

# Idaho National Laboratory

## At a Glance



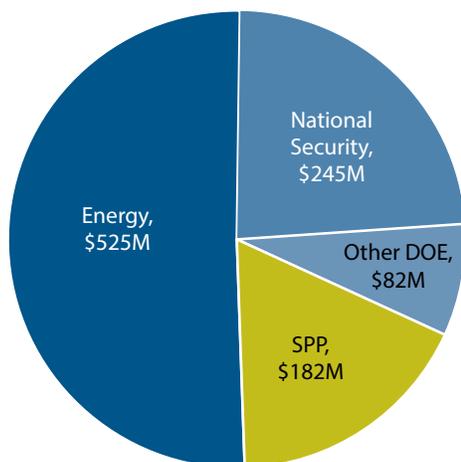
INL serves as the U.S. leader for advanced nuclear energy research and development, and is home to an unparalleled combination of nuclear energy test-bed facilities, including a focus on fuel development and fabrication, steady-state and transient irradiation, and macro- and microscale post-irradiation examination.

INL's applied science and engineering discipline and problem-solving approach helps the Defense and National and Homeland Security departments, as well as industry partners, solve significant national security challenges in critical infrastructure protection, cybersecurity, and nuclear nonproliferation. Scientists and engineers are also exploring solutions to grand challenges in energy technologies and improving the water and energy efficiency of industrial manufacturing processes.

Under direction of DOE-NE, INL is leading the Gateway for Accelerated Innovation in Nuclear (GAIN) initiative to provide the nuclear community with access to the technical, regulatory and financial expertise necessary to move innovative nuclear energy technologies, such as small modular reactors, toward commercialization while ensuring the continued safe, reliable and economical operation of the existing nuclear fleet.

INL is managed by Battelle Energy Alliance (BEA) for DOE's Office of Nuclear Energy. BEA is a partnership of Battelle, BWX Technologies Inc., AECOM, the Electric Power Research Institute (EPRI), a national university consortium (Massachusetts Institute of Technology, The Ohio State University, Oregon State University, North Carolina State University and University of New Mexico), and Idaho university collaborators (University of Idaho, Idaho State University, and Boise State University).

### FY 2016 Funding by Source



Lab operating cost: **\$1,034M**  
 DOE/NNSA Costs: **\$852M**  
 SPP (Non-DOE/Non-DHS): **\$182M**  
 SPP as % total lab operating costs: **21%**  
 DHS costs: **\$35M**

### Facts

**Location:** Idaho Falls, Idaho  
**Type:** Multiprogram Laboratory  
**Contractor:** Battelle Energy Alliance  
**Responsible Site Office:** Idaho Operations Office

### Physical Assets

**890** square miles and **534** real property assets  
**2.3** million GSF in owned-operating buildings  
**40.2K** GSF in operational standby buildings  
**\$4.8B** in replacement plant value  
**69K** GSF in 8 excess facilities  
**1** million GSF in leased facilities  
**61-mile** test grid (dual-fed power loop with 7 substations and control center, linked with state-of-the-art communications/instrumentation)

### Human Capital

**4,272** full-time equivalent (FTE) employees  
**20** joint faculty  
**41** postdoctoral researchers  
**198** undergraduate students  
**105** graduate students  
**72** facility users  
**470** visiting scientists

### Core Capabilities

- Advanced Computer Science, Visualization, and Data
- Applied Materials Science and Engineering
- Biological and Bioprocess Engineering
- Chemical Engineering
- Chemical and Molecular Science\*
- Condensed Matter Physics and Materials Science\*
- Cyber and Information Sciences
- Decision Science
- Environmental Subsurface Science and Analysis
- Large Scale User Facilities and Advanced Instrumentation
- Mechanical Design and Engineering
- Nuclear Engineering
- Nuclear and Radiochemistry
- Power Systems and Electrical Engineering
- Systems Engineering and Integration

\*Emerging capabilities

### Mission Unique Facilities

- Advanced Test Reactor
- Transient Reactor Test Facility
- Hot Fuel Examination Facility
- Irradiated Materials Characterization Laboratory
- Fuel Manufacturing Facility
- Experimental Fuels Facility
- Space and Security Power Systems Facility
- Critical Infrastructure Test Range Complex
- Specific Manufacturing Capability
- Biomass Feedstock National User Facility
- Wireless Test Bed



# Idaho National Laboratory

## Accomplishments



### Unique Facility

#### Advanced Test Reactor and World-Class Nuclear Research Facilities



INL hosts an expansive array of nuclear research facilities that center around the Advanced Test Reactor (ATR). The ATR is a pressurized water test reactor with a unique serpentine core that allows the reactor's corner lobes to be operated at different power levels, making it possible to conduct multiple simultaneous experiments under different testing conditions. The ATR is the only U.S. research reactor capable of providing large-volume, high-flux neutron irradiation in a prototype environment. The reactor makes it possible to study the effects of intense neutron and gamma radiation on reactor materials and fuels.

In addition to the ATR, the Materials and Fuels Complex on the INL Site is a prime testing center for advanced technologies associated with nuclear power systems. This complex is the nexus of research on new reactor fuels and related materials. As such, it contributes significantly to the development of increasingly efficient reactor fuels and the important work of nonproliferation.

### Research Highlight

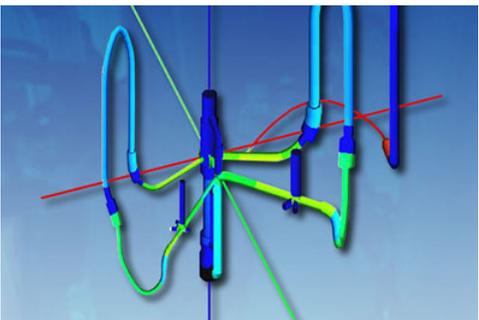
#### INL's Test Grid Modernization Project



INL is breaking ground on several projects over the next three years as part of the \$220M Grid Modernization Initiative. DOE-OE enables investment in INL to meet RD&D needs of utilities interested in the secure adoption of new smart grid technologies. The upgrades provide more reliable, resilient and flexible energy delivery while increasing security and efficiency of the system. The dedicated test system provides additional lines and a mesh framework to ensure the environment is more consistent with current industry distribution practices. INL works with industry, universities and government stakeholders to provide a testing environment that reduces the risks and facilitates real-world validation and verification of new and innovative concepts, technologies and systems including smart grid devices, distribution automation, communication tools, renewable energy and grid-scale energy storage.

### Technology to Market Highlight

#### INL Software RELAP5-3D Widely Used for Reactor Safety Analysis



INL's Reactor Excursion and Leak Analysis Program<sup>5-3D</sup> (RELAP5-3D) is used primarily for analysis of potential accidents and transients in water-cooled nuclear power plants, and for analysis of advanced reactor systems.

Since it was first introduced in 1996, RELAP5-3D has become one of the most widely licensed software products within DOE. Use of the code has grown steadily, nearly doubling in the last five years, and continued growth is expected. Licensees, both international and domestic, include universities, government agencies, nuclear steam supply system providers and utilities with operating power plants.