Safely And Responsibly Expanding U.S. Nuclear Energy: Deployment Targets And A Framework For Action

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I. Introduction and Context for Expanding U.S. Nuclear Energy Production

The climate crisis is one of the existential threats of our time. Expanding domestic nuclear energy production has a key role to play in helping to avoid the worst impacts of climate change by enabling the nation to achieve a net-zero greenhouse gas (GHG) emission economy no later than 2050. Nuclear power delivers safe, clean, reliable, and affordable electricity to communities across the nation and delivers local economic benefits, including sustained, high-paying jobs and tax revenues to help ensure that communities are not left behind by the nation's transition to clean energy. At the same time, investment in the safe and responsible deployment of nuclear energy and associated supply chains will strengthen our national security, increase energy reliability and resilience, grow America's economy, and restore American leadership in this critical industry.

Expanding domestic nuclear energy into a new era of nuclear deployments will be informed by lessons learned from the history of civil nuclear energy, and align with new efforts across the federal government to advance progress for all communities across our nation. Meaningful public participation, intergovernmental and community engagement, and Tribal consultations will continue to be important to ensure equitable participation from rightsholders and stakeholders, share information, and build and sustain the long-term public support and expertise necessary for effective deployment of additional domestic nuclear energy. Accordingly, this framework outlines pathways to responsibly expand domestic nuclear energy production. This requires action across all of the following pillars, which must be done in a process that continues to adhere to the highest safety, security, nonproliferation, and environmental protection standards:

1. **Building new large, gigawatt-scale reactors**
2. **Building small modular reactors (SMRs)**
3. **Building microreactors**
4. **Extending and expanding existing reactors, through license renewals, power uprates, and restarting recently retired reactors**
5. **Improving licensing and permitting**
6. **Developing the workforce**
7. **Developing component supply chains**
8. **Developing fuel cycle supply chains**
9. **Managing spent nuclear fuel**

This framework identifies more than 30 actions the U.S. government can take within existing statutory authorities and also includes actions that the U.S. nuclear industry and power customers can take to enable successful deployments. This framework recognizes the importance of licensing and permitting, workforce, component supply chains, fuel cycle supply chains, and spent fuel management on reactor deployment, and identifies key opportunities associated with each of these topics. In addition, this framework recognizes the importance of remediating legacy sites associated with the nation's history of civil nuclear energy. Any federal activities identified in this framework beyond those already reflected in the President's Budget will be subject to relevant budgetary, regulatory, and policy development processes before adoption or execution.

Recognizing the urgency of acting to combat the climate crisis, as well as the economic and national security benefits of investing in a broad scope of American climate solutions, the U.S. government is working to responsibly deploy domestic nuclear energy in a manner that considers all communities that may be affected and advances core values and commitments on public health, safety, and environmental protection. Expanding nuclear energy capacity must align with the U.S. government's core values and guiding principles for responsible nuclear energy:

1. **Ensuring public health and safety**
2. **Protecting the environment**
3. **Ensuring energy affordability**
4. **Meaningfully engaging with communities and delivering local community benefits**
5. **Honoring Tribal sovereignty**
6. **Advancing environmental justice**
7. **Promoting national security**

Achieving economy-wide, net-zero GHG emissions in the United States by 2050 requires the installation of approximately 1,500 to 2,000 gigawatts (GW) of carbon-free power generation. Of this, according to U.S. government and external modeling, about 30-50 percent will need to be clean, firm electric generating capacity.[1] Clean firm generation technologies are those that can broadly supply 24/7, year-round power without significant GHG emissions or air pollution. These technologies include nuclear power, advanced geothermal, and renewables paired with long-duration energy storage. This clean, firm generation will complement other forms of zero-emission, variable renewable power and short-duration battery electric storage to more reliably, efficiently, and cost-effectively reach systemwide decarbonization.

Nuclear power – a proven source of clean, firm power that already provides about half of the clean energy generated in the United States – is poised to play a critical role in the Nation's transition to a clean energy economy.[2] Expanding nuclear energy capacity can enable the timely retirement of coal-fired power plants, thereby reducing harmful air pollution and GHG

[1] Numbers based on the Long-Term Strategy of the U.S.: Pathways to Net-Zero Greenhouse Gas Emissions by 2050 [link] and Princeton Net-Zero America Project [link]
[2] EIA Electric Power Monthly [link]. Clean energy sources include nuclear, hydroelectric, wind, solar, biomass, and geothermal.

emissions.[3] Such greenhouse gases drive climate change and associated hazards, including extreme weather events that threaten human health, quality of life, and the environment. In providing clean, firm electricity, nuclear energy has potential to meet critical loads that require high-quality, consistent power, such as advanced manufacturing, semiconductor fabrication, and data centers that power the internet and advancements in artificial intelligence. Nuclear energy also has potential to decarbonize the maritime industry which is highly dependent on fossil fuels and currently accounts for about three percent of global greenhouse gas emissions.[4]

During the 1970s and 1980s, the United States successfully deployed approximately 100 GW of domestic nuclear power. The U.S. nuclear energy industry continues to lead the world in nuclear power safety, security, innovation, operational performance, and nonproliferation, but has since fallen behind in deploying new nuclear power plants and faces increasing competition in the global marketplace for reactor exports.[5]

The Biden-Harris Administration's policies, including historic investments through the Inflation Reduction Act (IRA) and Bipartisan Infrastructure Law (BIL), and authorities in the CHIPS and Science Act, Nuclear Fuel Security Act, and Prohibiting Russian Uranium Imports Act, support the demonstration, deployment, and retention of nuclear power plants, as well as the revitalization of critical domestic nuclear industry supply chains. Further, the Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy Act of 2024 (ADVANCE Act), which Congress passed with overwhelming bipartisan support, builds on this work through advancing timely and efficient reactor licensing to accelerate safe and responsible nuclear energy deployment consistent with decarbonization, economic, and national security goals.

A timely expansion of domestic nuclear power will require a diverse set of technologies to meet the unique needs of power customers, including grid-based power, behind-the-meter resilient power, industrial heat, and remote and transportable power. It will also require power customers with large power needs and carbon-free commitments to work creatively with utilities to help share project risks commensurate with resulting benefits of successful deployment.

Accelerating U.S. leadership in the deployment of safe nuclear energy both at home and abroad is also critical for national security. According to the International Atomic Energy Agency (IAEA), Russian and Chinese reactor designs have accounted for the majority of worldwide deployments over the past decade, including reactors currently under construction. It is imperative that the United States and allied countries compete effectively to supply the world with clean and safe nuclear energy. Yet, countries abroad typically want new reactor technologies demonstrated in the supplier country before building them in their own country. Domestic deployments will enable exports and provide a pathway for the United States to regain leadership in the international nuclear energy market and supply chain. Nuclear energy cooperation spans 50-100 years and builds unique government-to-government relationships

[3] Though 109 GW of coal capacity has retired in the last 10 years, the majority of remaining coal plants (138 GW out of 192 GW) have no announced retirement date. (EIA-860M) [link]
[4] UN Trade and Development [link]
[5] As of 2024-08-28, there were about 64 GW of nuclear power under construction globally. About 28.5 GW were under construction in China alone, while no reactors were currently under construction in the United States (IAEA Power Reactor Information System) [link]

amongst countries. The United States is committed to ensuring the next generation of nuclear energy technology contributes to global goals of clean and resilient energy and sustainable development, while simultaneously protecting public health and safety and reducing nuclear proliferation risks.

As prioritized by President Biden in his National Security Memorandum on Countering Weapons of Mass Destruction Terrorism and Advancing Nuclear and Radioactive Material Security[6], the United States is committed to leading a coalition of like-minded countries with nuclear expertise, will work hard to provide next-generation technologies with the highest nuclear nonproliferation, safety, and security standards to benefit America's partners — advantages that Russia and the People's Republic of China (PRC) do not prioritize. Indeed, the United States has long been a global leader in, and proponent of, the peaceful use of nuclear energy, and promotes the highest safety, security, and nonproliferation standards integrated early into the design process of new nuclear facilities from initial planning through deployment. While U.S. reactor developers and engineering, procurement, and construction (EPC) firms do not have the same state-sponsored financing offered by Russia and China, U.S. technologies are more advanced, safe, and secure, and therefore attractive to importing countries after successful deployment in the United States. The United States also supports the IAEA, which plays a central role in developing safety standards, security guidance, and safeguards compliance that provide the basis for governments to build robust regulatory regimes for the safe and secure operation of nuclear power.

As scaling up domestic nuclear energy is a climate, economic, and national security priority, the U.S. government intends to pursue it in a manner that is informed by and sensitive to the nation's complicated history of civil nuclear energy. The U.S. government recognizes public concerns regarding the potential impacts of uranium mining and spent fuel disposal, and the risk, albeit extremely low, of accidents at nuclear power plants. A new era of domestic nuclear energy requires acknowledging and working to address the concerns of all communities while concurrently tackling the climate crisis by deploying critical, clean energy solutions.

[6] White House Fact Sheet: President Biden Signs National Security Memorandum to Counter Weapons of Mass Destruction Terrorism and Advance Nuclear and Radioactive Material Security [link]

II. Deployment Targets

The U.S. government is establishing a target to **deploy 200 GW of net new capacity by 2050,** at least tripling U.S. nuclear energy capacity based on 2020 numbers. The net new capacity gains would come from multiple sources, including building new plants (including large, small-modular, and microreactors and including Generation III+ water-cooled designs and Generation IV designs), uprating existing reactors, and restarting reactors that have retired for economic reasons.

