanced reactor families as potential sources of electricity production, including heavy-water SMRs, high-temperature gas-cooled reactors, sodium-cooled fast reactors, lead-cooled fast reactors, molten salt reactors, and microreactors.

The report concluded a prudent course of action for the state would be to continue developing the policy, siting, workforce, infrastructure, and community engagement foundations necessary to support advanced nuclear deployment while maintaining the flexibility to select a particular technology after the market matures and preferred technologies demonstrate commercial viability.

Advanced Nuclear Technology

A representative of INL provided an overview of advanced nuclear reactors and the state of the nuclear landscape. The testimony indicated recent power agreements from sizeable technology companies, such as Meta, Google, Amazon Web Services, and Microsoft, are driving nuclear energy development nationwide. The federal government is actively supporting advanced reactor demonstration and deployment, including through issuance of several executive orders related to advanced nuclear development and through DOE programs such as the federal Reactor Pilot Program and the federal Fuel Line Pilot Program. The increase in electricity demand, together with recent support for advanced nuclear development from the current federal administration, may result in nuclear energy playing a larger role in the nation's energy portfolio.

According to the testimony, the term "advanced nuclear reactor" means a nuclear fission reactor with significant improvements, including additional inherent safety features, compared to reactors operating on December 27, 2020, in the United States. Nuclear reactor companies engaged in formal licensing or prelicensing activities with the NRC for power-producing reactors that use various fuel sources and coolants, including gas, water, molten salt, liquid metal, and heat pipes. Advanced reactors vary in size, ranging from outputs of 1 megawatt to over 1,000 megawatts of power and plant footprints of less than an acre to 1,500 acres.

A DOE representative provided testimony regarding the DOE's work with INL to support advanced nuclear development. The representative testified that the DOE supports advanced nuclear development through use of technology at its national laboratories, including the Advanced Test Reactor and the Transient Reactor Test Facility at INL. The Advanced Test Reactor provides for expedited testing of nuclear fuels and materials, and the Transient Reactor Test Facility is used to study nuclear fuel and material performance under off-normal operational conditions and hypothetical accident scenarios. Additionally, to support accelerating advanced reactor demonstration and deployment, the DOE supports several advanced reactor projects. Specifically, 10 companies with 11 reactors were working toward criticality under DOE contracts, and up to 5 of those reactors were identified as having potential to meet the July 4, 2026, deployment goal outlined in recent executive orders.

The committee received testimony from a representative of the DOE's National Reactor Innovation Center (NRIC) located on the INL site. According to the testimony, the NRIC works with industry and national laboratories and manages the DOE Reactor Pilot Program, which supports moving advanced nuclear technologies from concept to commercialization using test bed facilities, including the Laboratory for Operations and Testing in the United States and Demonstration of Microreactor Experiments. There are 10 DOE Reactor Pilot Program participants.

Nuclear Regulatory Commission Licensing and Department of Energy Authorization

The INL representatives also provided an overview of the NRC reactor licensing pathways and the DOE's reactor authorization process. According to the testimony, nuclear regulations are rapidly evolving in response to the growing interest in nuclear energy. For example, effective in April 2026, 10 CFR part 53 provides a risk-informed, technology-inclusive regulatory framework specifically for advanced reactors. The committee also was informed with the support of artificial intelligence, the DOE is developing crosswalks to help reactor developers meet both DOE and NRC requirements without a significant rework. These crosswalks will assist participants in the DOE Reactor Pilot Program to more expeditiously achieve NRC licensing to operate for commercial purposes.

A DOE representative testified, in response to executive order directives, the DOE undertook a nuclear regulatory reform initiative that reduced its regulatory framework from approximately 1,500 to 600 pages in a relatively short timeframe. The reform preserved the fundamental elements of the authorization process while eliminating unnecessary transactional oversight, including certain approval requirements and duplicative reviews by other agencies.

Nuclear Facility Tours

Committee members toured several INL nuclear facilities, including the Advanced Test Reactor Complex, Idaho Nuclear Technology and Engineering Center, and Materials and Fuels Complex, which houses advanced reactor test beds operated by the NRIC and the Hot Fuel Examination Facility. The tours provided committee members insight into nuclear technologies, research, and facility operations.

