

PROGRAM OVERVIEW:

Nuclear Technology Demonstration and Deployment

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Office of Nuclear Energy

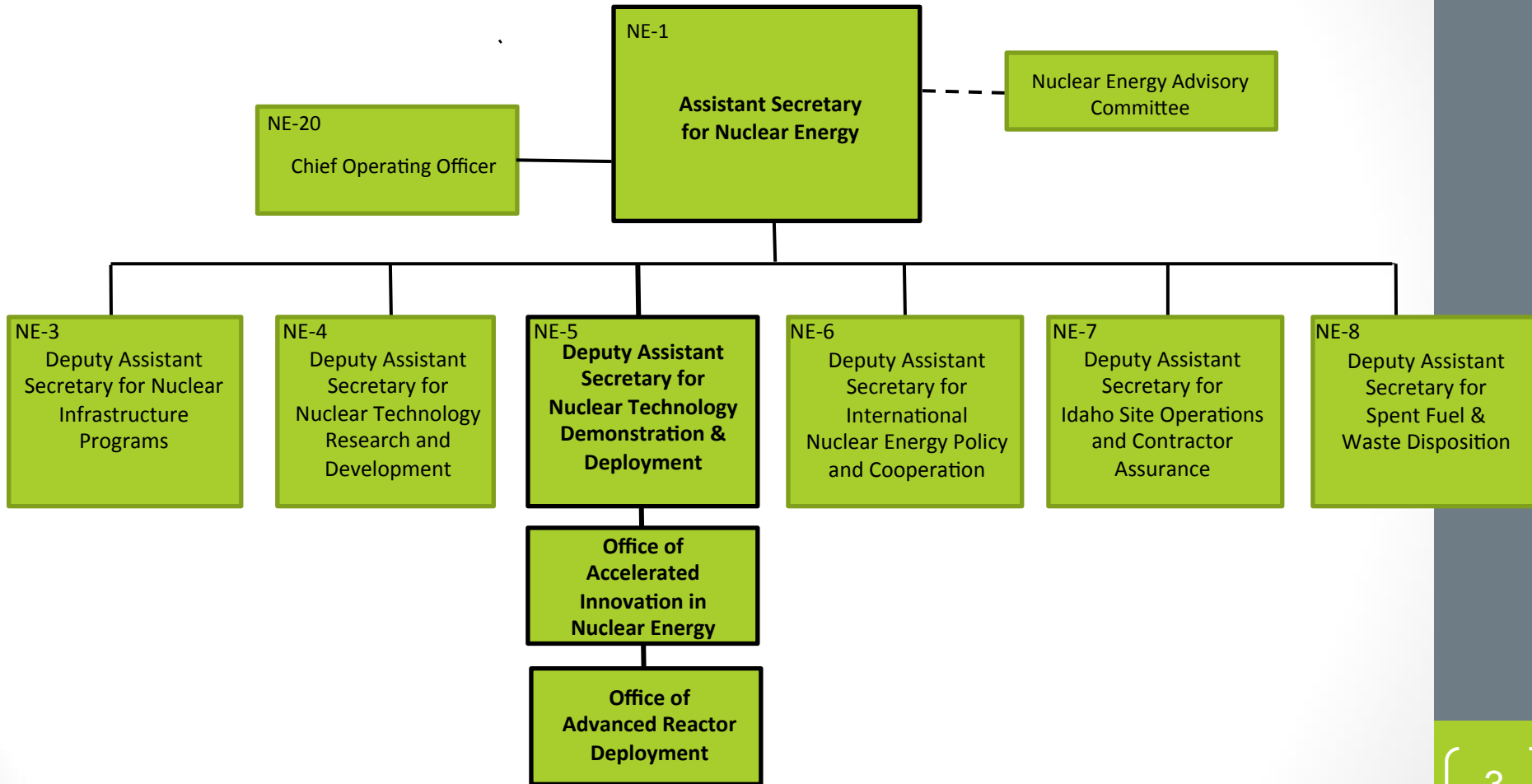
Mission:

Advance nuclear power as a resource capable of meeting the Nation's clean energy, environmental, and national security needs by resolving technical, cost, safety, proliferation resistance, and security barriers through research, development, and demonstration.

