Office of Clean Energy Demonstrations

U.S. DEPARTMENT OF ENERGY | Office of NUCLEAR ENERGY

Notice of Intent No.: DE-FOA-0003392

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This is a Notice of Intent to Issue:
Solicitation No.: DE-FOA-0003392

Generation III+ Small Modular Reactor Pathway to Deployment Program

The U.S. Department of Energy's (DOE) Office of Clean Energy Demonstrations (OCED) in collaboration with the Office of Nuclear Energy (NE) intends to issue a solicitation entitled "Generation III+ Small Modular Reactor Pathway to Deployment Program". This Notice of Intent (NOI) describes a preliminary plan that will evolve during the solicitation development process.

Key Objectives

The primary objective of this program is to focus DOE and non-federal resources on a credible and sustainable pathway to fleet-level deployment of Generation (Gen) III+ small modular reactors (SMR). To spur the necessary industry-wide momentum, DOE intends to offer funding for projects under this solicitation through two tiers:

- Tier 1 will provide up to $800M to support up to two first-mover teams of utility, reactor vendor, constructor, and end-users/off-takers committed to deploying a first plant while facilitating a multi-reactor, Gen III+ SMR orderbook.[1]

- Tier 2 will provide up to $100M to spur additional Gen 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.

DOE invites all interested potential applicants and team members to attend an in-person Industry Day in August 2024 where DOE, along with Nuclear Regulatory Commission (NRC) staff, will present and answer questions on the following topics:

- Tier 1 and 2 priorities, including objectives for teaming and establishing an orderbook

- Details around the anticipated solicitation process and how to submit an application

- Permitting and licensing strategies

The Industry Day will also provide an opportunity for teaming. To learn more and register to attend, visit https://www.energy.gov/oced/generation-iii-small-modular-reactor-program-engagement-opportunities.

[1] Full funding will not be available up front. DOE will structure the awarded project milestone requirements to include specific go/no-go decision points. Additional amounts may be made available, subject to the availability of appropriations.

This NOI describes a preliminary plan that will evolve during the solicitation development process. The appendix includes definitions for the terms included in this document.

Background

DOE works with the domestic nuclear industry, end-users/off-takers, utilities, States, national laboratories, and academic institutions to support the development and deployment of advanced reactors. DOE pursues these activities in support of the Administration's objectives to (1) put the United States on a path to a 100 percent clean power sector by 2035 and reaching net-zero emissions, economy-wide, by no later than 2050; (2) maintain the Nation's technological leadership position in the global nuclear industry; and (3) ensure national energy security. DOE recognizes that work remains in the design and development of domestic SMRs to ensure the successful deployment of these reactors into the U.S. and international marketplace.

In a recent Pathways to Commercial Liftoff report,[2] DOE estimates the U.S. will need 700–900 GW of additional clean, firm capacity to reach net-zero by 2050. Nuclear power is a proven option that can deliver this magnitude of clean, firm power at scale. It also offers significant regional economic benefits, can aid in an equitable transition to a net-zero grid, and has a wide variety of use cases that enable grid flexibility and decarbonization beyond the grid.[3] For example, nuclear power creates high-paying jobs with concentrated economic benefits for communities most impacted by the energy transition, can respond flexibly to complement intermittent renewables, has low land-use requirements, and is not constrained by technical siting requirements. SMRs are envisioned to play an important role in the scale-up of nuclear power given the potential for modular, factory-based construction, reductions in overall total project costs and capital cost requirements, and ability to meet smaller localized power demands.

However, the nuclear industry today is at a commercial stalemate between potential customers and investments in the nuclear industrial base needed for deployment. Utilities and end-users/off-takers recognize the benefits of, and need for, nuclear power, but perceived risks of cost and timeline overruns and project abandonment have limited committed orders for new reactors.[4] Nevertheless, the demand for clean, firm electricity continues to increase, driven by growth in artificial intelligence and data centers, onshoring of energy-intensive industries like semiconductor fabrication, and electrification of heavy industry and transportation.