State Regulation Considerations and Community Engagement

Nucleon Century Code Evaluation and Final Report

A representative of Nucleon presented a report containing an evaluation of relevant Century Code provisions and practical policy considerations related to potential development of advanced nuclear energy in the state. The report indicated the state's existing statutory and institutional framework provides a substantial foundation for future evaluation of advanced nuclear proposals. However, the report identified areas related to the state's existing restrictions on high-level radioactive waste as the most significant statutory roadblock because the restrictions directly impact a nuclear project developer's ability to advance and license a nuclear facility in the state. The report suggested further consideration of a narrower policy question regarding whether the state would be willing to allow temporary onsite storage of high-level radioactive waste or used nuclear fuel associated with an in-state facility, as opposed to storage of waste imported from other states.

The report also indicated the state's existing agency structure provides a practical framework for state-level oversight and coordination of advanced nuclear energy projects, and that creation of a new agency or authority may not be necessary to support advanced nuclear development. Agencies likely to interface with advanced nuclear energy projects include the PSC, Department of Environmental Quality, and Industrial Commission. The report did not identify an immediate need for nuclear-specific tax legislation but suggested that a review of taxation issues may be warranted to determine whether existing tax frameworks provide for clear and predictable treatment of nuclear facilities.

The consultant representatives also summarized the five reports presented during the interim and identified the following recurring themes that emerged across all the consultant's reports:

- The state's statutory framework, regulatory institutions, and permitting authorities provide a substantial foundation for evaluating future advanced nuclear proposals.
- Many of the issues identified in the reports relate to agency roles, coordination, public information, and administrative readiness rather than the selection of a particular reactor technology.
- Development interest, site evaluations, environmental reviews, transmission studies, and community engagement activities may occur years before an advanced nuclear facility is constructed or begins operations.

Approaches in Other States

The committee received testimony regarding state-level policy and legislation related to advanced nuclear energy in other states. Representatives of the National Association of State Energy Officials, a nonprofit association for governor-designated energy officials from each of the 56 states and territories, testified regarding state legislation and executive orders related to advanced nuclear energy. Examples of state legislation and executive orders include task forces, pilot programs, roadmaps, nuclear moratorium repeals, new state structures, and nuclear reactor site readiness programs. Industry and stakeholder input also indicated waste management and workforce and supply chain readiness should be part of early conversations related to advanced nuclear development.

The committee also received information from representatives from Georgia and Wyoming, which are two states actively engaged in nuclear development.

A representative of the Georgia Public Service Commission provided testimony regarding planning and implementation of advanced nuclear energy projects in Georgia, including an overview of Plant Vogtle. The committee was informed Plant Vogtle consists of four nuclear reactors and is the largest nuclear energy facility in the United States. Vogtle Units 3 and 4, both Westinghouse AP1000 nuclear reactors, began construction in 2009, have an expected operating life of 60 to 80 years, and provide reliable and clean baseload power to over 1 million homes and businesses. According to the testimony, a significant factor in selecting the Plant Vogtle location was the availability of affordable land in an area with limited agricultural activity and close proximity to a reliable water source. Workforce availability has been a key challenge for Vogtle Units 3 and 4 since construction began, with more than 9,000 workers needed at peak construction, 30,000 workers badged during construction, and approximately 800 permanent positions supported by the

facility. The committee also was encouraged to identify a nuclear regulatory strategy that spans from initial financing through commercial operation, prioritize transparency in the regulatory process, develop and maintain a positive relationship with the NRC, and evaluate nuclear financing options available to the state.

A member of the Wyoming Legislature provided testimony regarding the state's legislative efforts related to advanced nuclear development. Testimony indicated the legislature enacted a robust framework for high-level radioactive waste regulation in 1995 in response to decades of uranium mining and controversy associated with proposals for interim dry storage of high-level radioactive waste. According to the testimony, the framework effectively froze any nuclear development in the state for about 25 years. In 2020, the legislature enacted legislation addressing SMR permitting and authorizing the replacement of coal generation capacity with SMR capacity, motivated by concerns regarding potential coal plant closures and associated economic impacts on the state. In 2022, the legislature substantially revised the 1995 statutory framework by authorizing the temporary onsite storage of high-level radioactive waste generated by a reactor operating within the state. The legislation also repealed overly detailed state-level requirements regarding reactor size and construction in recognition of the NRC's primary authority over reactor licensing and safety regulation.