To achieve this, the U.S. government is also establishing nearer term targets:

- Jumpstarting the nuclear energy deployment ecosystem with **35 GW of new capacity by 2035** that will be operating or under construction.

- Accelerating the capability of the nuclear energy deployment ecosystem by ramping to a **sustained pace of producing 15 GW per year by 2040**, in support of both U.S. and global project deployments.

These domestic nuclear energy deployment targets are ambitious yet achievable, and serve as a signal that the U.S. government is committed to facilitating the safe and responsible deployment of nuclear energy and necessary, supporting infrastructure. These targets are also a call to action to the nuclear energy industry, policymakers, power customers, and civil society, which all have a role to play in accelerating deployment. Achieving this scale of nuclear deployment will require the active contribution, collaboration, and commitment of all public and private stakeholders in the nuclear power sector, including electric utilities, reactor and equipment vendors, EPC firms, project developers, component suppliers, fuel cycle suppliers, the nuclear workforce and unions, power customers, the federal government, state and local energy authorities, public utility commissions, non-governmental organizations, academia, and financial investors. It will also require expanded international partnerships to ensure reliable access to upstream materials, fuels, and components.

These deployment targets represent an ambitious vision that encompasses all advanced nuclear fission technologies, including both generation III+ and generation IV reactor types of all size categories, including large gigawatt-scale reactors, SMRs, and microreactors. While the United States ramps up its annual deployment pace for new reactors in the early 2030s, it must concurrently extend the safe operation of the existing nuclear fleet through license renewals, power uprates, and working to restart reactors that prematurely retired due to economic conditions.

Harnessing the potential of nuclear energy as a decarbonization and economic growth solution is both a domestic and international imperative that the United States is committed to pursue in unwavering tandem with partners and allies. In December 2023, the United States co-led the Declaration to Triple Nuclear Energy at the 28th United Nations Climate Change Conference

(COP28), a pledge among 25 countries to triple global nuclear energy capacity by 2050.[7] Though the pledge does not require endorser countries to triple their own domestic nuclear energy capacity, the United States aims to do its part to both support clean economic growth at home as well as uphold international pledges through supporting likeminded countries seeking to deploy peaceful nuclear energy, building on existing U.S. leadership in nuclear energy science and technology.

The near-term 2035 deployment target reflects the sense of urgency needed to make a significant expansion of domestic nuclear energy possible. Adding 35 GW by 2035 will put us on the path towards a 15 GW annual deployment pace by 2040, bringing the 200 GW target within reach by 2050. The 2035 target includes capacity gains from all sources, both operating and under construction. Achieving the 2035 deployment target requires near-term action to establish orders of sufficient quantity for multiple reactor designs. These orderbooks are critical to enable the investment necessary to expand the fuel and component supply chains. They are also needed to ensure that first-of-a-kind (FOAK) costs can rapidly proceed to lower Nth-of-a-kind (NOAK) costs. This will require careful attention to project management, delivery, and execution to ensure positive learning from each successive deployment.

Ramping sustained production to about 15 GW annually by 2040 will be important to serve both our domestic 2050 deployment goals and project deployments around the globe, making more U.S. nuclear products and services available for export. This will add hundreds of thousands of good-paying construction and operation jobs across the United States that would be sustained for decades. Achieving this production rate will require an expanded workforce, robust supply chains for fuel and components, and long-term solutions for managing spent fuel.

Though these nuclear deployment targets are ambitious relative to the stagnation of new builds over the last 30 years, they are not without precedent based on achieved capacity additions in the 1970s and 1980s. During those two decades, the U.S. nuclear industry completed construction of about 100 GW, with a peak at over 10 GW added in 1974. Through technology innovation, greater design standardization, modularization, and repetition, we have the potential to safely and responsibly deploy new nuclear power faster and more efficiently than in previous decades. Existing reactors continue to operate safely and with a high capacity factor, however their costs and construction times did not achieve the desired level of positive learning, in large part because most plants were built with unique, bespoke designs; the 94 currently operating reactors in America represent over 50 different combinations of reactor types, nuclear steam supply systems, models, power levels, containment types, and balance-of-plant architecture.[8] This new era of nuclear energy deployments must feature greater standardization, along with the integration of modern design, project management, and construction techniques and a wealth of lessons learned from past deployments.

To achieve these ambitious deployment targets, this framework outlines an expansive set of actions to accelerate and expand domestic nuclear energy deployment. This framework identifies

[7] DOE: At COP28, Countries Launch Declaration to Triple Nuclear Energy Capacity by 2050, Recognizing the Key Role of Nuclear Energy in Reaching Net Zero [link]
[8] DOE Pathways to Commercial Liftoff: Advanced Nuclear, September 2024 [link]

over 30 actions the U.S. government can take as well as actions that apply to the U.S. nuclear industry and power customers to enable successful deployments. Actions identified include those that are critical to jumpstarting deployments in the early 2030s as well as others that are more relevant to achieving the 2040 pace target. This framework also recognizes the importance of licensing and permitting, workforce, component supply chains, fuel cycle supply chains, and spent fuel management on reactor deployment and identifies key opportunities for improving them.

III. Guiding Principles

Scaling up nuclear energy in the United States will only be successful if pursued in alignment with the U.S. government's guiding principles for responsible nuclear energy, including (1) ensuring public health and safety, (2) protecting the environment, (3) ensuring energy affordability, (4) meaningfully engaging with communities and delivering local community benefits, (5) honoring Tribal sovereignty, (6) advancing environmental justice, and (7) promoting national security.

Ensuring Public Health and Safety

U.S. civil nuclear energy facilities—from the front end of the fuel cycle to reactors to spent fuel repositories—must continue to be built, operated, and decommissioned in a manner that ensures public health and safety. U.S. nuclear power plants are already among the safest and most secure industrial facilities in the world due to the industry's safety procedures, robust training and qualification programs, and stringent federal regulation that keep nuclear plants and neighboring communities safe. Support for development of more nuclear energy is increasing and is particularly high for "nuclear neighbors," those who live within 10 miles of a nuclear plant.[9] Maintaining and further risk-informing these procedures, programs, and regulations will continue to be important given the increased diversity of technologies and applications that can be expected in the coming decades. As the world's most concentrated energy source, nuclear power plants are designed, built, and operated using a "defense-in-depth" approach in which multiple independent and redundant layers of protection are always in place to ensure safe operation, even in the event something goes wrong. This is important to keep onsite workers safe and keep surrounding communities safe in the unlikely event that systems malfunction. Modern nuclear power plant designs also feature enhanced safety over the already-safe existing fleet of reactors, primarily through increased use of passive cooling.[10] Passive safety refers to the ability of advanced large, small modular, and microreactors to shut down and remove excess heat without human intervention and relies on natural circulation or gravity to remove heat without the need for external power sources, pumps, or operator action. Further advancing this guiding principle, the U.S. Nuclear Regulatory Commission (NRC) should continue to conduct rigorous, risk-informed safety reviews to ensure that nuclear power plant designs are safe, are constructed according to plans, and operated safely.

Protecting the Environment

All actions related to civil nuclear energy infrastructure should reflect the clear environmental benefits from expanding clean nuclear energy that further enable the nation to reduce reliance on fossil fuels and reduce harmful pollution and greenhouse gas emissions. At the same time, all nuclear energy infrastructure, from uranium recovery facilities to reactors to spent fuel repositories, should also incorporate the most robust environmental protections available at the

[10] DOE: Enhanced Safety of Advanced Reactors [link]

local and regional level. It is important to meaningfully consider and address the potential effects of nuclear energy-related actions and incorporate mitigation measures to avoid and reduce potential impacts on local communities and protect lands, waters, and natural resources vital to our nation's well-being. Agencies must continue to ensure that their activities comply with all applicable environmental laws, including by ensuring major federal actions related to nuclear energy are informed by effective and efficient environmental reviews and account for climate change and other environmental effects.[11, 12]

Ensuring Energy Affordability

To benefit society, nuclear energy must be affordable for all customers. The U.S. government recognizes the burden that rising utility bills place on families, and is taking action to lower energy costs with affordable clean energy. The U.S. government has taken, and will continue to take, important steps to enable utilities to provide affordable carbon-free nuclear power to customers, including through low-cost financing; grants for large-scale demonstrations of new nuclear technologies; support for the development and expansion of a domestic nuclear supply chain and fuel cycle; tax credits for the investment or production of carbon-free electricity, including nuclear; and policies to discourage reactors from closing for economic reasons. It is now incumbent on the U.S. nuclear industry to successfully build new nuclear plants and rapidly move down the cost curve from higher, FOAK costs to lower, NOAK costs. This will be achieved through design standardization and increased partnerships between utilities, EPC firms, project developers, and power customers.

Meaningfully Engaging with Communities and Delivering Local Community Benefits

The federal government will continue to meaningfully engage with communities where civil nuclear energy actions may be taken, and should periodically assess its efforts and seek opportunities for continued high-quality engagement. As an example, the Department of Energy (DOE) is using a consent-based siting approach for storing spent nuclear fuel in which it is working collaboratively with communities to build a mutual trust relationship that enables broad participation and centers equity and environmental justice.[13] NRC also considers public involvement in, and information about, its activities to be a cornerstone of strong, fair regulation of the nuclear industry and to be successful, must not only excel in carrying out its mission but must do so in a manner that inspires confidence.[14] The federal government will also continue to take steps that ensure that civil nuclear energy actions deliver local community benefits.[15] For many federal grant and loan programs, when an applicant is selected for federal funding, its Community Benefits Plan, created with community and labor engagement, becomes part of the contractual obligation of the funding recipient and thus a legally-binding agreement signed by community groups or coalitions and a project developer, identifying the community or labor

[11] White House Fact Sheet: Modernizing Environmental Reviews [link]
[12] White House Fact Sheet: Climate Impacts in Environmental Reviews [link]
[13] DOE: Consent-Based Siting [link]
[14] NRC Strategic Plan: Fiscal Years 2022-2026 (NUREG-1614, Volume 8) [link]
[15] DOE: About Community Benefits Plans [link]

benefits a developer agrees to deliver in return for community support or workforce availability for a project.