Accelerating Gen III+ SMR deployments and creating a sustainable infrastructure for future fleet-level deployments provide one potential pathway to break this stalemate. Gen III+ SMR designs are expected to provide the same or improved safety, security, and environmental impacts compared to current large nuclear power plant designs while allowing for deployment in markets that desire firm power but are not amenable to large gigawatt-size light-water reactors.

Implementation Approach

The pending solicitation is expected to make available a total of up to $900M in federal funds for the award of multiple projects. These funds will be made available in two tiers.

[2] Pathways to Commercial Liftoff: Next-Generation Geothermal Power, March 2024, https://liftoff.energy.gov/next-generation-geothermal-power/

[3] Pathways to Commercial Liftoff: Advanced Nuclear, March 2023, https://liftoff.energy.gov/advanced-nuclear/

[4] Pathways to Commercial Liftoff: Advanced Nuclear, March 2023, https://liftoff.energy.gov/advanced-nuclear/

Tier 1: First Mover Team Support (Up to $800M) – This tier is intended to facilitate the near-term utility-scale deployment of domestic Gen III+ SMR technologies. It will provide funding for up to two Gen III+ SMR projects that are reliable, licensable, commercially viable, and have demonstrated a path towards a multi-reactor orderbook.

The Department anticipates that eligible entities will consist of a team that includes a U.S. Gen III+ technology vendor along with two or more domestic deployment partners, one of which must be a utility. The prime applicant should be a utility or end-user/off-taker that is a U.S. entity.

DOE plans to prioritize projects with the following attributes:

- Teams that include legally binding agreements between a utility (or utilities), reactor vendor, end-users/off-takers, and a constructor;
- Documented agreement on pursuing a preferred reactor technology with a replicable design;
- Full subscription to the electricity, steam, or other form of power to be produced by the project;
- A strategy for financing the reactor project, including the anticipated sources of funding and a breakdown between debt and equity at each project stage;
- Identified mechanism(s) to navigate risk on cost-overruns;
- A plan for meaningful engagement with the host community;
- A plan for multiple reactor deployments, and a timeline for how procurements and construction would be staged for each subsequent project;
- A mechanism to leverage the first-of-a-kind learnings to facilitate cost reductions in n^{th}-of-a-kind projects;
- Use of domestic supply chains with demonstrated capacity and capability to support planned orders as well as potential future growth, to the extent possible; and
- Timeliness of the proposed deployment, including mechanisms such as use of an existing site with the potential for expansion or existing engagement with the NRC including pre-application engagement, submission of a permit or license application, and/or receipt of design certification.

DOE recognizes that, while these funds will likely amount to only a portion of the funds necessary to complete a new nuclear project, they can be particularly impactful in helping project proponents derisk and navigate necessary early capital outlay in the project lifecycle for items such as site development, reactor design finalization, and early long-lead procurements.

The Department plans to request that applicants propose how the available funds would be best used to accelerate their project towards deployment. Anticipating the recipient will need to leverage substantial additional capital to complete the proposed project, applicants will also be asked to identify how they will navigate cost risk associated with construction. Awards made under this tier may be configured in such a way to allow recipients to access financing from the Loan Programs Office (LPO) for later stages in the project, such as construction and start-up testing.

Applicants should specify how they plan to complete the project using any combination of the following:

- Additional non-federal support, such as private investment and/or state incentives
- Private risk-sharing mechanisms, such as agreements among team members or insurance products
- Loans, either through conventional lenders or a federal program, such as LPO
- Tax credit revenue

To support the goal of building a clean and equitable energy economy, projects are expected to (1) support meaningful community and labor engagement; (2) invest in quality jobs; (3) advance diversity, equity, inclusion, and accessibility; and (4) contribute to the goal that 40% of the overall benefits of certain federal investments flow to disadvantaged communities (the Justice40 Initiative). The strength of a proposal's community benefits, including a project's impact on equity and environmental justice, will be considered when reviewing applications.

DOE will weigh the financial and commercial viability of the proposed projects when ranking applications, including a project's ability to complete the reactor project leveraging the Department's existing appropriations and authorizations.

DOE anticipates that Tier 1 will leverage the DOE's Other Transactions Agreement (OTA)[5] authority. OTAs offer DOE flexibilities during the solicitation process to meet with applicants to discuss their proposed projects.