According to testimony from a representative of TerraPower, in 2021, the company began pursuing an NRC license for the Natrium Reactor under the traditional two-step licensing process under 10 CFR part 50. TerraPower's construction permit was issued in March 2026, and plant construction for the first Natrium plant began in April 2026 near the Naughton plant in Kemmerer, Wyoming. TerraPower chose the Kemmerer site due to community support, a nearby retiring coal facility, and the availability of a skilled energy workforce. At the peak of construction, 1,600 construction jobs are anticipated, with between 200 and 250 full-time jobs anticipated when the plant is operational. Testimony stressed the importance of community trust during the site selection and development process and cited supply chain issues as a difficulty that has been identified in the development process. The DOE and United States Congress have committed to providing nearly $2 billion in funding for the Natrium Reactor through DOE's Advanced Reactor Demonstration Program, and TerraPower and its investors will provide matching funds. The project's spend rate is about $2.5 million per day, with 800 to 1,000 engineers working on the project to move the technology from the research and development stage to commercial deployment.

Potential Regulatory Roles of State Agencies

Representatives of several state agencies provided testimony regarding potential administrative roles in connection with future nuclear energy development in the state.

A representative of the PSC testified the commission's statutory and regulatory framework for certificates of public convenience and necessity could be applied to nuclear generation projects but may require modifications specific to nuclear investments. The commission's energy facility siting authority may require legislative review because advanced nuclear facilities raise issues that may not be contemplated by existing siting statutes. Due in large part to the high cost associated with development and deployment of nuclear technology, the commission's ratemaking authority may become one of the commission's most significant areas of involvement if advanced nuclear projects are proposed in the state.

Testimony from a representative of the Department of Environmental Quality indicated the state became an agreement state in 1969, and pursuant to that agreement, the regulatory authority over certain radioactive materials was transferred from the NRC to the state. The NRC defines two emergency planning zones around each nuclear power plant, the size and configuration of which vary based on factors such as local emergency response needs, population, land characteristics, access routes, and jurisdictional boundaries. New nuclear technologies may create additional emergency planning, regulatory, and coordination considerations for both the state and the NRC. The testimony further indicated the department expects to better assess future regulatory and resource needs as advanced nuclear technologies mature and other states deploy reactors.

A representative from the Department of Emergency Services testified that, in response to potential nuclear development, the department would anticipate developing a radiological emergency preparedness program. This program would include training, coordination with state agencies and first responders, development of plans and procedures to respond to potential incidents, and collaboration with other agencies on policy development. The department also would need to be aware of and comply with Federal Emergency Management Agency requirements and provide education to the public, which may require additional staff resources. Further, testimony indicated the extent to which industry should contribute to costs associated with emergency preparedness is a policy decision for legislative consideration.

Testimony from a representative of the Department of Water Resources indicated the state's aquifers have over 60 million acre-feet of ground water. However, based on existing demand and permits issued, ground water is unlikely to be a viable option to support nuclear energy development. Testimony emphasized water planning is vital to the siting of nuclear facilities and identified the Missouri River as the state's best-available water source for potential nuclear

development needs, with an average annual flow of 16.7 million acre-feet per year. The department also indicated it does not anticipate any statutory changes or budget adjustments will be necessary to accommodate advanced nuclear development in the state.

A representative of the Industrial Commission testified the commission does not have a position on the commission's potential administrative involvement in advanced nuclear development in the state. Testimony also indicated the High-Level Radioactive Waste Council is being reviewed for potential adjustments.

Community Engagement

A representative of the NDSU Center for Social Research provided information regarding best practices and approaches to community engagement for evaluating social interests and community acceptance of potential siting locations for energy projects, including advanced nuclear energy projects. The committee was informed best practices include coordinating and engaging with community leaders, industry representatives, and other stakeholders, and transparent, unbiased communication supported by multiple outreach and data collection methods. According to the testimony, the center frequently collaborates with the NDSU Extension Service for research projects.

The committee also received testimony from representatives of the Gateway for Accelerated Innovation in Nuclear regarding approaches used in other states to support community engagement and public education related to advanced nuclear energy. Testimony highlighted a variety of engagement models, including state-led efforts to solicit interest in nuclear development, nuclear-ready community designation programs, utility-led outreach initiatives, and statewide public education campaigns. According to the testimony, effective community engagement strategies should be tailored to a state's policy objectives and existing site evaluation and project planning efforts, if appropriate. Testimony suggested in North Dakota a regional approach to community engagement may be appropriate given the potential siting locations identified by the committee's consultant.

