

# ADVANCED NUCLEAR SECURITY, WASTE AND ENERGY R&D (ANSWER) PROGRESS & PROMISE



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# ANSWER INITIATIVE

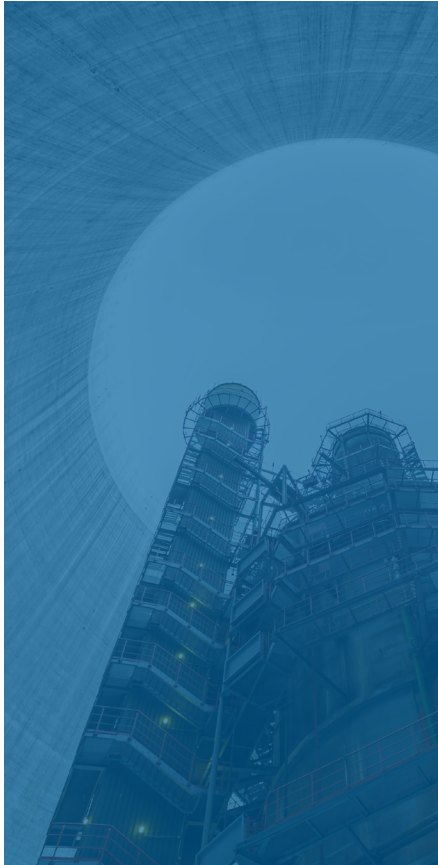
**America's leadership and influence in global nuclear energy development, as well as in international nuclear nonproliferation and security regimes, depends on sustained international deployment of U.S. nuclear energy systems and technologies.**

**By proactively aligning nuclear science, technology, and policy efforts, we can enhance and expedite deployment by U.S. industry of high-performing, cost-competitive, advanced civil nuclear energy systems that advance nonproliferation, security, and waste minimization goals.**



# WHAT IS ANSWER?

## Advanced Nuclear Security, Waste and Energy R&D



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**OBJECTIVE** To facilitate a coordinated U.S. Department of Energy (DOE) approach to position the U.S. as **the** enduring leader in global civil nuclear energy deployment.

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**CORE PARTICIPANTS** Department of Energy – Office of Science  
National Nuclear Security Administration – Office of Defense Nuclear Nonproliferation  
Department of Energy – Office of Nuclear Energy

Labs:  
Argonne National Laboratory  
Oak Ridge National Laboratory  
Idaho National Laboratory

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**ACTIVITIES** ANSWER serves as a forum to address selected policy, technical, and administrative challenges spanning multiple DOE program offices and requiring National Laboratory expertise from across the DOE complex to solve.

