

Advanced Reactor International Safeguards Engagement Program

ARISE

Mission & Program Objectives

The **Advanced Reactor International Safeguards Engagement (ARISE)** program supports early integration of safeguards by design (SBD) in U.S.-origin advanced reactor designs by partnering with vendors to improve the safeguardability of future exports. ARISE aims to offer U.S. vendors a smooth transition to global markets by:

- Integrating safeguards early in the design process by assessing nonproliferation risks posed by specific designs and proposing mitigating design features and material control strategies
- Supporting U.S. vendors by developing safeguards approaches and concepts for individual facility designs, thereby facilitating regulatory harmonization
- Engaging with the International Atomic Energy Agency (IAEA) and other stakeholders to develop international safeguards guidelines and resources on evolving nonproliferation challenges posed by advanced reactors

Why Partner With ARISE to Incorporate SBD?

U.S. advanced reactor vendors can benefit by working with ARISE throughout the design process (concept development through demonstration). By working with ARISE, vendors can:

- Reduce need for potentially costly retrofits/ redesigns, thereby **minimizing risk** to scope, schedule and budget
- Facilitate the legal requirement that exported facilities are safeguarded, **improving deployment readiness**
- Be better prepared to initiate dialogues with **potential international customers and IAEA** on safeguards, security, and safety
- **Demonstrate corporate social responsibility** via nonproliferation leadership
- Gain **access to world-renowned safeguards experts, leverage resources, and receive specialized tools** from DOE national laboratories

What is Safeguards by Design (SBD)?

SBD is an approach whereby international safeguards requirements and objectives are fully integrated into the design process of any nuclear facility, from initial planning through design, construction, operation, and decommissioning.



186
non-nuclear
weapons states

party to the
Nonproliferation Treaty (NPT)*

**Countries required to place all nuclear material and facilities under international safeguards*



27
countries

currently embarking on
new nuclear power programs



10-12
embarking
countries

expected to have
nuclear power by 2035

As several embarking countries are considering advanced and small modular reactors, the international market for these technologies will continue to expand.



Questions? Contact

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<https://nuclear-nexus.anl.gov/>

Frequently Asked Questions

What are international safeguards and how do they differ from domestic safeguards or security?

International safeguards are distinct yet complementary to security or domestic safeguards.

- International safeguards are a set of **legally mandated** technical measures used by the IAEA to verify that a country is using its nuclear facilities only for peaceful purposes and is not diverting material for nuclear weapons.
- In contrast, domestic safeguards or security systems address the risk that non-State actors could steal nuclear material or sabotage nuclear facilities.
- When it comes to domestic safeguards or security, the U.S. Nuclear Regulatory Commission (NRC) sets the regulations and standards. However for international safeguards, the IAEA defines the safeguards approach, such as material control and accounting (MC&A), and implements verification activities (e.g., surveillance and inspections), and domestic regulators (e.g., NRC in the U.S.) help facilitate access.
- Nuclear material accounting data declared by the country to the IAEA generally originates from the domestic MC&A system, comprising a basic linkage between international safeguards and domestic safeguards or security.

How does ARISE work with vendors to apply SBD to individual facilities?

ARISE, a Congressionally mandated program, funds DOE national laboratory experts to partner with vendors and implement work under Cooperative Research and Development Agreements (CRADAs) or non-disclosure agreements (NDAs). Collaborating with ARISE will help prepare you for conversations with international customers and the IAEA. Specific areas of support are tailored to the vendor's needs and reactor design.

Specific examples include:

- Safeguards 101: Awareness building on safeguards requirements, technical objectives, and the IAEA

Why Does International Safeguards Affect U.S. Nuclear Industry?

Exports are a big part of advanced reactor vendors' strategies as countries around the world look to nuclear power to meet growing energy needs and climate change mitigation objectives. Under the Nuclear Non-proliferation Treaty (NPT), non-nuclear weapons states (NNWS) are required to place their nuclear facilities under international safeguards. **If advanced reactors are exported to NPT-signatory NNWS, they will be placed under international safeguards.** Additionally, advanced reactors that are built in the U.S. (including demonstration reactors) may also be selected for the application of international safeguards under U.S. law.

- Sharing safeguards assessments on generic reactor designs or fuel cycle concepts to familiarize vendors with potential issues
- Analyzing flow sheets to assess safeguards challenges posed by specific designs and offering solutions
- Identifying material accountancy requirements and approaches that harmonize domestic and international requirements and regulations
- Providing analyses to prepare vendors for international design reviews and licensing processes

How can a vendor engage with ARISE?

The ARISE team seeks to engage early in the design process to integrate smoothly and support stakeholders. As needed, we support the designer during iterative design reviews. We leverage our experience working with the IAEA to support the project during design, regulatory review, commissioning, and the licensing process by providing resources, analyses and information, coordinating relevant interests, and other efforts.