DOE also anticipates that it will use a milestone-based OTA as the structure for the agreement between the Department and the recipient(s) to provide flexibility around activities that will receive Federal funds in the overall project structure. The milestones should represent a set of meaningful accomplishments that are strong indicators of project progress and potential project success, with associated completion definitions that the Department can objectively evaluate throughout the course of the project.

The milestones and the number of such milestones will be negotiated with the Department as a part of the award, but will generally address major project and commercial events. Notional milestones will be provided in the solicitation. The ultimate milestones will be determined based on the proposed project.

Tier 2: Fast Follower Deployment Support (Up to $100M)

This tier is intended to accelerate efforts to reduce key barriers to achieve the first order-book for Gen III+ SMRs that can be deployed in the early 2030's and to advance the goals of the Fission for the Future authorization (CHIPS Act, Sec. 10781; 42 U.S.C. § 19351)[6]. Efforts in this tier will

[5] Other Transaction Authority | Department of Energy, https://www.energy.gov/management/other-transaction-authority

[6] The Fission for the Future initiative is working to engage with States, Tribes, local governments, utilities, and private entities to accelerate the deployment of advanced reactors and its associated infrastructure. Communities with retiring or retired fossil fuel generation facilities will be prioritized as will support for non-electric applications such as heating, hydrogen production, systems integration, and industrial processes. Efforts through the Fission for the Future initiative are intended to drive clean energy generation, maintain the workforce, and support economic development.

improve the domestic nuclear industry resilience to commercialize their products and achieve nth-of-a-kind pricing for new nuclear deployments. This includes improvements in design, licensing support, supplier development, and site preparation. In furtherance of these initiatives, this tier is further divided into three sub-tiers. DOE will determine the allocation of projects between the sub-tiers based on the merits of the individual applications.

Tier 2.1: SMR Site Selection and Preparation – This sub-tier is intended to support siting initiatives which can help lead to multi-reactor orderbook of advanced SMRs. Efforts could include issuance of Early Site Permits[7], site characterization studies, or coal-to-nuclear transition feasibility studies, through milestone-based awards. Applicants for this sub-tier shall be a utility or owner of a planned Gen III+ SMR deployment. Preference will be given to entities working to achieve a committed orderbook for project(s) to be deployed in the early 2030s. Tier 2.1 projects can be used to assist with building an orderbook for Tier 1 applicants. Coal-to-nuclear feasibility studies should be conducted at a state or regional level and should not be limited to just one individual site.

Eligibility: Eligible entities under sub-tier 2.1 are limited to planned U.S. owners or utilities for domestic Gen III+ SMR deployment projects.

Tier 2.2: SMR Supply Chain Development – This sub-tier is intended to support initiatives that accelerate the cost/schedule-competitiveness, technical capability, and/or industrial capacity of the U.S. nuclear supplier industrial base in support of future Gen III+ SMR deployments, through milestone-based awards. Example projects could include acquiring N-Stamp or NQA-1 Certification, increasing domestic modular fabrication capabilities and/or capacities, and developing and/or improving domestic fabrication capabilities and/or capacities for component fabrication. For component suppliers, priority will go to entities that intend to leverage the capabilities to establish a training center to reduce the burden for entry into the field. Preference will be given to entities supporting a committed orderbook for project(s) to be deployed in the early 2030s. Tier 2.2 projects can be used to assist with building an orderbook for Tier 1 applicants.

Eligibility: Eligible entities under sub-tier 2.2 are limited to domestic entities looking to improve the domestic supply chain needed for the near-term deployment of Gen III+ SMRs.

Tier 2.3: SMR Project Improvement – This sub-tier is intended to support initiatives that increase the confidence of cost and schedule estimates of Gen III+ SMR projects. Applicants for this sub-tier shall be a utility or owner of a planned Gen III+ SMR deployment. Awards will be based on a milestone payment approach and will include a ceiling amount of $1,500,000 per completed set of milestones. Each set of milestones are to include the delivery of a project cost estimate and integrated project schedule to DOE for review, as well as the completion of an independent review with no critical issues. Each set of milestones should represent an increased level of maturity and reduced uncertainty for project cost and schedule estimates. The milestones will be negotiated with the Department as a part of the award, but will generally be items such as:

- Submittal of an AACE Class 4 Project Cost Estimate with a Level 2 Integrated Project Schedule as verified for accuracy and quality by an independent review

[7] Early Site Permit (ESP) as defined by the Nuclear Regulatory Commission (NRC). Visit https://www.nrc.gov/reading-rm/basic-ref/glossary/early-site-permit-esp.html.