Honoring Tribal Sovereignty

The responsible use of civil nuclear energy must ensure that nuclear deployments and associated supply chains reflect, fulfill, and respect the federal trust responsibility, Tribal treaty rights, and the U.S. government's commitment to Tribal consultation and environmental justice. Tribal consultation should align with Executive Orders 13175 and 14112 and all applicable memoranda.[16, 17, 18, 19, 20] The federal Government has initiated a series of nuclear energy-related working groups, including the Nuclear Energy Tribal Working Group and the Tribal Radioactive Materials Transportation Committee, to help ensure early engagement with Tribal Nations and federal agencies regarding actions related to civil nuclear energy that could impact Tribal Nations.[21, 22] These are positive steps, and more engagement from both public and private entities will be required to fulfill our federal trust responsibility. Tribal consultation, specific to this framework, is described in the appendix.

Advancing Environmental Justice

America's clean energy transition must advance environmental justice in communities across our nation, including in communities that are overburdened by pollution, marginalized by underinvestment, and/or are particularly vulnerable to the impacts from climate change. Safeguarding local communities' health and the environment, including through ensuring meaningful engagement, information access, and transparency in project siting and planning efforts across the nuclear energy life cycle, must be prioritized. Meaningful engagement helps ensure that the voices, perspectives, and lived experiences of local communities, including those with environmental justice concerns, are heard and reflected in decision-making. The federal Government will also continue to address harms caused by the history of civil nuclear energy on Tribal Nations and local communities, including from the impacts of abandoned uranium mines, and will prioritize sustained long-term attention and remediation to solve this problem and prevent future contamination.

Promoting National Security

In the expansion of domestic and international nuclear energy, the U.S. government will continue to actively partner with the U.S. nuclear industry to incorporate nuclear safety, security, and nonproliferation considerations as early as possible into the reactor design process and ensure that buyer countries can carry out their IAEA safeguards obligations. The United States has long

[16] Memorandum on Tribal Consultation and Strengthening Nation-to-Nation Relationships, January 2021 [link]
[17] Memorandum on Uniform Standards for Tribal Consultation, November 2022 [link]
[18] Memorandum of Understanding Regarding Interagency Coordination and Collaboration for the Protection of Tribal Treaty Rights and Reserved Rights, November 2021 [link]
[19] Memorandum of Understanding Regarding Interagency Coordination and Collaboration for the Protection of Indigenous Sacred Sites, November 2021 [link]
[20] Guidance for Federal Departments and Agencies on Indigenous Knowledge, November 2022 [link]
[21] Nuclear Energy Tribal Working Group [link]
[22] Tribal Radioactive Materials Transportation Committee [link]

been a global leader in promoting the peaceful use of nuclear energy in tandem with the highest safety, security, and international safeguards standards. The U.S. government places a high priority on international nuclear nonproliferation norms and nuclear security best practices, and is actively working with industry to incorporate these principles early in the development of reactor designs. This includes efforts to help industry integrate international safeguards approaches into reactor designs to facilitate potential buyer countries' implementation of their IAEA safeguards obligations. The United States also supports capacity building with foreign partners and outreach with U.S. industry to incorporate nuclear security best practices across several applications, including information security, cybersecurity, radioactive material security, insider threat programs, and others. Domestic security programs include physical protection of facilities, material control and accounting for special nuclear material, and threat assessments to maintain awareness of the capabilities of potential adversaries and threats to facilities, material, and activities.

Energy security is national security. In the global arena, we will encourage countries to carefully consider the larger political, economic, and strategic consequences of who they choose as a civil nuclear cooperation partner, and we are committed to establishing the United States and its allies as the partners of choice to support the expansion of this sector. Nuclear energy offers a viable option for countries to reduce their dependence on traditional suppliers of fossil fuels and pave the way for clean, resilient, economic growth. We will work with our partners to establish secure, diverse, responsible clean energy supply chains, including a resilient global uranium supply market free from Russian influence and non-market, coercive economic practices. Nuclear reactors, including SMRs and microreactors, can provide secure, resilient 24/7 power to critical infrastructure for several years, even in the face of physical or cyberattacks, extreme weather, pandemics, biothreats, and other emerging challenges that could disrupt commercial energy networks.

IV. Framework for Action

To accelerate the domestic deployment of nuclear energy and realize its climate, economic, and national security benefits, and in alignment with the guiding principles for responsible nuclear energy, the United States is taking action across the following areas: (1) building new large reactors, (2) building SMRs, (3) building microreactors, (4) extending, expanding, and restarting existing reactors, (5) improving licensing and permitting, (6) developing the workforce, (7) developing component supply chains, (8) developing fuel cycle supply chains, and (9) managing spent nuclear fuel. These actions, many of which are already underway, apply to the U.S. government as well as to the U.S. nuclear industry.

Building New Large Reactors

The current U.S. operating fleet of 94 reactors is entirely comprised of large light-water-cooled reactors, mostly gigawatt-scale, which utilize low-enriched uranium (LEU) fuel. Large reactors include the two newest units to enter commercial operation, Vogtle 3 and 4 in Georgia, which use the Westinghouse AP1000 design. Relative to the rest of the U.S. reactor fleet, most of which were built during the 1970s and 1980s, the AP1000 units feature passive safety systems as well as modular construction to improve economics.

Large, gigawatt-scale reactors are particularly attractive where bulk, grid-based electricity is needed, as they currently have the lowest cost per unit of electricity ($/kW and $/kWh) among the different categories of reactors and are the most mature options for deployment.[23] Large reactors benefit from economies of scale, have operated with very high capacity factors exceeding 90 percent, and are vital and reliable assets to utilities across the country. Large reactors have an important role in scaling domestic nuclear power in recognition of (1) our growing clean firm power needs, (2) large reactors' lower levelized cost of electricity owing to economies of scale, (3) the efficiency per worker (megawatts (MW) produced per worker-hour) that large reactors can provide in the face of workforce constraints, and (4) valuable construction and licensing experience gained from the recent completion of the two new reactors at Vogtle Units 3 and 4.

Recent construction experiences in North America and Europe have included significant construction cost overruns and schedule delays. Even with increasing load growth, utilities and state utility commissions have demonstrated reluctance to build new large reactors until the risk of cost and schedule overruns can be managed. Vogtle 3 and 4 were completed behind schedule and over budget, however, the design, construction, and licensing experience that resulted from Vogtle 3 and 4 provides valuable lessons for reactor vendors, plant owners, EPC firms, workforce, and NRC. While in general there are advantages to having multiple industry competitors in any one reactor category, U.S. utilities have down-selected from several large reactor designs to deploy just one, the AP1000 due to its passive safety features and potential for standardized production; it is imperative that America capitalizes on this experience and applies

[23] MIT CANES: 2024 Total Cost Projection of Next AP1000 [link]

it to future deployments. Vogtle Unit 4 saw cost and schedule reductions compared to Unit 3, and future deployments should continue to see lower costs and shorter construction times. The construction of Vogtle 3 and 4 utilized about 9,000 skilled trades workers at peak, some of whom could build new units. Vogtle 3 and 4 also benefitted from loan guarantees issued by DOE's Loan Programs Office; additional nuclear projects may be eligible to apply for similar public loan programs as well.

A significant potential deployment pathway for new large reactors is leveraging existing nuclear sites. Adding new units to existing sites can reduce costs and construction times because site characterization work is at least partially complete, a workforce is already in place, physical security is in place, and support from the local community is often present. Among the 54 sites with operating reactors and 11 sites where reactors have retired, a recent DOE study identified that 41 sites have the land, water, and other conditions to site up to 60 GW of new large reactors.[24] Several of the 54 sites were originally designed for two or more reactors but only have one operating. Between 2007 and 2009, 17 companies submitted applications to NRC for combined construction and operating licenses (COLs) to build 28 new reactors. Many of the sites that would have hosted those 28 reactors are prime candidates for new large reactors.[25] Sites with room for multiple new units are additionally attractive because they are most ideal to maximize learning benefits and cost reductions across successive builds.

Actions to Expand Nuclear Energy:

- **Reduce Delivered Costs of Nuclear Energy Through Tax Credits:** The IRA enacted a new technology-neutral Clean Electricity Production tax credit and Clean Electricity Investment tax credit for electricity producers that do not emit greenhouse gases. These tax credits, and in particular, the Clean Electricity Investment tax credit, can make capital costs more manageable. The U.S. Department of the Treasury and the Internal Revenue Service have issued initial guidance that proposes to clarify that nuclear power is a zero-emission technology eligible for the Clean Electricity Production and Investment tax credits and will continue to provide additional guidance as needed.[26] The value of these credits can be enhanced for projects located in an energy community or on a brownfield site, including at the site of a retired coal plant.

