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

Department of Energy: Accelerating Advanced Nuclear Deployment

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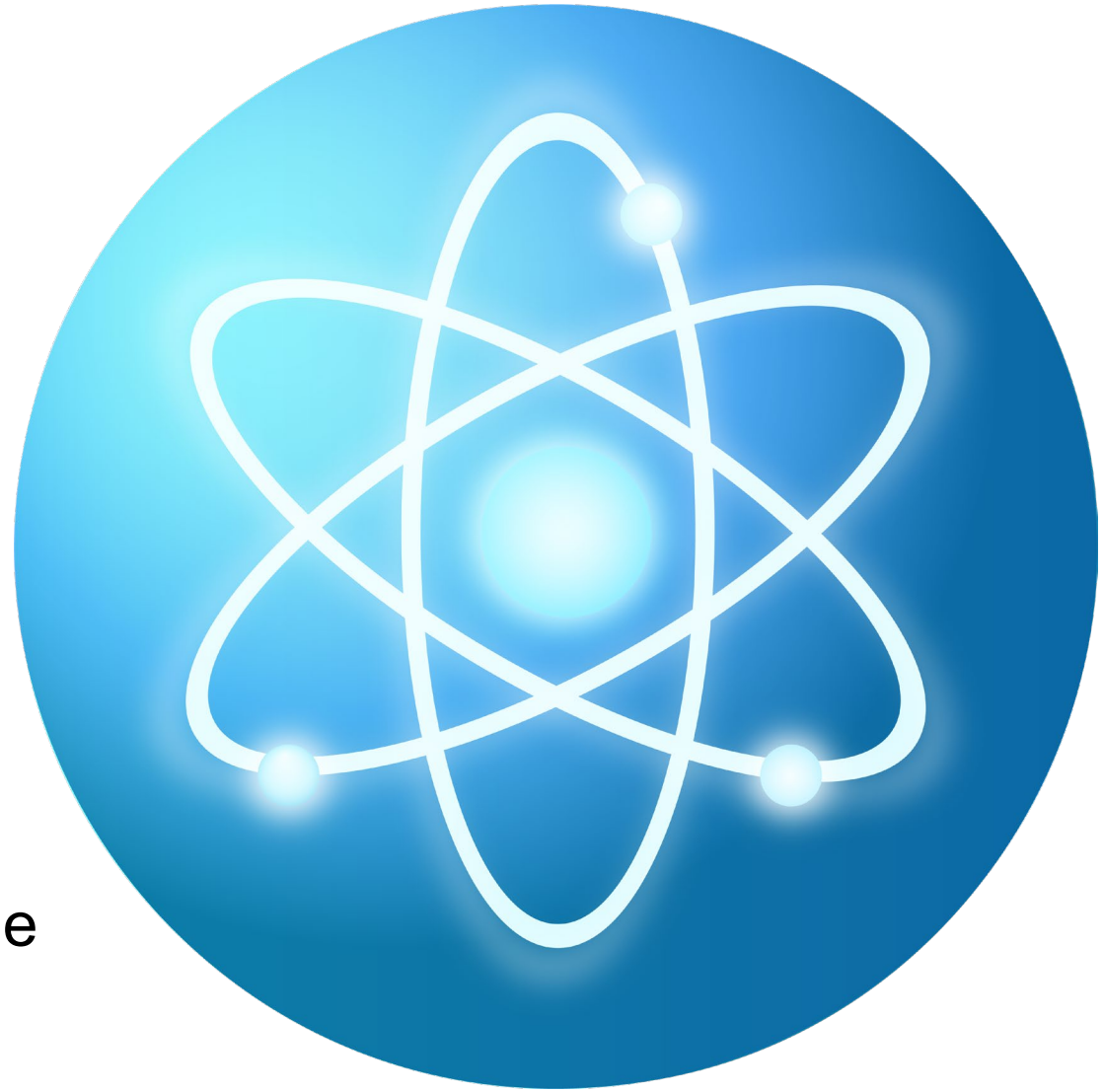
DOE - Nuclear Energy