Mission Areas:

- Current Fleet of Light Water Reactors
- Small Modular Reactors
- Advanced Reactors
- Nuclear Science User Facilities and Enabling Capabilities
- Nuclear Waste Management

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Vision

Be a catalyst for the commercialization of NE-sponsored research, development, and demonstration products

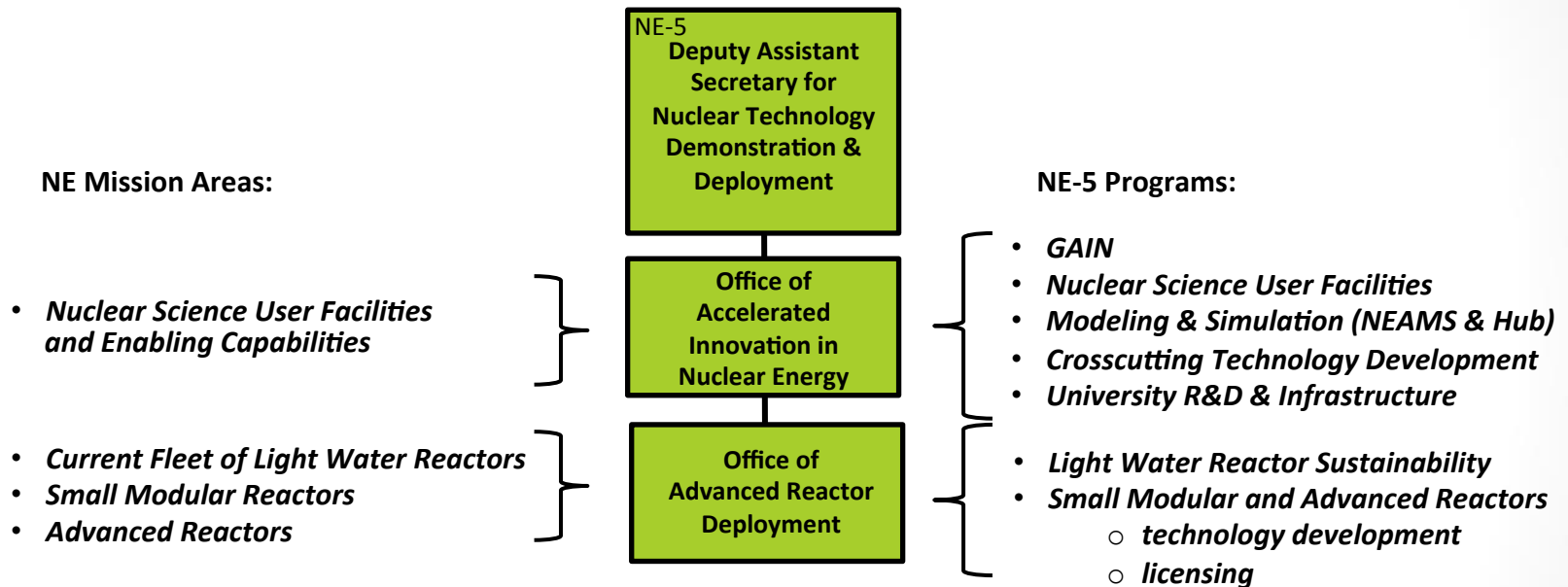
Mission

Integrate NE's research investments to achieve a productive and balanced portfolio of competitive and crosscutting RD&D and research infrastructure to enable an expansion of the US commercial nuclear industry

Objectives

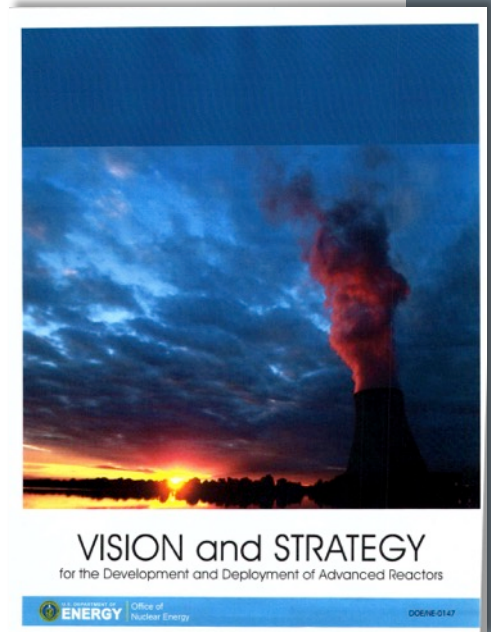
- Full and effective integration of NE's planning, execution and oversight
- Systematic management of NE investments in research capabilities
- Alignment of NE's RD&D programs with industry-identified technical and regulatory needs
- Accelerate commercialization of innovative nuclear technologies (GAIN)