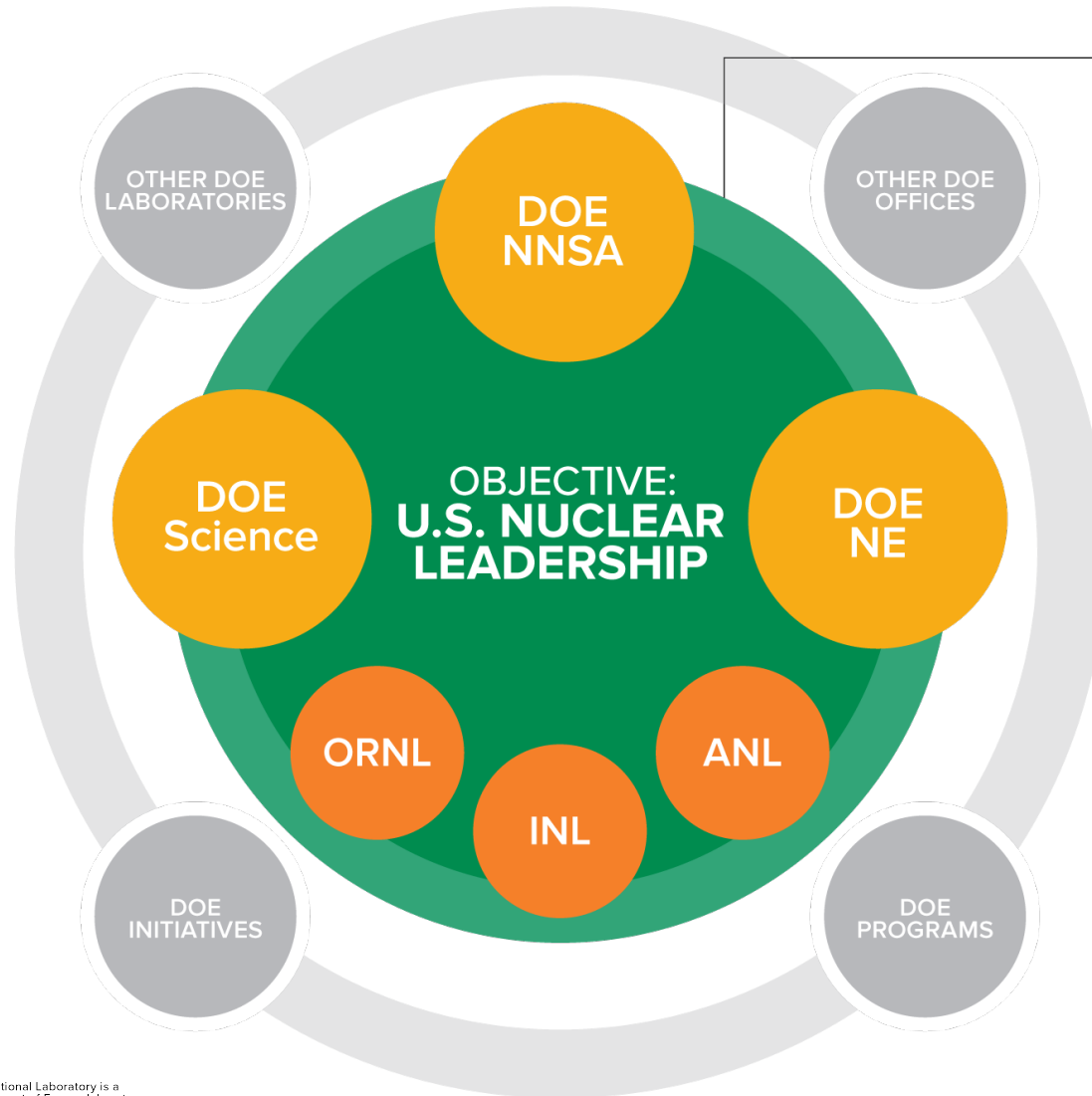
Primary mechanism is Working Group (core group and technical subgroups) *Initial in-person workshop held March 5, 2020; working group established.*

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**OUTPUTS** Subgroup technical papers, action plans, and/or recommendations  
Improved program alignment, coordination, and collaboration

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# ANSWER SUPPORTS DOE ALIGNMENT FOR U.S. NUCLEAR LEADERSHIP



**ANSWER** is a coordinating mechanism for a whole-of-DOE approach to nuclear reactor demonstration and deployment.

While DOE offices implement programs and initiatives, **ANSWER** Working Group identifies cross-office interests, leading to:

- Improved alignment
- Better coordination
- Increased collaboration

#### Current Areas of Focused Coordination

- Safeguards and security by design for advanced reactors
- HALEU availability
- Advanced reactor demonstration