- **Facilitate Financing of Nuclear Energy Projects:** DOE's Loan Programs Office (LPO) provides attractive financing in the form of loans and loan guarantees for eligible projects, which can significantly reduce borrowing costs associated with deploying capital-intensive clean energy technologies like nuclear energy. LPO is ready to support nuclear technologies that will provide safe, clean firm, reliable power by financing innovative project structures to facilitate deployment at volume and scale and encourage fast followers. LPO can provide financing for innovative nuclear energy projects, such as large-scale advanced reactors under the Title 17 Innovative Clean Energy Loan

[24] DOE/ORNL/INL: Evaluation of Nuclear Power Plant and Coal Power Plant Sites for New Nuclear Capacity, September 2024 [link]
[25] INL: Opportunities for AP1000 Deployment at Existing and Planned Nuclear Sites, August 2024 [link]
[26] Federal Register: Section 45Y Clean Electricity Production Credit and Section 48E Clean Electricity Investment Credit [link]

Guarantee Program and for asset and infrastructure conversion, such as reusing existing infrastructure to add additional large reactors to existing project sites, under the Title 17 Energy Infrastructure Reinvestment Program.

- **Early Project Tracking:** As large reactor deployment projects begin development, the U.S. government will closely track these early-moving projects and monitor market needs to enable future fleet-mode deployments of new reactors.

- **Suitability of Existing Sites for New Builds:** The U.S. government will increase its engagement with owners of currently operating and recently retired nuclear reactors to evaluate existing sites' capacity for adding new nuclear reactors.

- **Leveraging Prior Large Reactor Licensing Efforts:** To support efficient licensing, for applicants who wish to update applications they have already submitted for an early site permit and/or a COL for large reactors and demonstrate that prior NRC safety and environmental findings are still relevant, NRC could assess the potential to build on and leverage its previous reviews, while still ensuring up-to-date public and governmental engagement, consideration of current high-quality data as needed, and adherence to up-to-date safety and environmental standards.

- **Project Management and Delivery:** The Biden-Harris Administration created a nuclear power project management and delivery working group that is drawing on leading experts from across the nuclear and megaproject construction industry to help identify opportunities to proactively mitigate sources of cost and schedule overrun risk to improve the ability of new reactor projects to be completed on schedule and on budget.

- **Convene Power Customers:** The U.S. government will continue to work with prospective power customers who have clean power procurement ambitions, large and resilient power needs, and the financial strength to effectively share risk with a utility toward a new nuclear power deployment project.

- **Expand International Partnerships:** The United States will seek to expand partnerships with Canadian, UK, European, and other international utilities, regulators, suppliers, workforce groups, and relevant entities to maximize application of potential international large reactor deployment lessons learned to domestic deployment.

- **State and Community Engagement:** The U.S. government will increase engagement with states (especially public utilities commissions, energy offices, and governor's offices) to ensure they are positioned to assess and implement local solutions that could facilitate deployment. The U.S. government will work with potentially impacted communities to ensure deployments reflect the U.S. government's environmental justice commitments. Meaningful engagement includes timely access to information, timely notice of opportunities to share input, demonstrated careful consideration of public input,

and technical assistance, tools, and resources where appropriate to assist communities, including communities with environmental justice concerns, with engaging effectively.

- **Tribal Consultation and Engagement:** The U.S. government will work with Tribal Nations to ensure that nuclear energy deployments and associated supply chains reflect the federal trust responsibility, Tribal treaty rights, and the U.S. government's commitment to Tribal consultation and environmental justice. Tribal consultation should align with Executive Orders 13175 and 14112 and applicable memoranda. Tribal consultation, specific to this framework, is described in the appendix.

Building Small Modular Reactors

Small Modular Reactors (SMRs) have strong potential for both grid-based and behind-the-meter resilient electricity as well as for industrial heat and hydrogen production. SMRs typically produce between 50-500 MW-electric per reactor, either as a single combined reactor and power plant, or as a power plant comprising multiple reactor modules. They can also come in a range of technologies, including Generation III+ light-water-cooled (e.g., GE-Hitachi's BWRX-300, Westinghouse's AP300, Holtec's SMR-300, and NuScale's VOYGR power modules) and Generation IV non-light-water-cooled designs (e.g., TerraPower's Natrium sodium-cooled reactor, X-energy's Xe-100 gas-cooled reactor, and Kairos Power's fluoride salt-cooled high temperature reactor), with additional differences across offerings.

SMRs have several advantages relative to large reactors in situations where the bulk power from large reactors is not optimal. For instance, SMRs may be in a better position to replace specific smaller power plants (e.g., retiring coal plants) or serve specific large loads that do not have gigawatt-scale power needs. Also, some technologies have particular attributes that are valuable for specific end use applications, such as thermal energy storage or high-temperature heat for industrial processes.

Although not yet commercially demonstrated in the United States, and with potentially higher, projected unit costs ($/kW and $/kWh) compared with large reactors, SMRs are attractive due to a smaller up-front capital investment and the potential for faster construction than large reactors. The lower, total capital costs and relatively smaller sizes of SMRs make them more accessible for customers and financers and suitable for more diverse commercial and industrial applications.

There are many promising SMR designs under development spanning a broad diversity of underlying technologies. This diversity is beneficial to support a wide range of applications and promote competition; however, rapid down-selection to a subset of these for fleet deployment will be crucial within the next decade to enable large orderbooks to be developed and NOAK costs to be realized, delivering reliable, clean, and low-cost electricity and industrial capabilities to customers across the United States.

Generation IV SMR designs currently under development utilize high-assay low-enriched uranium (HALEU) fuel to improve fuel efficiency and lengthen operating time prior to refueling. Therefore, HALEU availability is a key component to support the accelerated deployment of SMRs.

There are significant opportunities for siting SMRs at existing reactor sites and coal-fired power plant sites that have recently retired or will soon retire. Such coal-to-nuclear transitions are particularly compelling for the ability to re-use existing transmission, water, and land-based infrastructure to reduce costs and leverage the existing workforce, ensuring that good-paying jobs remain in communities as they transition to new, clean sources of power generation. A DOE study analyzed almost 400 coal power plant sites and found that about 80 percent have characteristics needed to host a nuclear reactor.[27] The study also found that utilizing existing coal plant infrastructure can reduce nuclear power plant construction costs by up to 35 percent. Successfully advancing coal-to-nuclear transitions will require effective community engagement by relevant Government entities and the reactor development and deployment team (e.g., utilities, EPC firms and constructors, power customers) to demonstrate a commitment to the community, ensure safety and protection of the environment, including environmental justice, and ensure that local community benefits are delivered.[28]

The Department of the Navy released a Request for Information (RFI) to industry, seeking to explore concepts for the development of nuclear power facilities aimed at enhancing energy security at seven Navy and Marine Corps installations in the United States.[29] Nuclear reactors, including SMRs and microreactors, have the potential to provide defense installations with resilient energy for several years, even in the face of physical or cyberattacks, extreme weather, pandemics, biothreats, and other emerging challenges that could disrupt commercial energy networks. This announcement builds on recent Department of Defense (DoD) initiatives in this area, including an announcement in early 2024 by the Assistant Secretary of the Army for Installations, Energy, and Environment to support a deployment program for advanced reactors to power multiple Army sites across the United States. This effort is also complemented by other initiatives, such as the Department of the Air Force's microreactor pathfinder project at Eielson Air Force Base and the Office of the Secretary of Defense Strategic Capabilities Office Project Pele, a transportable microreactor prototype that recently broke ground at DOE's Idaho National Laboratory.

Actions to Expand Nuclear Energy:

- **Financial Support for Generation III+ SMR Deployments:** DOE is working to expeditiously deploy $900 million made available by the Fiscal Year (FY) 2024 Consolidated Appropriations Act for competitive awards for Generation III+ SMR deployments and design, licensing, supplier development, and site preparation work.[30] Tier 1 of this program will provide up to $800 million for milestone-based awards to

[27] Investigating Benefits and Challenges of Converting Retiring Coal Plants into Nuclear Plants, September 2022 [link]
[28] PNNL: Redeveloping Coal Power Plants: Nuclear Power, April 2024 [link]
[29] Department of the Navy Request for Information: Identification of Contractor Owned/Operated Nuclear Power Sites [link]
[30] DOE: Biden-Harris Administration Announces $900 Million to Build and Deploy Next-generation Nuclear Technologies [link]

support up to two first mover teams of utility, reactor vendor, constructor, and power customers committed to deploying a first plant while facilitating a multi-reactor, Generation III+ SMR orderbook. Tier 2 will provide up to $100 million to spur additional Generation III+ SMR deployments by addressing key gaps that have hindered the domestic nuclear industry in areas such as design, licensing, supplier development, and site preparation.

- **Advanced Reactor Demonstration Program:** DOE's Advanced Reactor Demonstration Program (ARDP) provides significant funding for nuclear demonstration and risk reduction projects, including nearly $2.5 billion appropriated by the BIL. The U.S. government will continue to work with ARDP awardees to advance the successful completion of these projects.

- **Facilitate Financing of Nuclear Energy Projects:** DOE's LPO provides attractive financing in the form of loans and loan guarantees for eligible projects, which can significantly reduce borrowing costs associated with deploying capital-intensive clean energy technologies like nuclear energy. LPO is ready to support nuclear technologies that will provide safe, clean firm, reliable power by financing innovative project structures to facilitate deployment at volume and scale and encourage fast followers. LPO can provide financing for innovative nuclear energy projects, such as advanced Generation III+ or Generation IV SMR projects under the Title 17 Innovative Clean Energy Loan Guarantee Program and for asset and infrastructure conversion, such as converting retiring fossil fuel assets to nuclear power plants, under the Title 17 Energy Infrastructure Reinvestment Program.