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NE's Advanced Reactor Deployment Strategy

- **Fully execute GAIN Initiative**
 - Ease the burden to Private Sector access to DOE assets
 - Institute “Single Point of Contact”
 - Standardize R&D agreements
- **Demonstrate performance, reduce costs, and retire technical risks**
 - Partner through GAIN technology working groups to pursue industry-selected generic and design-specific R&D
- **Support development of fuel cycle pathways**
- **Support the establishment of a regulatory framework**
 - Work with GAIN technology working groups and NRC to advance the appropriate regulatory framework
- **Maximize the effectiveness of public/private partnerships**
- **Address human capital and workforce development needs**
 - Support university research and the development of next generation of nuclear professionals through vibrant university research infrastructure



Nuclear Technology Demonstration & Deployment

Program Integration



Universities
 Industry
 All (incl. National Labs)

Facilities, Equipment & Expertise

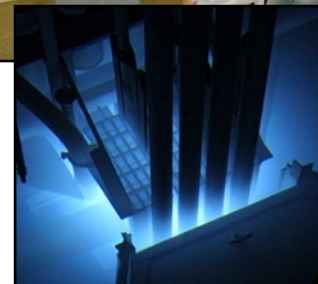
Nuclear Science User Facilities (NSUF)

- No-cost access to irradiation and post-irradiation examination capabilities at INL and partner facilities to conduct cutting edge R&D.
- Database of NE research capabilities and coordination of NE infrastructure investments.



NE's University Programs

- *Nuclear Energy University Program (NEUP)*
 - R&D and infrastructure projects
- *Integrated University Program (IUP)*
 - Fellowships and Scholarships
- *Research Reactor Infrastructure (RRI)*
 - New and Used Fuel Services
- *Traineeships*
 - Graduate student training in specific disciplines



Research, Development & Demonstration

Light Water Reactor Sustainability

- Develop fundamental scientific basis to allow continued long-term safe operation of existing LWRs (beyond 60 years) and their long-term economic viability

Crosscutting Technology Development

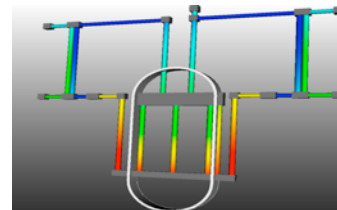
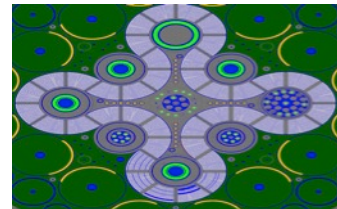
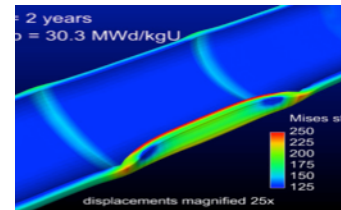
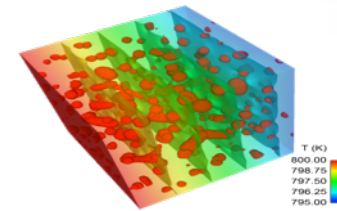
- RD&D to develop innovative and crosscutting technologies leading to significant advancements for multiple reactor and fuel cycle concepts
- Strategic investments to enhance the U.S. nuclear research infrastructure
- Advance the state-of-the-art in enabling technologies
 - *Advanced Sensors and Instrumentation*
 - *Advanced Methods for Manufacturing*
 - *Transient Testing R&D*



Computational Frameworks

NE's Advanced Modeling & Simulation

- **State-of-the-art products** to support the existing LWR fleet and the next generation of reactor technologies (small modular and non-light water designs)
 - Energy Innovation Hub for Modeling and Simulation (Hub)
 - Nuclear Energy Advanced Modeling and Simulation (NEAMS)
- Develop and deploy state-of-the-art **predictive modeling and simulation tools** focused on enabling transitions:
 - theory-based, predictive models;
 - single CPU to many CPU;
 - single physics to multi-physics;
 - single length/time scale to multi-length/time scales
- **Pellet-to-Plant Toolkits** to empower researchers/designers to:
 - obtain fundamental insights that are unattainable through experiment alone;
 - solve important customer-driven high-impact problems