#### Other Areas of Interest

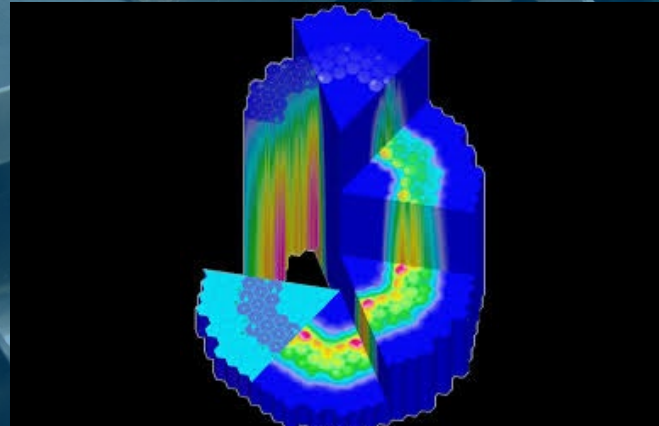
- Used-fuel considerations

# CURRENT FOCUS

## Technical subgroups



**Incorporating Safeguards and Security by Design into Advanced Reactor and Fuel-Cycle Technologies**



**Advancing Near-Term Demonstrations of New Reactor and Fuel-Cycle Technologies**



**Fostering the Increased Availability of High-Assay LEU (HALEU)**

# INCORPORATING SAFEGUARDS AND SECURITY BY DESIGN INTO ADVANCED REACTOR AND FUEL CYCLE TECHNOLOGIES SUBGROUP

## OBJECTIVES

Coordinate efforts to identify and resolve technical, regulatory, and policy challenges related to safeguards and security for advanced reactor and fuel-cycle technologies early in the design process and in close coordination with industry.

## ACTION PRIORITIES

Ensure necessary technical and policy support for U.S. vendors to complete physical protection design parameters for submission to NRC.

Provide technical basis for advanced reactor and fuel cycle (e.g., Molten Salt Reactor, Pebble Bed, and Microreactor) materials accountancy system design and vital area/target set identification techniques.

Support engagement between U.S. vendors and the IAEA to ensure that international safeguards and security requirements and best practices are incorporated into reactor designs.

# ADVANCING NEAR-TERM DEMONSTRATIONS OF NEW REACTOR AND FUEL CYCLE TECHNOLOGIES SUBGROUP

## OBJECTIVES

**Coordinate efforts across DOE offices/programs to support demonstration projects and maximize their chance of success; ensure R&D programs are aligned with needs of industry**

**Serve as a resource/liaison to industry; help identify resources that can be brought to bear on industry challenges**

## ACTION PRIORITIES

**Assess demonstration project needs, for instance, risks associated with safeguards, security, licensing, and used-fuel management.**

- **Dialogue with ARDP demo and risk reduction awardees**
- **Coordinate and execute R&D within DOE to address such risks.**

**Explore collaborative opportunities with international demonstration initiatives (by U.S. and international companies).**

- **Delineate role of ANSWER relative to NRIC and other supporting entities**

# FOSTERING THE INCREASED AVAILABILITY OF HIGH-ASSAY LEU (HALEU) SUBGROUP

## OBJECTIVES

Facilitate the near-term supply of HALEU for advanced reactor R&D and demonstrations

Support the development of a reliable long-term supply of HALEU to fuel prospective advanced commercial reactor technologies.

Ensure the availability of HALEU for research reactors, medical isotope production, and, potentially, for DOD and space applications.

## ACTION PRIORITIES

Develop process for adjudicating industry requests to DOE/NNSA for near/medium-term quantities of HALEU for R&D and demonstration projects.

Identify near-term HALEU supply options to determine if any would be feasible if funded by multiple DOE/NNSA programs.

Determine if there are gaps in policy and technology related to HALEU supply chain needs (e.g. the availability of shipping containers, criticality tools).



# PROGRESS TO DATE

## Key Accomplishments

- Demonstrated shared commitment of DNN, NE and SC to the objective of increasing U.S. leadership in global civil nuclear development and deployment
- Strengthened network of and communication between DOE personnel working on overlapping and complementary aspects of reactor development and deployment
- Identified and prioritized issues critical to the deployment of advanced reactors that cut across multiple DOE programs/offices
- Fostered coordination between safeguards and security R&D programs
- Facilitated the transfer of DOE safeguards and security information and capabilities to the nuclear industry through user-friendly portals
- Completed cost and schedule estimates for options to supplement and increase available HALEU to meet near-term demand

# NEXT STEPS

- Continue work of current technical subgroups focused on
  - Incorporating safeguards by design and security by design, especially addressing safeguards and security aspects early in the design process
  - Coordinating cross-office efforts related to ARDP and risk reduction projects; identifying and aligning R&D and resources with industry needs
  - Facilitating short-term and developing long-term HALEU supply to meet needs for advanced reactors and other applications
- Consider additional technical subgroups on topics such as
  - AI/ML, data science, digital twins
  - Used fuel management
- Expand coordination with other DOE and USG stakeholders

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