- Submittal of an AACE Class 3 Project Cost Estimate with a Level 3 Integrated Project Schedule as verified for accuracy and quality by an independent review

Awardees should anticipate providing some level of support in the conduct of independent reviews. The criteria to be used for the independent reviews will be addressed in the solicitation.

Eligibility: Eligible entities under this sub-tier are limited to planned U.S. owners or utilities for domestic Gen III+ SMR deployment projects.

Tier 2 Program Priorities:

In addition to the project attributes outlined above, DOE anticipates further prioritizing projects based on:

- The criteria in part (d) of the Fission for the Future authorization
- Whether an entity is working to achieve a committed orderbook for project(s) to be deployed in the early 2030s
- The extent to which project success will promote growth of the domestic nuclear industry

DOE will look for applications that account for a region's overall capabilities and shared assets, and leverage synergies across public and private efforts at all levels, to the extent allowed by law. Guidance on specific application and reporting requirements will be included in the solicitation but examples are available on OCED eXCHANGE.[8]

Additional details on Selection Criteria will be provided in the solicitation. The Department may consider multiple vehicles, such as cooperative agreements (CA) or OTAs, or other funding mechanisms for Tier 2 awards to ensure that both traditional and non-traditional private entities, consortia, and collaborations are eligible to participate in the Gen III+ Pathway to Deployment Program, and to maximize flexibility, execution speed, and program impact.

National Environmental Policy Act (NEPA)

DOE's decision of whether and how to distribute federal funds under this program is subject to NEPA (42 U.S.C. §§ 4321 *et seq.*), which requires federal agencies to consider the environmental effects of their proposed actions in their decision-making processes and inform and engage the public in that process. For additional background and guidance on NEPA, refer to the DOE NEPA Website, https://www.energy.gov/nepa or https://ceq.doe.gov/index.html.

While NEPA compliance is a federal agency responsibility and the agency is responsible for the accuracy, scope, and content of any environmental documents, all recipients selected for negotiation of an award will be required to assist in the timely and effective completion of the NEPA process.

DOE has and will continue to collaborate with the NRC on all projects where DOE's funding and NRC's jurisdiction overlap. NEPA compliance activities will be tailored to each project awarded

[8] See for example Community Benefits Plan Guidance for DE-FOA-0002779 (Clean Hydrogen Hubs under Application Forms and Templates); available for download at https://oced-exchange.energy.gov

under the forthcoming funding opportunity; NEPA compliance activities should be accounted for in the project scope, schedule, and budget. For additional background and guidance on NEPA refer to the DOE NEPA Website https://www.energy.gov/nepa or https://ceq.doe.gov/index.html.

Submission and Registration Requirements for Full Application

DOE envisions awarding multiple financial assistance awards in the form of OTAs or CAs. The solicitation will be released in summer / fall 2024. DOE intends to announce selections in early- to mid-2025.[9] DOE plans to hold an Industry Day in August 2024 in support of this pending solicitation to answer questions and obtain industry feedback. A notional schedule is provided in Figure 1 below.