Regulatory Development & Support

SMR Licensing Technical Support

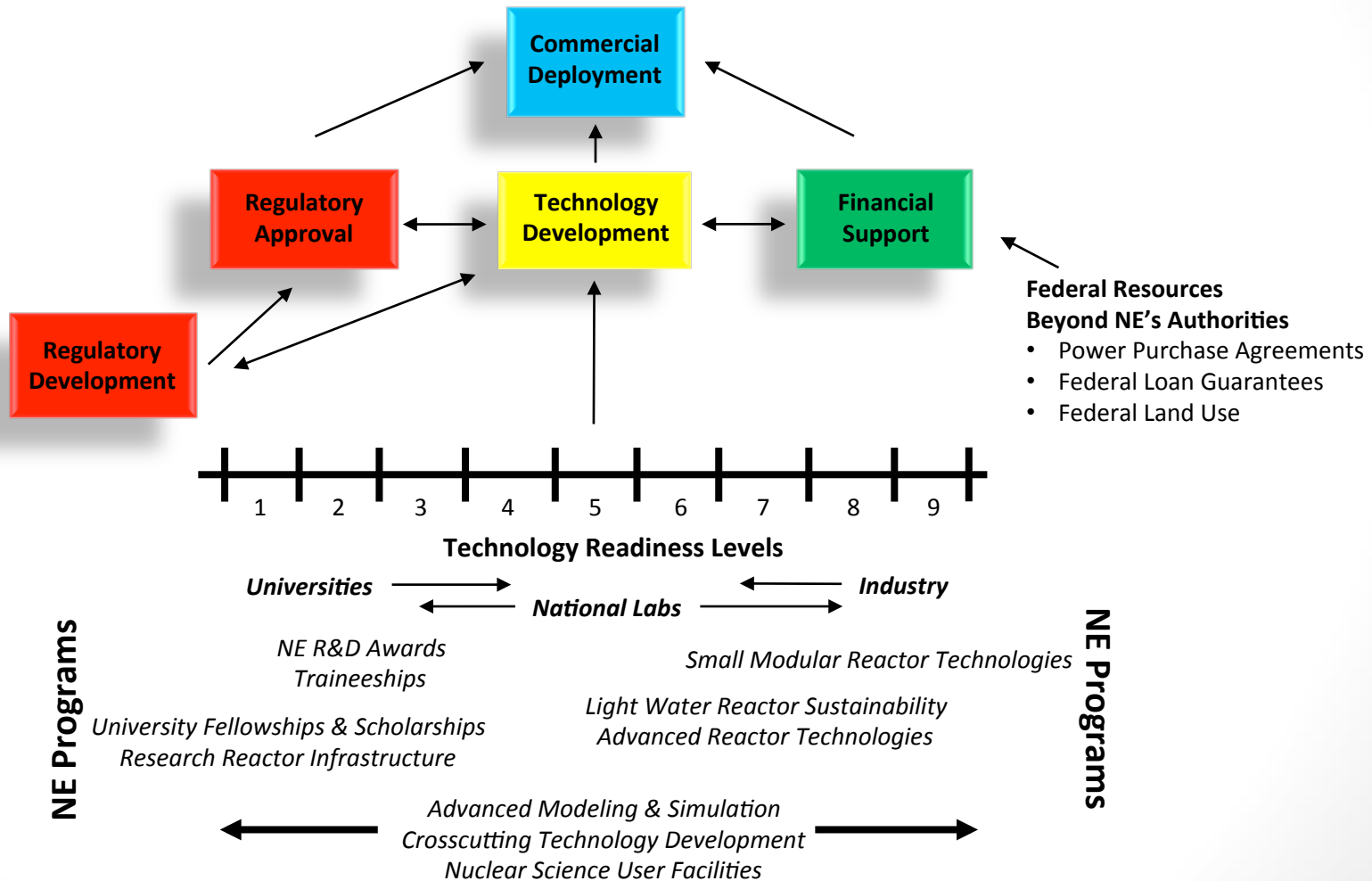
- Supports first-movers to complete design certification
- Supports site characterization and early site permit activities
 - Idaho National Laboratory
 - TVA Clinch River

Advanced Reactor Licensing Support

- Establishing Licensing Technical Requirements
 - Consensus codes and standards for new materials/designs
 - Technology inclusive General Design Criteria
- Phased licensing approach to allow incremental progress

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Next Generation Reactor Deployment



Conclusion

An **integrated and systematic approach** to *Nuclear Technology Demonstration and Deployment* will allow the US Government, for the first time, **in collaboration with the private sector,** to serve as **an effective catalyst for the commercialization** of innovative nuclear technologies **to enable an expansion** of the US commercial nuclear industry.