Our Mission

To advance nuclear energy science and technology to meet U.S. energy, environmental, and economic needs

Priorities

- Keep existing U.S. nuclear reactors operating
- Deploy new nuclear reactors
- Secure and sustain our nuclear fuel cycle
- Expand international nuclear energy cooperation



The Future Landscape for Nuclear Energy Systems

Nuclear Energy Generation

Light water reactors, high temperature advanced reactors, small modular reactors, microreactors

Other Energy Generation

Variable renewables, municipal waste, fossil with carbon capture, etc.

Biofuel

New chemical processes

Clean water

Industry

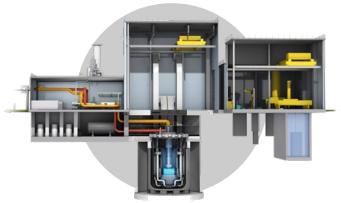
Electricity

Hydrogen for vehicles and industry

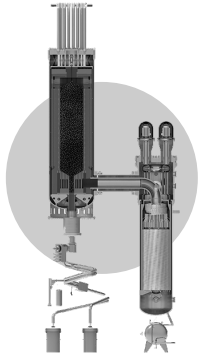
Deploy New Reactors

1 DEMONSTRATION

Bipartisan Infrastructure Law – Office of Clean Energy Demonstrations - $2.5 B



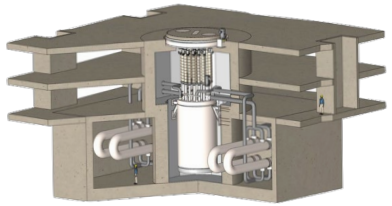
Natrium Reactor
Sodium-cooled fast reactor + molten salt energy storage system
TERRAPOWER
Kemmerer, WY



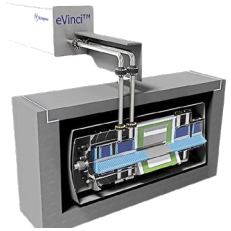
Xe-100
High-temperature gas reactor
X-ENERGY
Seadrift, TX

2 RISK REDUCTION

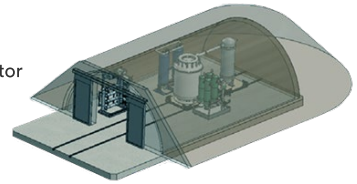
Solve technical, operational and regulatory challenges to support demos within 10-14 years

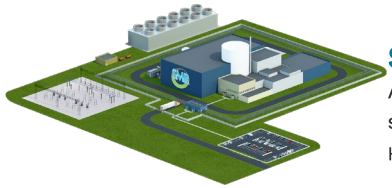


KP-FHR
Fluoride salt-cooled high-temperature reactor
KAIROS POWER

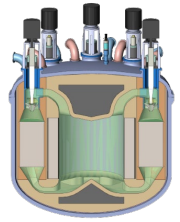


eVinci
Heat pipe-cooled microreactor
WESTINGHOUSE NUCLEAR





SMR-160
Advanced light-water small modular reactor
HOLTEC INTERNATIONAL

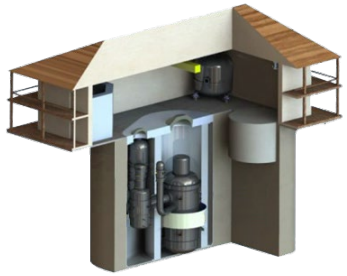


BWXT Advanced Nuclear Reactor (BANR)
High-temperature gas-cooled microreactor
BWX TECHNOLOGIES

Molten Chloride Fast Reactor
SOUTHERN COMPANY

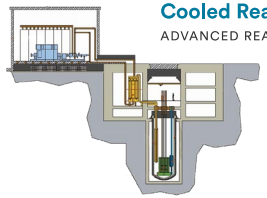
3 CONCEPT DEVELOPMENT

Solidify concept to mature technology for potential demo in mid-2030s



Fast Modular Reactor
GENERAL ATOMICS

Horizontal Compact High-Temperature Gas Reactor
MASSACHUSETTS INSTITUTE OF TECHNOLOGY