Comments by Interested Persons

The committee received testimony from interested persons related to the committee's study. The testimony encouraged the committee to address a number of factors before modifying laws related to nuclear energy and high-level radioactive waste, including the high cost of nuclear technologies compared to other power sources, the absence of a current need for nuclear energy in the state, and the importance of community consent before selection of a host community for a nuclear project. The committee also was encouraged to consider potential health effects associated with uranium mining and processing, including effects related to contamination of abandoned uranium mines on air, land, and water. The committee received testimony related to the importance of continued exploration of the feasibility of advanced nuclear energy in the state as a potential generation source to meet increasing electricity demand.

Committee Discussion

Committee members expressed a range of views regarding the potential development of advanced nuclear energy in the state. Some committee members expressed interest in further exploring advanced nuclear development in the state as a potential way to meet growing electricity demands, particularly in light of recent federal support for advanced nuclear development. Other committee members noted hesitation and emphasized the importance of proceeding cautiously to allow sufficient time to evaluate potential risks, educate the public, and gather community feedback. Committee members also noted advanced nuclear development involves long planning and deployment timelines and is likely to remain a topic of legislative consideration.

Committee members emphasized the importance of community engagement and public education regarding advanced nuclear energy. Committee members noted the value of providing communities with objective, relevant information regarding the potential impact of large-scale development projects, including advanced nuclear development projects, before specific project sites are identified. Committee members suggested working with the Department of Commerce to explore whether communities within the state may have an interest in serving as host communities for future advanced nuclear development.

Related to community engagement, the committee considered a bill draft that would have provided an appropriation to the NDSU Extension Service for an advanced nuclear energy education and community engagement initiative grant program. The proposed grant funding would have supported a series of at least 12 unbiased, community-based education and discussion sessions related to advanced nuclear energy, including 4 sessions conducted at locations intended to promote tribal engagement. The sessions would have been required to include structured opportunities for information sharing, community engagement, and facilitated discussion. Committee members expressed support for the concept of community engagement and public education regarding advanced nuclear energy. The committee ultimately chose not to advance the bill draft but acknowledged an interested legislator could choose to introduce legislation related to the topic during the next legislative session.

Committee members noted the importance of continued discussion regarding advanced nuclear energy beyond the conclusion of the committee's work, particularly as energy demand continues to increase, advanced nuclear energy technology develops, and the industry matures. To support continued discussions of these issues, the committee considered a bill draft that would have expanded the membership and duties of the High-Level Radioactive Waste Advisory Council. The proposal would have revised the membership of the council, including adding legislative members and representatives of the electric utility industry to the council, and expanded the council's responsibilities to include evaluating the feasibility, siting, and deployment of advanced nuclear power generation resources in the state. Committee members expressed support for continued study and discussion of advanced nuclear energy. However, the committee chose not to advance the bill draft and deferred to an individual legislator to sponsor legislation if desired.

Committee members discussed the potential to modify the state's general prohibition on placement, storage, exploration, testing, or disposal of high-level radioactive waste. Committee members noted an approach similar to the legislation adopted in Wyoming could address a significant barrier to advanced nuclear energy development while maintaining restrictions on the importation of waste from other states. Committee members discussed the concept of potential legislation that would have authorized the onsite storage of high-level radioactive waste or spent nuclear fuel generated by a nuclear power generation facility operating in the state. Committee members expressed mixed opinions regarding the concept. Some committee members noted the change could remove a significant obstacle to the licensing and deployment of advanced nuclear energy projects in the state. Other committee members expressed concern regarding the public perception of the potential legislation, particularly if considered before additional community engagement and public education efforts occur. Although committee members acknowledged statutory changes may be necessary to support potential advanced nuclear development, the committee concluded additional evaluation and discussion of the concept may be beneficial and deferred consideration of the proposal to an individual legislator interested in further exploring the proposed legislation.

The committee also discussed areas that may merit legislative review if the state considers proceeding with advanced nuclear development, including state financing mechanisms, tax policy, and agency roles and coordination. Committee members acknowledged the potential importance of these issues but concluded the issues would be more appropriately addressed after further evaluation of the feasibility, siting, and deployment of advanced nuclear power generation resources in the state, as well as additional community engagement and public education efforts.

CONCLUSION

The committee makes no recommendation regarding its study of advanced nuclear energy.