



U.S. Department of Energy
Advanced Research Projects Agency-Energy
Announcement of Teaming Partner List
for Upcoming Funding Opportunity Announcement:
Transmutation of Used Nuclear Fuel

The Advanced Research Projects Agency-Energy (ARPA-E) is considering issuing a Program Funding Opportunity Announcement (FOA) that would support used nuclear fuel (UNF) transmutation. Transmutation of UNF would promote nuclear energy by addressing significant challenges associated with the permanent disposal of UNF arising from current and future nuclear reactors. Transmutation research and development will focus on reducing the storage impact of UNF components, specifically minor actinides, intermediate-lived fission products, and long-lived fission products fated for a permanent geological repository.

As described in more detail below, the purpose of this announcement is to facilitate the formation of new project teams to respond to a potential future FOA. Any FOA issued in the future would provide specific program goals, technical metrics, and selection criteria. FOA terms would be controlling.

For purposes of this Teaming Partner List, overall goals for the potential program include:

- 30-year timeline to transmute key minor actinides, medium-lived fission products, and long-lived fission products in the U.S. UNF stockpile
- $\geq 99\%$ reduction in storage time for UNF
- $\geq 60\%$ reduction in decay heat in watts per metric ton of uranium of UNF
- $\geq 90\%$ reduction in activity of UNF

The potential FOA would consider the following technical areas:

- 1. Resilient components of transmutation systems.** This technology area includes specific components that improve the power, current, reliability, and efficiency, and reduce the operating power of particle beam production.
- 2. Increased transmutation throughput.** This technology area includes methods and processes to incorporate UNF into transmutation systems that maximize transmutation of components into more manageable isotopes. Process chemistry for liquid or molten salt targets and spallation targets for accelerator-driven systems are also included in this area.
- 3. Capability teams.** ARPA-E is seeking capability teams for testing component integration and system resiliency to support the assessment of technologies in the program. Additionally, capability teams will be tasked with the development of artificial intelligence and machine learning (AI/ML) algorithms to apply to accelerator facilities and to reduce the magnitude and duration of beam trips. Capability teams will create and maintain a materials database and perform techno-economic analyses on transmutation systems concepts.



Other solutions that do not clearly fall under one of the previous categories will be considered. However, a compelling case must be made that the technology will deliver significant improvements to the enhanced throughput of transmutation.

Expertise in the following areas may be useful in responding to the potential FOA:

- Radio frequency generation
- Laser systems
- Accelerators
- Cryogenics
- Material coatings technologies
- Power electronics
- AI/ML
- Nuclear chemistry
- Process chemistry
- Separations
- Radiological monitoring
- Materials analysis

As a general matter, ARPA-E strongly encourages outstanding scientists and engineers from different organizations, scientific disciplines, and technology sectors to form new project teams. Interdisciplinary and cross-sector collaboration, spanning organizational boundaries, enables and accelerates the achievement of scientific and technological outcomes that were previously viewed as extremely difficult, if not impossible.

The Teaming Partner List is being compiled to facilitate the formation of new project teams. The Teaming Partner List will be available on ARPA-E eXCHANGE (<http://arpa-e-foa.energy.gov>), ARPA-E's online application portal, starting in April 2024. The Teaming Partner List will be updated periodically until the close of the Full Application period to reflect new Teaming Partners who have provided their information.

Any organization that would like to be included on this list should complete all required fields in the following link: <https://arpa-e-foa.energy.gov/Applicantprofile.aspx>. Required information includes the following: Organization Name, Contact Name, Contact Address, Contact Email, Contact Phone, Organization Type, Area of Technical Expertise, and Brief Description of Capabilities.

By submitting a response to this Notice, you consent to the publication of the above-referenced information. **By facilitating this Teaming Partner List, ARPA-E does not endorse or otherwise evaluate the qualifications of the entities that self-identify for placement on the Teaming Partner List.** ARPA-E will not pay for the provision of any information, nor will it compensate any respondents for the development of such information. Responses submitted to other email addresses or by other means will not be considered. **This list is completely voluntary to participate in and utilize.** ARPA-E will not identify or facilitate connections through the teaming list and participation in the list has no bearing whatsoever on the evaluation of applications submitted to the potential FOA.



This Notice does not constitute a FOA. No FOA exists at this time. Applicants must refer to the potential FOA, expected to be issued around June 2024, for instructions on submitting an application and for the terms and conditions of funding.