Nuclear Energy: Public-Private Partnerships

Dr. Michael Goff
Senior Advisor
Office of Nuclear Energy
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**Generation IV**: Nuclear Energy Systems Deployable no later than 2030 and offering significant advances in sustainability, safety and reliability, and economics.
In the middle of last decade, DOE Office of Nuclear Energy made transition to more public-private partnerships.

White House Summit on Nuclear Energy held in November 2015.

Gateway for the Accelerated Innovation in Nuclear (GAIN) announced at Summit.
Collaborations funded through:
- Small Modular Reactor Program
- iFOAs
- Advanced Reactor Concepts (ARC) 15
- GAIN

National Reactor Innovation Center (NRIC) established via Nuclear Energy Innovation Capabilities Act (September 2018).

Nuclear Energy Innovation and Modernization Act (January 2019) focused on regulatory improvements.
• Initiative from Department of Energy: Office of Nuclear Energy

• Mission is to simplify private industry’s access to the assets of the DOE complex: expertise, historical data and facilities.

• Accelerated - must match advanced nuclear developer pace and reflect the market window (next 5-10 years).

• Innovation is not just about technology. Be creative in all spaces with a bias toward taking risks.

• Focus on initiating and completing projects that support commercial deployment.
Gateway for Accelerated Innovation in Nuclear – 2022 Activities

State Level Outreach
- Policymakers, NGOs, Utilities, Regulators, Industrials, Commissioners
- Introduce Advanced Nuclear through direct conversation or testimony
- Help connect states to financial or technical resources across DOE complex
- Looking at state level regs

Advanced Nuclear Industry Milestones

- **Coal to Nuclear Transitions**
  - Leading Industry Research Group
  - Specific Case Studies: WY, AZ, MD, KY
  - Coordinated with Interagency WG

- **Rediscovering the Past**
  - to Power the Future!

- **Purdue University and Duke...**
  - **VA Legislature Passes Bill...**
  - **Indiana Passes SMR Bill**
  - **NuScale Power and KGHM...**
  - **West Virginia Repeals New...**
  - **Oklo Partners with Argonne...**
  - **USNC Partners with Coppe...**

- **6,5**
  - 65 nuclear energy vouchers have been awarded through GAIN

- **69**
  - Total NE vouchers awarded since inception

- **40**
  - Different companies awarded vouchers to date

- **42**
  - Total NE vouchers completed

- **$24.9M**
  - Amount of voucher funding awarded through GAIN since FY15

- **2016**
  - NE Voucher funding cycle now offered each year

- **Gain.inl.gov**
Advanced Reactor Demonstration Program

• Program established via the Further Appropriations Act of 2020 (December 2019).
  • Much of the structure for the program defined in the law.
    • Operation in 5 to 7 years
    • Evaluation board
    • General criteria
    • Demonstrations and risk reduction
  • An industry day was held to gain feedback.

Demonstration awards announced in October 2020.
(FOA released in May 2020)
• Technical feasibility that the demonstration can be operational in five to seven years
• Likelihood that the design can be licensed for safe operations by the Nuclear Regulatory Commission
• Use of certified fuel design or demonstration of a clear path to certification within five to seven years
• Affordability of the design for full-scale construction and cost of electricity generation
• Ability of the team to provide its portion of the cost share
• Technical abilities and qualifications of teams desiring to demonstrate a proposed advanced nuclear reactor technology
Advanced Reactor Demonstration Program

**RISK REDUCTION**

**GOAL:** Solve technical, operational and regulatory challenges to support demonstration within 10 - 14 years.

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

- **eVinci**
  - Heat pipe-cooled microreactor
  - WESTINGHOUSE NUCLEAR

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

**CONCEPT DEVELOPMENT**

**GOAL:** Solidify concept to mature technology for potential demonstration by mid-2030s.

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

- **Molten Chloride Fast Reactor**
  - SOUTHERN COMPANY

- **Advanced Sodium-Cooled Reactor Facility**
  - ADVANCED REACTOR CONCEPTS
  - GENERAL ATOMICS

- **Fast Modular Reactor**
  - GENERAL ATOMICS
  - MASSACHUSETTS INSTITUTE OF TECHNOLOGY

- **Horizontal Compact High-Temperature Gas Reactor**
  - MASSACHUSETTS INSTITUTE OF TECHNOLOGY
2020 – 2030: An Important Decade for Nuclear Energy in the United States

- **MARVEL**
  - **DOE**
  - **2022-2023**

- **DOME Test Bed**
  - **NRIC**
  - **2023-2024**

- **Project Pele Microreactor**
  - **DoD**
  - **2023-2024**

- **MCRE**
  - **Southern Co. & TerraPower**
  - **2025**

- **Hermes**
  - **Kairos**
  - **2026**

- **Aurora**
  - **Oklo Inc.**
  - **TBD**

- **Xe-100**
  - **X-energy**
  - **2027**

- **Natrium Reactor**
  - **TerraPower & General Electric**
  - **2028**

- **SMR**
  - **UAMPS & NuScale**
  - **2029-2030**