Advanced Sodium-Cooled Reactor Facility
ADVANCED REACTOR CONCEPTS

Office of Nuclear Energy Funding Opportunities

- U.S. Industry Opportunities for Advanced Nuclear Technology Development FOA – now complete
  - Continuously open for five years with multiple round of awards
  - Three maturity pathways: demonstration readiness, R&D, and regulatory assistance
- GAIN Voucher Program – ongoing
  - Funding to national lab to perform work
- Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) – ongoing
- Advanced Reactor Demonstration FOA – now complete
  - Three maturity pathways: demonstration, risk reduction, and advanced concepts
- Advanced Reactor Licensing Cost-Share Grant Program – upcoming new FOA

http://gain.inl.gov – Funding Opportunities tab

Department of Energy Opportunities for Nuclear

- Regional Clean Hydrogen Hubs FOA – Current FOA complete
  - Will catalyze investment in the development of H2Hubs that demonstrate the production, processing, delivery, storage, and end-use of clean hydrogen
- Qualifying Advanced Energy Project Credit (48C) – ongoing
  - Provides a tax credit for investments in advanced energy projects
- Capacity Building for Repurposing Energy Assets initiative – ongoing
  - Help energy communities build technical capacity and develop a workforce necessary to help revitalize energy systems, address environmental impacts, and tackle challenges associated with energy assets that that have retired, or are slated for retirement
- Communities Local Energy Action Program (C-LEAP) – ongoing
  - Facilitate sustained community-wide economic and environmental benefits primarily through DOE's clean energy deployment work

LPO solicitation crosses the nuclear value chain

As of April 2022, eligible projects may include, but are not limited to, the following:

Front-end

Conversion

Projects that economically convert U3O8 powder into a gaseous form of uranium hexafluoride

Enrichment

Projects that transform natural uranium or uranium tails; includes gas centrifuge and laser isotope separation

Fabrication

Projects that fabricate nuclear fuel including production of UO2 powder[3], formation of UO2 pellets[4], and fuel assembly[5]

Reactors

Advanced reactors

Projects with state-of-the-art design improvements in the areas of fuel technology[1], thermal efficiency, standardized design and modularized construction, safety systems[2], and size (including small modular reactors and microreactors)

Includes light water reactors

Uprates

Projects consisting of improvements and/or modifications to an existing reactor that is operating but that due to such improvements and/or modifications will operate more efficiently

Upgrades

Projects consisting of improvements and/or modifications to an existing reactor that is not operating and cannot operate without such improvements and/or modifications or an existing reactor that is operating but would be required to cease operating unless such improvements and/or modifications are made

Per the Energy Act of 2020, LPO has authority to finance manufacturing

1. Including nuclear waste reduction, reuse, or management; 2. Especially the use of passive rather than active systems; 3. that is “reconverted” from enriched UF6 gas from enrichment plants; 4. from UO2 powder through compaction and sintering; 5. e.g., insertion of pellets into zircaloy tubes and formation of a fuel assembly using fasteners

Access to technical, regulatory, and financial support

- State and Community Engagement
- Funding opportunities to accelerate deployment
- Nuclear research expertise and capabilities
- Advanced computational tools
- Legacy U.S. research data

http://gain.inl.gov

What can State Policy Makers do?

The Office of Nuclear Energy engages in partnerships to:

- Promote an understanding of emerging nuclear energy technologies and their potential applications
- Provide technical information to assist in state decision-making
- Connect states with technical assistance through national laboratories, including the Gateway for Accelerated Innovation in Nuclear Energy (GAIN)
- Enable states to maximize their resources and participate in the policies, programs, and activities undertaken by the Department of Energy and other agencies

Thank You!

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