- **Reduce Delivered Costs of Nuclear Energy Through Tax Credits:** The IRA enacted a new technology-neutral Clean Electricity Production tax credit and Clean Electricity Investment tax credit for electricity producers that do not emit greenhouse gases. These tax credits, and in particular, the Clean Electricity Investment tax credit, can make capital costs more manageable. The Department of the Treasury and the Internal Revenue Service have issued initial guidance that proposes to clarify that nuclear power is a zero-emission technology eligible for the Clean Electricity Production and Investment tax credits and will continue to provide additional guidance as needed. The value of these credits can be enhanced for projects located in an energy community or on a brownfield site, including at the site of a retired coal plant.

- **Project Management and Delivery:** The Biden-Harris Administration created a nuclear power project management and delivery working group that is drawing on leading experts from across the nuclear and megaproject construction industry to help identify opportunities to proactively mitigate sources of cost and schedule overrun risk.

- **Early Project Tracking:** Several U.S.-design SMR projects are under development across North America. The U.S. government will continue to closely track these early-moving projects and monitor market needs to enable future fleet-mode deployments of new reactors.

- **Convene Power Customers:** The U.S. government will continue to work with prospective power customers, including federal agency power customers, who have clean power ambitions, large and resilient power needs, and the financial strength to effectively share risk with a utility toward a new nuclear power deployment project.

- **State and Community Engagement:** The U.S. government will increase engagement with states (especially public utilities commissions, energy offices, and governor's offices) to ensure they are positioned to assess and implement local solutions that could facilitate deployment. The U.S. government will work with potentially impacted communities to ensure deployments reflect the U.S. government's environmental justice commitments. Meaningful engagement includes timely access to information, timely notice of opportunities to share input, demonstrated careful consideration of public input, and technical assistance, tools, and resources where appropriate to assist communities with engaging effectively. Particular attention is warranted for deployments such as coal-to-nuclear transitions where communities may already be overburdened by the energy sector.

- **Tribal Consultation and Engagement:** The U.S. government will work with Tribal Nations to ensure that nuclear energy deployments and associated supply chains reflect the federal trust responsibility, Tribal treaty rights, and the U.S. government's commitment to Tribal consultation and environmental justice. Tribal consultation should align with Executive Orders 13175 and 14112 and applicable memoranda.

- **Expand International Partnerships:** The U.S. government will seek to expand partnerships with Canadian, UK, European, and other international utilities, regulators, suppliers, workforce groups, and relevant entities to maximize application of potential international SMR deployment lessons learned to domestic deployment.

- **Defense Installations and Federal Facilities:** The U.S. government will continue to explore the potential for SMR deployment at defense installations and other federal facilities for energy resilience, in partnership with utilities and developers, to serve the installations' needs and those of the surrounding communities.

- **Risk-Informed, Technology-Inclusive Licensing:** As directed by the 2019 Nuclear Energy Innovation and Modernization Act (NEIMA), NRC is developing the risk-informed, technology-inclusive 10 CFR Part 53 licensing framework to reflect the risk and operational profiles of SMRs and non-water-cooled reactors.

- **HALEU Availability:** The U.S. government will continue to work to help promote the availability of HALEU for non-water-cooled reactors including SMRs and microreactors. In developing the fuel supply chain, the U.S. government will consider and seek to reduce existing legacy impacts and to prevent new adverse environmental, community, and Tribal impacts; encourage economic growth in local communities, including

economically distressed areas; and ensure geographic dispersal of economic activity across all regions of the United States.

Building Microreactors

Microreactors are compact nuclear reactors that typically produce 1-20 MW of thermal energy, though some designs range up to 50 MW.[31] Microreactors are uniquely suited for applications such as industrial activities and remote applications including mining, rural communities, and oilfield operations that are currently dependent on expensive and emissions-intensive diesel fuel. Microreactors can provide defense installations resilient energy for several years amid the threat of physical or cyberattacks, extreme weather, pandemic biothreats, and other emerging challenges that could disrupt commercial energy networks. Multiple DoD components are pursuing microreactor deployments. The Department of the Air Force is planning a microreactor deployment at Eielson Air Force Base in Alaska.[32] The Office of the Secretary of Defense Strategic Capabilities Office is leading the Project Pele transportable microreactor prototype.[33] The Department of the Army is taking a key role in exploring the deployment of advanced reactors to power multiple Army sites in the United States and has issued an RFI to inform deployment options.[34] These efforts will help inform the regulatory and supply chain pathways that will pave the path for additional deployments of advanced nuclear technology to provide clean and reliable energy for federal installations and other critical infrastructure.

The commercial viability of microreactors heavily depends on the ability to mass-produce them in a manufacturing facility where they can be rapidly constructed, potentially fueled, and then transported to a deployment site. This is necessary to reduce costs and increase the speed of licensing and deployment to match the timescales of those use cases. Moreover, nearly all microreactor designs currently under development utilize HALEU fuel to improve fuel efficiency and lengthen operating time prior to refueling. Therefore, HALEU availability is a key component to support the accelerated deployment of microreactors.

Actions to Expand Nuclear Energy:

- **Microreactor Regulatory Framework:** Consistent with the ADVANCE Act, NRC is continuing to develop the regulatory framework for licensing and regulating microreactors including units built and fueled in a manufacturing facility. This work can leverage the learning from Project Pele, through which DOE has executed a flexible and efficient regulatory process.

- **Defense Installations and Federal Facilities:** The U.S. government will continue to explore the potential for microreactor deployment at defense installations and other

[31] DOE: What is a Nuclear Microreactor? [link]
[32] Air Force: Microreactor Pilot Program at Eielson Air Force Base [link]
[33] DoD Breaks Ground on Project Pele: A Mobile Nuclear Reactor for Energy Resiliency [link]
[34] DIU and U.S. Army to Prototype Advanced Nuclear Power for Military Installations [link]

federal facilities for energy resilience, and to explore options to provide power to assist with natural disaster recovery efforts.

- **Early Project Tracking:** As microreactor deployment projects develop, the U.S. government will continue to closely track these early-moving projects and monitor market needs to enable future fleet-mode deployments of new reactors.

- **HALEU Availability:** The U.S. government will continue to work to help promote the availability of HALEU for non-water-cooled reactors including SMRs and microreactors.

- **State and Community Engagement:** The U.S. government will increase its engagement with states (especially public utilities commissions, energy offices, and governor's offices) to ensure they are positioned to assess and implement local solutions that could facilitate deployment. The U.S. government will work with potentially impacted communities to ensure deployments reflect the U.S. government's environmental justice commitments. Meaningful engagement includes timely access to information, timely notice of opportunities to share input, demonstrated careful consideration of public input, and technical assistance, tools, and resources where appropriate to assist communities with engaging effectively.

- **Tribal Consultation and Engagement:** The U.S. government will work with Tribal Nations to ensure that nuclear energy deployments and associated supply chains reflect the federal trust responsibility, Tribal treaty rights, and the U.S. government's commitment to Tribal consultation and environmental justice. Tribal consultation should align with Executive Orders 13175 and 14112 and applicable memoranda.

Extending, Expanding, and Restarting Existing Reactors

Adding nuclear generation capacity to existing reactors and extending their operating lifetimes are key ways to maximize the output of the domestic nuclear energy operating fleet. The United States currently has the world's largest operating fleet, with 94 reactors at 54 sites across 28 states. The U.S. fleet is also among the world's oldest; almost all reactors began operation in the 1970s and 1980s, and the average U.S. reactor has been in service for 42 years. Most reactors have already received a renewed license to operate an additional 20 years after the initial 40-year license term, and some have received a subsequent license renewal to operate for an additional 20-year period (for a total of 80 years). Among U.S. operating reactors, 30 have licenses that will expire prior to 2035 and 54 have licenses that will expire between 2035 and 2050. It is a priority that all existing reactors that can demonstrate continued safe operations according to NRC's safety, security, and environmental standards, apply for renewed licenses and that NRC conducts timely safety and environmental reviews. Research is also necessary to inform the strong potential for long-term operation in which existing reactors could operate beyond 80 years, out to 100 years.

Power uprates represent an important way to safely add nuclear generating capacity to existing reactors. A power uprate refers to changes made to a nuclear reactor that enable its operators to

increase its power output. Such changes require NRC review and approval. NRC has approved 172 power uprates associated with 100 reactors between 1977 and 2021 for increases in power ranging from 0.4-20 percent. In total, these have added over eight GW to U.S. electric generation capacity. Recent advances in accident tolerant fuel, low-enriched uranium plus (LEU+, 5-10 weight percent U-235), and operating at higher burnup levels (increasing energy extraction from fuel) all add potential for new sizable power uprates, on the order of 10-20 percent increases in power. Such uprates may require refurbishments and extended downtime beyond refueling intervals to make them possible. Uprates have significant potential to add gigawatts of new capacity to the grid. These technologies may also enable extending the operating cycle for pressurized water reactors such that refueling would be on a 24-month interval rather than an 18-month interval, which would increase average annual electric generation.

Since 2013, 13 reactors at 11 sites, primarily in deregulated electricity markets and accounting for approximately 11 GW, retired prematurely, generally due to unfavorable economic conditions. In addition, several other reactors were on the verge of retiring, including the Diablo Canyon Nuclear Power Plant in California. The Civil Nuclear Credit Program, enacted and funded under the BIL, along with key policies enacted by specific states, have averted the shutdown of these and several other reactors, enabling the continued delivery of clean power to local communities. The IRA created a production tax credit for existing nuclear plants, giving their owners more economic security to continue operating. In addition, DOE has provided a $1.52 billion loan guarantee to Holtec Palisades to finance the restoration and resumption of service of the Palisades Nuclear Power Plant in Michigan. Bringing Palisades back online, provided it meets NRC's rigorous safety, environmental, and security standards, will add 800 MW to the grid and protect 600 union jobs at the plant and 1,100 jobs in the community.[35] Projects like this support the U.S. government's commitment to expanding access to affordable, clean energy as well as good-paying, high-quality jobs.