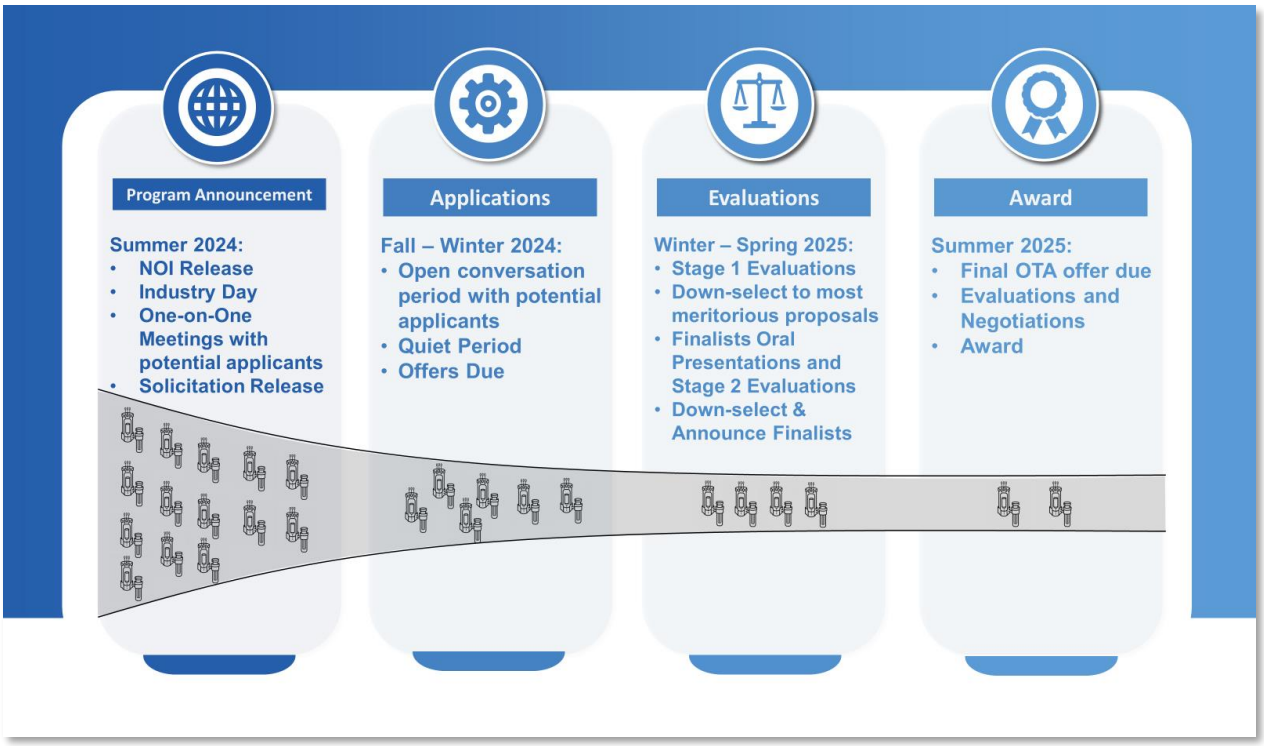

Figure 1: Notional Selection Process Schedule

This Notice is issued so that interested parties are aware of the DOE's intention to issue this solicitation in the near term. All the information contained in this Notice is subject to change. **DOE will not accept formal questions at this time regarding issuance of the potential solicitation. Details on how to submit formal questions and comments will be provided in the solicitation, when issued. Informal questions and feedback can be addressed through the industry day.**

DOE plans to issue the solicitation via the OCED eXCHANGE website https://oced-eXCHANGE.energy.gov/. If applicants wish to receive official notifications and information from

[9] Please note that these dates are tentative and subject to change.

OCED regarding this solicitation, they should register in OCED eXCHANGE. When the solicitation is released, applications will be accepted only through OCED eXCHANGE.

In anticipation of the solicitation being released, applicants are advised to complete the following steps, which are required for application submission:

- Register and create an account in OCED eXCHANGE at https://oced-eXCHANGE.energy.gov. This account will allow the user to apply to any open OCED solicitations that are currently in OCED eXCHANGE. Please note that potential applicants must create an account in OCED eXCHANGE even if the organization has already registered for an EERE eXCHANGE account. It is recommended that each organization or business unit, whether acting as a team or a single entity, use only one account as the contact point for each submission.

  Questions related to the registration process and use of the OCED Exchange website should be submitted to: OCED-ExchangeSupport@hq.doe.gov

- Register with the System for Award Management (SAM) at https://www.sam.gov. Designating an Electronic Business Point of Contact (EBiz POC) and obtaining a special password called a Marketing Partner Identification Number (MPIN) are important steps in SAM registration. Please update your SAM registration annually. Upon registration, SAM will automatically assign a Unique Entity ID (UEI).