Actions to Expand Nuclear Energy:

- **Subsequent License Renewal Application Reviews:** As documented by NRC staff in its license renewal roadmap and as further directed by the Commission, NRC is working to achieve its goals for efficient and predictable reviews of subsequent license renewal applications.[36, 37] In support of this goal, applicants should consider coordinating the timing of submittals of subsequent license renewal applications to produce a more consistent review workload for NRC. NRC should continue to engage with licensees to understand the timing of such applications and ensure resources are in place and priorities are shifted as necessary to achieve its license renewal and subsequent license renewal review goals.

- **Preparing for Long-Term Operation beyond 80 Years:** NRC and the nuclear industry should continue to identify and conduct research to ensure the continued integrity of

[35] DOE: Biden-Harris Administration Bringing Back Clean Nuclear Energy, Creating Clean Energy Union Jobs Across the Midwest [link]
[36] NRC License Renewal Roadmap [link]
[37] NRC License Renewal and Subsequent License Renewal Review Expectations [link]

structural materials in the existing fleet of reactors to enable them to operate beyond 80 years, out to 100 years.[38]

- **Tax Credit Eligibility for Power Uprates and Restarts:** The Department of the Treasury and the Internal Revenue Service have proposed rules that would clarify eligibility of capacity additions and restarted nuclear power plants for the Clean Electricity Production and Clean Electricity Investment tax credits. The U.S. government will strive to ensure that future tax credit guidance provides additional clarity and certainty regarding investment in existing nuclear power facilities.

- **Sizable Power Uprates:** The U.S. government will execute efforts through DOE's Light Water Reactor Sustainability program to help enable the development, demonstration, and licensing of technologies that enable sizable power uprates, including accident tolerant fuels and LEU+.

- **Restarting Retired Reactors:** The United States will leverage experience expected to be gained through the planned restoration and restart of Palisades nuclear power plant to assess potential for additional restarts of other recently retired reactors, provided the licensee meets NRC's safety, security, and environmental standards.

- **Facilitate Financing of Nuclear Energy Projects:** DOE's LPO provides attractive financing in the form of loans and loan guarantees for eligible projects, which can significantly reduce borrowing costs associated with deploying capital-intensive clean energy technologies like nuclear energy. LPO is ready to support the restart of retired reactors that can continue to provide safe, clean firm, reliable power. As it has with the restart of the Palisades nuclear power plant, LPO can provide financing for reactor restarts under the Title 17 Energy Infrastructure Reinvestment Program.

- **State and Community Engagement:** The U.S. government will increase its engagement with states (especially public utilities commissions, energy offices, and governor's offices) to ensure they are positioned to assess and implement local solutions that could facilitate potential capacity additions. The U.S. government will work with potentially impacted communities to ensure that extensions, uprates, and restarts reflect the U.S. government's guiding principles for responsible nuclear energy. Meaningful engagement includes timely access to information, timely notice of opportunities to share input, demonstrated careful consideration of public input, and technical assistance, tools, and resources where appropriate to assist affected communities.

- **Tribal Consultation and Engagement:** The U.S. government will work with Tribal Nations to ensure that Tribes located near where retired reactors may be restarted will be consulted and the history of the impacts of these reactors in their communities will be taken into account. The U.S. government will work to assure the federal trust responsibility, Tribal treaty rights, and the U.S. government's commitment to Tribal

[38] NRC Workshop on Structural Materials: What Research for Beyond 80 Years? [link]

consultation and environmental justice are all incorporated. Tribal consultation should align with Executive Orders 13175 and 14112 and applicable memoranda.

Improving Licensing and Permitting

In anticipation of the growing interest in reactor deployment, NRC continues to make strides in reforming its licensing and permitting processes to ensure that its reviews and analyses can be performed efficiently while providing reasonable assurance of adequate protection of public health and safety, promoting the common defense and security, and protecting the environment. NRC has built a reputation globally as a strong and independent regulator, and this has helped enable the successful, safe, and secure operation of the U.S. reactor fleet. This has also helped the nuclear power industry gain acceptance and trust in local communities in which they operate. In addition, NRC's high-quality reviews and processes help to make exports of U.S. reactor technology more attractive to foreign nations.

All pathways for scaling up and accelerating domestic deployment depend on the ability and capacity of NRC to perform its licensing and permitting reviews with efficiency without compromising safety, security, or environmental protection. Utilities, power customers, project developers, and the financial community also need clear visibility that NRC reviews will be done on a predictable schedule, conditional on NRC receiving high-quality applications. NRC has gained significant licensing and construction oversight experience through its reviews of Vogtle Units 3 and 4 as well as with licensing reviews of the NuScale SMR design and the Kairos Hermes 1 and 2 non-power reactors. In fact, NRC completed its safety and environmental reviews of the Kairos Hermes 1 construction permit application ahead of schedule and on-budget. Consistent with NRC's existing goals, it will need to apply all of this experience and build on this example, find additional efficiencies, and develop greater staff capacity to be able to review the increased number of applications it should expect to receive. Particular attention should be paid toward efficiencies for repeat deployments of a design where prior reviews can be leveraged, as NRC deems appropriate.

In recognition of the importance of efficient and predictable licensing on nuclear energy deployments, Congress passed the ADVANCE Act with overwhelming bipartisan support. This law strengthens U.S. leadership in civilian nuclear energy and accelerates deployment by providing extra resources, authorities, and direction to NRC without diminishing the utmost importance of its vital work to protect people, communities, and the environment.

<u>Key Opportunities for Licensing and Permitting Efficiencies:</u>

- **NRC Licensing Reviews:** Consistent with the ADVANCE Act, NRC is implementing licensing review efficiencies by addressing repeat deployments of the same design and the use of existing reactor sites. Beyond the ADVANCE Act, NRC has approved simplified procedures that will improve the efficiency and transparency of mandatory hearings on licensing decisions for commercial nuclear power plants and is considering further improvements to Advisory Committee for Reactor Safeguards reviews. NRC

continues to assess safety impacts from natural hazards including those affected by climate change to ensure adequate climate resilience.

- **NRC Environmental Reviews:** Consistent with the ADVANCE Act and the Fiscal Responsibility Act of 2023, NRC is working to facilitate efficient, timely, and predictable environmental reviews including through expanded use of categorical exclusions, environmental assessments, and generic environmental impact statements.

- **NRC Staff Capacity:** As directed and authorized by the ADVANCE Act, NRC is working to utilize new and expanded hiring authorities to strengthen staff capacity to ensure NRC has the right number of staff at the right time with the necessary technical and non-technical skills to review all types of applications and then efficiently oversee construction and operations.

- **Leveraging Prior Large Reactor Licensing Efforts:** To support efficient licensing, for applicants who wish to update applications they have already submitted for an early site permit and/or a COL for large reactors and demonstrate that prior NRC safety and environmental findings are still relevant, NRC could assess the potential to build on and leverage its previous reviews, while still ensuring up-to-date public and governmental engagement, consideration of current high-quality data as needed, and adherence to up-to-date safety and environmental standards.

- **Risk-Informed, Technology-Inclusive Licensing:** As directed by the 2019 Nuclear Energy Innovation and Modernization Act (NEIMA), NRC is developing the risk-informed, technology-inclusive 10 CFR Part 53 licensing framework to reflect the risk and operational profiles of SMRs and non-water-cooled reactors.

- **Microreactor Regulatory Framework:** Consistent with the ADVANCE Act, NRC is continuing to develop the regulatory framework for licensing and regulating microreactors, including units built and fueled in a manufacturing facility.

- **Subsequent License Renewal Application Reviews:** As documented by NRC staff in its license renewal roadmap and as directed by the Commission, NRC is working to achieve its goals for efficient and predictable reviews of subsequent license renewal applications.[39, 40] In support of this, applicants should consider coordinating the timing of submittals of subsequent license renewal applications to produce a more consistent review workload for NRC. NRC should continue to engage with licensees to understand the timing of such applications and ensure resources are in place and priorities are shifted as necessary to achieve its license renewal and subsequent license renewal review goals.

[39] NRC License Renewal Roadmap (SECY-24-0026) [link]
[40] NRC License Renewal and Subsequent License Renewal Review Expectations [link]

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- **Role of Applicants and Nuclear Industry Toward Efficient Licensing:** Applicants have a key role in enabling high-efficiency licensing and permitting by submitting high-quality applications building off of productive pre-application reviews with NRC. Applicants can also expedite NRC reviews by down-selecting to a subset of reactor technologies.

- **Leveraging Artificial Intelligence and Advanced Computational Tools:** The U.S. government should continue to assess the potential to utilize artificial intelligence (e.g., machine learning and large language models) and other tools to improve computational modeling of nuclear reactor systems and help support efficient licensing and permitting reviews.

Developing the Workforce

The U.S. nuclear power industry directly employs about 60,000 workers today in good-paying jobs, and many more will be needed to construct, maintain, and operate new and existing reactors. Expanding U.S. nuclear capacity requires a preeminent, equitable, and inclusive technically trained and experienced workforce. This includes skilled and experienced trades workers including welders, electricians, mechanics, and pipefitters; construction and project managers; and engineers including nuclear, mechanical, civil, electrical, and environmental. Nuclear power plant construction is particularly reliant on skilled trades workers as typically over two-thirds of the cost and materials involved in building a nuclear unit are associated with the non-nuclear portions of the plant, including underground utilities, civil construction, switchyards, and cooling infrastructure. Successful nuclear construction also requires re-using the same teams of trades workers from one build to the next with the same design to capture the learning at every step during construction. At peak construction, Vogtle Units 3 and 4 utilized 9,000 workers, and many developers could leverage that experience toward construction of new AP1000s. With both new Vogtle units online, they support hundreds of good-paying, long-term jobs — encouraging community investment and economic development across the state. Today, there remains a shortage of skilled and qualified trades workers who will build and maintain the many units that will soon be deployed, particularly those with reactor construction experience. This is mitigated to some extent by the long lead times associated with power plant construction, which provide time to recruit workers.

Successful deployment and operation of advanced nuclear energy technology also requires a versatile research and development (R&D) ecosystem that could include enabling R&D at national laboratories and universities in areas such as fundamental underlying nuclear physics and data to predictive modeling and simulation, integral benchmarks, fuel qualification, reactor testbeds, and demonstrations. DOE recently surpassed $1 billion in total funding to U.S. colleges and universities advancing nuclear energy research and training the next generation of nuclear energy leaders. Efforts should continue to support Tribal Colleges and Universities to support Native students entering in nuclear energy research and related fields of study.

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Actions to Expand Nuclear Energy:

- **DOE Awards for Workforce Development:** The U.S. government will work to expeditiously deploy up to $100 million funding made available in the FY 2024 Consolidated Appropriations Act for nuclear power plant workforce training to maximize its ability to help prepare the workforce needed for the continued safe operation of nuclear energy to meet future demand.

- **Working with Organized Labor to Expand Opportunities:** The U.S. government will work with labor organizations, including unions, to ensure workforce development programs are developed in concert with expected deployments. This will also include opportunities to redeploy workers from retired fossil-fuel plants into nuclear projects. Consideration of a regional focus may assist in using the same experienced teams of trades from new build to new build.

Developing Component Supply Chains

Building new nuclear power plants requires establishing a robust and resilient specialized nuclear power plant component supply chain for each type of reactor being deployed. Most nuclear power plants with near-term deployment potential are modular and require a high-performing module manufacturing factory to build the hundreds of submodules. Nuclear power plant construction also requires large, heavy steel vessels for some technologies that require highly specialized large forging facilities to build, which presently are only located in South Korea and Japan. These supply chain inputs could create a bottleneck for nuclear expansion and could limit the pace of domestic deployment given that other countries' reactor deployments will also require the use of such facilities. Long lead-time items, such as the largest modules and pressure vessels, are particularly important for deployment scenarios because utilities may base decisions about subsequent orders on the extent to which such items can be delivered on time and on budget. Certainty in a large number of orders would substantially help suppliers gain confidence to invest in and expand production capacity and mitigate potential supply chain vulnerabilities. Component supply chains for non-water-cooled reactor technologies tend to be more design-specific.

For nuclear reactor-grade suppliers, there are rigorous and costly training and quality assurance requirements to ensure that this highly specialized equipment meets NRC standards. Consequently, it should be noted that nuclear reactor-quality materials and components tend to be significantly more expensive than their non-nuclear-grade equivalents. In order to expand the number of suppliers able to support nuclear power plant construction, industry should develop incentives to encourage existing non-nuclear manufacturers and fabricators to enter this field and get training to achieve nuclear-grade qualification.

Actions to Expand Nuclear Energy:

- **Facilitate Financing of Nuclear Energy Component Supply Chains:** DOE's LPO provides attractive financing in the form of loans and loan guarantees for eligible

projects, which can significantly reduce borrowing costs associated with deploying capital-intensive clean energy technologies like nuclear energy component supply chain development. LPO can finance innovative projects across the advanced nuclear supply chain, including leveraging new authority Congress provided in the Energy Act of 2020 to add nuclear component supply chain projects to the Title 17 Innovative Clean Energy Loan Guarantee Program. This includes projects that manufacture components for advanced nuclear reactors or build manufacturing facilities to do so.

- **Tax Credits for Nuclear Energy Supply Chains.** The IRA provided $10 billion in funding for the 48C credit, a tax credit for investments in advanced energy projects. In May 2024, the Department of the Treasury and the Internal Revenue Service, in partnership with DOE, announced up to $6 billion for a second round of 48C tax credit allocations for projects that expand clean energy manufacturing and recycling, among other things. DOE's Office of Manufacturing & Energy Supply Chains manages the program on behalf of IRS and Treasury. When evaluating applications, DOE will take into consideration whether the project addresses energy supply chain and manufacturing priority areas, which include the manufacturing of specialized components and equipment for nuclear power reactors or their fuels (including fabrication of fuels, and manufacturing of equipment for conversion, enrichment, and deconversion), for both existing reactors and new reactor deployments.

- **Nuclear Reactor-Quality Suppliers:** The U.S. government will explore potential opportunities to help industry increase the pool of nuclear reactor-quality suppliers, expand capacity at existing suppliers, and incentivize non-nuclear manufacturers and fabricators to enter the nuclear field and get training to achieve nuclear-quality standard certification.

- **Nuclear-Grade Components:** As directed by the ADVANCE Act, NRC will examine the requirements for nuclear-grade components in manufacturing and construction for nuclear energy projects and opportunities to use standard materials, parts, or components where allowable.[41]

- **Catalyzing Private Sector Investments in Component Supply Chains:** The U.S. government will explore potential opportunities to help catalyze development of domestic nuclear power plant module fabrication factories and large forging facilities to reduce the likelihood of them becoming bottlenecks.

- **North America Supply Chain Partnerships:** The U.S. government will continue to explore opportunities to expand North American supply chain partnerships leveraging suppliers supporting Canadian deployments.

[41] ADVANCE Act Section 401(c)(1)(B)(i)-(iii) [link]

Developing Fuel Cycle Supply Chains

Over the past several years, the Biden-Harris Administration and Congress have taken critical steps to establish a robust nuclear fuel supply chain in the U.S. and reduce dependence on Russia. A domestic nuclear fuel supply chain is crucial to deliver the LEU needed for the existing reactor fleet and new light-water-cooled reactors, and HALEU needed for non-light-water-cooled SMRs and microreactors. Domestic uranium exploration, mining, milling, in-situ recovery, conversion, enrichment, deconversion, fabrication, and site reclamation are all essential aspects of the nuclear fuel supply chain and must be evaluated and undertaken in line with protective environmental and safety standards, following meaningful community engagement and Tribal consultation. In addition, similar consideration needs to be given to domestic availability of other critical minerals and materials needed to support construction and operation of nuclear reactors.

Regarding conversion and enrichment services, the U.S. government has taken significant steps to jumpstart a domestic commercial enrichment capability in the United States both to invest in innovation and economic security at home and reduce reliance on Russia as a demonstrably unreliable energy supplier. On May 13, 2024, President Biden signed into law the "Prohibiting Russian Uranium Imports Act" which imposes a prohibition on imported LEU from Russia unless importers receive a time-limited waiver granted by the Secretary of Energy.[42] The Consolidated Appropriations Act of 2024 made available up to $2.72 billion to seed a revolving fund intended to jumpstart new enrichment capacity in the U.S. for LEU and HALEU.[43] This was in addition to the $700 million provided by the IRA to DOE to implement a HALEU Availability Program, including to support enrichment and deconversion capacity. Success cannot be achieved without industry investment and action. Power customers have a role to further catalyze the needed expansion of conversion and enrichment capacity in the United States by sending a demand signal by committing to an orderbook of new orders of large reactors, SMRs, and microreactors. Supply chains are global, and the revitalization of a strong, safe, and secure international nuclear fuel cycle must be pursued in close coordination with partners and allies. To this end, the United States is working together with Canada, France, Japan, and the United Kingdom, a group known as the "Sapporo 5," to jointly establish a secure and resilient global nuclear fuel supply chain to ensure continued operation and support the growth of nuclear energy deployment around the world free of Russian influence and non-market policies and practices.

While today's in-situ methods of uranium recovery are improved with reduced environmental and human health concerns, the legacy of past uranium mining in the United States remains a concern and needs to be rectified. Past uranium mining was driven in part by national security and defense purposes, including mining that occurred before environmental review and permitting was required. The lack of environmental review and requirements for financial assurance before many mines were in operation means that, to this day, many uranium sites have not been reclaimed or remediated and there may not be responsible party funds or financial

[42] Public Law No: 118-62, "Prohibiting Russian Uranium Imports Act" May 2024 [link]
[43] Consolidated Appropriations Act of 2024, Division D – Energy and Water Development and Related Agencies Appropriations Act, 2024 [link]

assurance programs to conduct the cleanup. As a result, thousands of abandoned uranium mines still emit radiation and impact communities across the country, in particular Tribal Nations such as the Navajo Nation, which has more than 500 abandoned uranium sites with an estimated cleanup cost in the billions of dollars.[44] As new reactors are deployed and domestic uranium recovery gains more commercial interest, it is essential that uranium recovery be conducted according to appropriate environmental, labor, and health standards, respect for Tribal sovereignty including through consultation, and robust community engagement.

At the same time, the legacy of past uranium mining must be addressed. Tribes and communities have endured, and continue to endure, the legacy of uranium mining with little compensation, warning, protection and reconciliation from the U.S. to heal the wrongs of past energy policies. A comprehensive, interagency effort to tackle the cleanup of existing abandoned uranium sites should be developed, building off existing plans including the Ten-Year Plan on Federal Actions to Address Impacts of Uranium Contamination on the Navajo Nation.[45] In addition, domestic uranium mining should reflect the recommendations of the U.S. government's Interagency Working Group on Mining Laws, Regulations, and Permitting.[46] This includes, for example, avoiding areas near national monuments and the sensitive surrounding landscapes.