- Register in FedConnect at https://www.fedconnect.net/. To create an organization account, your organization's SAM MPIN is required. For more information about the SAM MPIN or other registration requirements, review the FedConnect Ready, Set, Go! Guide at https://www.fedconnect.net/FedConnect/Marketing/Documents/FedConnect_Ready_Set_Go.pdf

- Register in Grants.gov to receive automatic updates when amendments to a solicitation are posted. However, please note that applications will not be accepted through Grants.gov. http://www.grants.gov/. All applications must be submitted through OCED eXCHANGE.

Appendix A: Statutory Authority

On March 9, 2024, the President signed the Consolidated Appropriations Act, 2024 (CAA 2024, Public Law 118-42).[10] Section 311 of the CAA 2024 made up to $800,000,000 of the unobligated Infrastructure Investment and Jobs Act (IIJA, Public Law 117-58) funds available for not more than two commercial utility deployment, grid scale Gen III+ SMR projects ($200,000,000 in fiscal year 2024, $300,000,000 in fiscal year 2025, and up to $300,000,000 in fiscal year 2026). The CAA 2024 also made available an additional $100,000,000 for one or more competitive awards supporting design, licensing, supplier development, and site preparation of a grid-scale Gen III+ reactor design.

On August 9, 2022, the President signed the Chips and Science Act (Chips Act, Public Law 117 – 167).[11] Subtitle P of the Chips Act (Sec. 10781), titled 'Fission for the Future,' authorizes the Secretary of Energy to establish a program to provide Federal financial assistance to eligible entities to support the research, development, and demonstration of advanced nuclear concepts.

The mission of OCED is to deliver clean energy and industrial decarbonization demonstration projects, at scale, in partnership with the private sector, labor unions, other stakeholders, and communities to launch or accelerate market adoption and deployment of technologies, as part of an equitable transition to a decarbonized energy system and economy. The founding of OCED builds on DOE's expertise in clean energy research and development and expands DOE's mission to fill a critical gap on the path to achieve net-zero emissions by 2050.

NE's mission is to advance nuclear energy science and technology to meet U.S. energy, environmental, and economic needs. NE is working to accomplish this mission by enabling the continued operation of the existing nuclear reactor fleet, enabling the deployment of new nuclear reactors, securing and sustaining the global nuclear fuel cycle, and expanding international nuclear energy partnerships.

[10] https://www.congress.gov/118/bills/hr4366/BILLS-118hr4366enr.pdf
[11] https://www.congress.gov/117/plaws/publ167/PLAW-117publ167.pdf

Appendix B: Definitions

For the purposes of this program, the following terms are defined:

An **Early Site Permit (ESP)** is defined by the NRC as a permit granted by the NRC to approve one or more proposed sites for a nuclear power facility, independent of a specific nuclear plant design or an application for a construction permit or combined license. An ESP is valid for 10 to 20 years but can be renewed for an additional 10 to 20 years.

An **end-user/off-taker** is defined as any entity that will use the electrical energy or heat generated by the plant either through an established electrical distribution grid, or directly from the plant, or a load-serving entity that directly serves end-use customers.

A **Gen III+ SMR** is defined as a nuclear fission reactor that: (1) uses light water as a coolant and low-enriched uranium (LEU) as a fuel; (2) is included as part of a single or multiple unit plant that has a power output of approximately 50-700 mega-watts-electric (MWe) ; (3) maximizes factory fabrication approaches: and, (4) includes significant improvements compared to reactors operating on December 27, 2020, including improvements such as--

(i) additional inherent safety features;

(ii) lower waste yields;

(iii) improved fuel and material performance;

(iv) increased tolerance to loss of fuel cooling;

(v) enhanced reliability or improved resilience;

(vi) increased proliferation resistance;

(vii) increased thermal efficiency;

(viii) reduced consumption of cooling water and other environmental impacts;

(ix) the ability to integrate into electric applications and non-electric applications;

(x) modular sizes to allow for deployment that corresponds with the demand for electricity or process heat; and

(xi) operational flexibility to respond to changes in demand for electricity or process heat and to complement integration with intermittent renewable energy or energy storage.

A **utility** is defined as a person, individual or a corporation, or Federal, Tribal, or State agency or corporation that sells electric energy.