Actions to Expand Nuclear Energy:

- **Domestic Uranium Conversion and Enrichment:** The U.S. government will continue efforts to scale up domestic uranium enrichment capacity by implementing competitive procurement programs and awarding available funding to various suppliers.

- **Global Fuel Supply Chain Partnerships:** The U.S. government will continue working together with international partners – focusing on the Sapporo 5 grouping of Canada, France, Japan, and the United Kingdom – to increase the depth and resilience of the global civil nuclear fuel supply chain free from Russian influence. This includes coordinating complementary domestic policies aimed at expanding our collective capabilities to provide commercial fuel to countries seeking to deploy peaceful nuclear energy and that share a commitment to the highest standards of safety, security, and nonproliferation.

- **Facilitate Financing of Nuclear Energy Fuel Supply Chains:** DOE's LPO provides attractive financing in the form of loans and loan guarantees for eligible projects, which can significantly reduce borrowing costs associated with deploying capital-intensive clean energy technologies like nuclear energy fuel supply chain development. LPO can finance innovative projects across the advanced nuclear supply chain, including leveraging new authority Congress provided in the Energy Act of 2020 to add nuclear

[44] Ten-Year Plan: Federal Actions to Address Impacts of Uranium Contamination on the Navajo Nation [link]
[45] Ten-Year Plan: Federal Actions to Address Impacts of Uranium Contamination on the Navajo Nation [link]
[46] Interior Press Release: Biden-Harris Administration Report Outlines Reforms Needed to Promote Responsible Mining on Public Lands [link]

component supply chain projects to the Title 17 Innovative Clean Energy Loan Guarantee Program. This includes projects that convert, enrich, and fabricate nuclear fuel.

- **Tribal Consultation and Engagement:** The U.S. government will closely monitor the uranium supply chain including for domestic mining, milling, in-situ recovery, and transportation of uranium and fuel across Tribal lands and ensure appropriate mechanisms and transparency for Tribal consultation.

- **Roadmap for Cleaning Up Abandoned Uranium Mines:** In recognition of the significant and harmful legacy of uranium mining on and near Tribal lands, the U.S. government will continue to prioritize the cleanup of abandoned uranium mines, including by convening senior-level leaders across federal agencies to develop a roadmap for accelerating remediation.

Managing Spent Nuclear Fuel

Spent nuclear fuel is safely stored in spent fuel pools and NRC-licensed dry cask storage systems at over 70 facilities in 35 states, including 20 sites where reactors have ceased operations. A robust, multi-generational, integrated nuclear waste management program for spent nuclear fuel is vital to the successful expansion of U.S. nuclear power. DOE remains committed to fulfilling the federal Government's obligations to properly manage and dispose of spent nuclear fuel and high-level waste. There is broad international scientific consensus that consent-based siting of a deep geologic repository is the safest and most secure method for spent nuclear fuel and high-level radioactive waste disposal. Generic repository standards would also need to be updated to support the use of a deep geologic repository. In addition, future reactor technologies may utilize sustainable nuclear fuel cycles to reduce the volume of spent fuel requiring long-term storage.

Consistent with Congressional direction, DOE is committed to a consent-based approach to siting a federal consolidated interim storage facility. DOE's consent-based siting process will include informed, inclusive participation of Tribal governments, states, and local communities, including communities with environmental justice concerns, in the decision-making process and will ensure potential host communities have the opportunity to weigh the potential opportunities and risks of hosting a facility, including the social, economic, environmental, and cultural effects it may have on the community. In 2021, DOE issued an RFI on using consent-based siting to identify sites for interim storage of spent nuclear fuel. The RFI sought feedback on the process itself, removing barriers for meaningful participation, especially for groups and communities who have not historically been well-represented in these conversations, and the role of interim storage as part of the nation's waste management system. DOE summarized the 225 submissions in its effort to reflect the feedback into the process.[47]

[47] DOE Consent-Based Siting: Request for Information Comment Summary and Analysis, September 2022 [link]

Actions to Expand Nuclear Energy:

- **Consolidated Interim Storage:** The U.S. government will continue efforts using the consent-based approach for one or more federal consolidated interim storage facilities for spent fuel casks and high-level waste in a way that maximizes governmental, Tribal Nation, community, and stakeholder engagement and trust. The U.S. government will work to assure the federal trust responsibility, Tribal treaty rights, and the U.S. government's commitment to Tribal consultation and environmental justice are all incorporated. Tribal consultation should align with Executive Orders 13175 and 14112 and applicable memoranda.

- **Interagency Collaboration Toward Long-Term Waste Management:** The U.S. government will increase inter-agency collaboration towards starting a consent-based siting process for long-term management of spent fuel and high-level waste.

- **Generic Repository Standards:** The U.S. government will establish the technical, legal, legislative, and policy basis for a robust long-term spent fuel solution including early efforts to update risk-informed, technology-inclusive generic repository standards.

- **Spent Fuel Removal Prioritization:** The U.S. government will explore potential options to prioritize sites for eventual removal of spent fuel casks, and will consider the impact on communities and Tribal Nations near where a reactor has ceased operations.

- **Sustainable Advanced Fuel Cycles:** The U.S. government will continue R&D efforts to assess the technical challenges of advanced fuel cycles and engage with industry to ensure commercial activities are focused on solving economic and technical challenges.

V. Conclusion

This framework outlines pathways to expand domestic nuclear energy and describes how the U.S. government, U.S. nuclear industry, and workforce can capitalize on this moment for the American people. The nation is anticipating substantial growth in electricity demand and is undergoing a clean energy transition. A successful expansion of nuclear power, consistent with the U.S. government's guiding principles for responsible nuclear energy deployment, will play a key role in reducing greenhouse gas emissions and avoiding the worst impacts of the climate crisis, increase the stability and resilience of the grid, and further U.S. energy security.

A strong domestic industry is critical to expanding U.S. exports of civil nuclear goods and services to the global market, with a U.S. share of export revenues estimated around $1.9 trillion through 2050.[48] Since nearly all international partners desire to see U.S. licensing and deployment of our technologies before they commit to them, domestic deployment is a vital first step to the U.S. export strategy. It is also critical to advance local economic opportunity because nuclear energy has the potential to create sustained good-paying jobs, including union jobs, in communities across the country, including where they are needed most. In addition, nuclear energy deployment at home supports America's national security interests as a robust civilian industrial base also supports the defense industrial base. U.S. international cooperation on nuclear energy also helps like-minded countries achieve energy security. Adopting an approach to intensify U.S. government collaborations with the U.S. nuclear industry as well as allies and partners will help accelerate the competitive export of U.S. nuclear technology including through international nuclear partnership programs that can provide essential capacity-building support to counterpart countries as they develop their nuclear energy programs under the highest international standards for nuclear safety, security, and nonproliferation.

Even with rapid electricity demand growth and important momentum across the public and private sectors, nuclear energy deployment is not guaranteed and will require all the expertise and ingenuity our nation can deliver. It is also critical that the nation addresses legacy contamination from historical civil nuclear energy, learns from the past, and applies and follows appropriate standards for environmental, labor, Tribal, and community health protection, as well as provides opportunities for meaningful engagement and Tribal consultation to inform federal actions on nuclear energy at every step. Working together, harder, and more creatively, America can enter a new era of nuclear power that brings clean, safe, affordable, 24/7 energy to communities, businesses, and homes across the country while providing sustained good-paying jobs, economic opportunity, and environmental justice.

[48] UxC Global Nuclear Market Assessment Based on IPCC Global Warming of 1.5C Report, July 2020 [link]

Appendix: Planned Tribal Consultation and Request for Information

The U.S. government recognizes that expanding domestic nuclear energy production must continue to be informed by Tribal consultation, intergovernmental and community engagement, and meaningful public participation. This appendix announces a new dialogue and extends an invitation for Tribal and public input on efforts to safely and responsibly meet the U.S. government's carbon-free power, economic development, and national security goals. In alignment with the goal established at the 28th United Nations Climate Change Conference (COP28) to triple global installed nuclear capacity by 2050, *Safely and Responsibly Expanding U.S. Nuclear Energy: Deployment Targets and a Framework for Action* provides updates on federal Government activities since COP28, establishes domestic deployment targets, and outlines pathways to expand domestic nuclear energy production. The framework, including guiding principles which underpin the deployment targets, will be open to comment from all interested Tribes and stakeholders.

The U.S. government intends to conduct Tribal consultation on this document in November and December 2024. A summary of Tribal comments would be created by the U.S. government to incorporate input into agency implementation and any future updates to this framework, as appropriate. The Tribal consultation process will begin with the issuance of Dear Tribal Leader Letters (DTLLs) to all federally recognized Tribes, which will include a date and details for a consultation session with federal decision makers that will occur at least 30 days from issuance of the DTLLs. Written comments would be due no earlier than 60 days from the issuance of the DTLLs.

The Administration is also offering opportunities for public engagement on this document. The Department of Energy will release a request for information (RFI), providing all stakeholders an opportunity to comment. Comments will be published online at regulations.gov and available for implementing agencies to review and inform implementation of actions in this framework as well as any future updates to this framework, as appropriate.

In addition to the Tribal consultation and RFI processes on the framework described herein, the U.S. government is committed to continued Tribal consultation and broader public, intergovernmental, and community engagement with respect to federal actions related to energy, including nuclear energy.

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