U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

FACILITIES AND INFRASTRUCTURE
FY 2016 BUDGET AT-A-GLANCE

The Facilities and Infrastructure Program manages the Office of Energy Efficiency and Renewable Energy's (EERE's) capital investment and operations, as well as the maintenance of the National Renewable Energy Laboratory (NREL). NREL is the nation's only national laboratory with a primary mission dedicated to the research, development and demonstration (RD&D) of energy efficiency, renewable energy, and related technologies. EERE is NREL's steward, primary client, and sponsor of its designation as a federally funded research and development center. The Facilities and Infrastructure (F&I) budget maintains NREL's research and support infrastructure; ensures availability for EERE's use; and provides a safe and secure workplace for employees and the public.

What We Do

EERE is committed to maintaining and fully utilizing NREL's capabilities as the nation's premier energy efficiency and renewable energy research facility. EERE's investment in NREL's energy technology research, property, people, and support infrastructure is designed to create and maintain the physical and operational assets required to achieve NREL's assigned mission in a safe, secure, and efficient manner.

- ✓ **Operations and Maintenance** subprogram provides the program planning as required by U.S. Department of Energy (DOE) Order 430.1B, Real Property and Asset Management, to maintain the real property assets at NREL. This includes general plant projects, general purpose equipment, maintenance and repair, and safeguards and security projects.
- ✓ **Facility Management** subprogram provides user facility funding for core operations at the Energy Systems Integration Facility (ESIF), ensuring the availability of grid integration laboratories and high-performance computer (HPC) to partners.

Program Goals/Metrics

- Provide the laboratory with a safe and secure work environment, and protect EERE partners and the public.
- Maintain EERE's science and support infrastructure investments through regular annual reinvestments reflecting age, condition, risk, and DOE and industry standards.
- Renovate research and support infrastructure, as necessary, to ensure the availability of a world-class research, development, and demonstration environment and support ongoing EERE mission.
- Acquire new mission-critical capabilities, when warranted, and provide direct operating funding for all appropriate activities.
- Develop energy systems integration as a new aspect of energy research and development for the nation through experiments and development of capabilities at ESIF through HPC models and hardware-in-the-loop modeling and testing.

FY 2016 Priorities

- **Grid Modernization** crosscut is supported through the continued funding of ESIF to explore and enhance the integration of energy supplies from fossil, renewable, and electric systems for addressing grid integration challenges using real hardware and software in a controlled environment.
- **DOE Cybersecurity** crosscut includes funding for the existing and expanding capabilities of the Peregrine HPC to enable DOE laboratories and the Joint Cybersecurity Coordination Center to test systems and explore challenges to HPC operations in various settings and predict future risks, as well as examine technologies to solve fundamental problems in coordination with the Cyber Sciences Laboratory.

(Dollars in Thousands)	FY 2014 Actual	FY 2015 Enacted	FY 2016 Request
General Plant Projects	$7,800	$7,800	$7,800
General Purpose Equipment	$3,573	$3,600	$3,600
Maintenance and Repair	$5,400	$5,400	$5,400
Safeguards and Security	$9,200	$9,200	$9,200
ESIF User Facility	$20,000	$30,000	$36,000
Total, Facilities and Infrastructure	**$45,973**	**$56,000**	**$62,000**

Key Accomplishments

- **Capital Investments:** Capital investments at NREL have provided and maintained a world-class research environment for renewable energy and energy efficiency collaborations.
- **Simulations:** Simulations conducted on NREL's HPC have led to significant advances in energy efficiency and renewable energy technologies. Examples of advances include improving understanding of how cellulase enzymes work, identifying rate-limiting steps at the molecular level to enable protein engineering, and identifying new protein engineering targets, which will help reduce the cost of renewable fuels. Solar energy researchers have used simulations to identify novel alloys and materials with prescribed physical properties. In wind energy, researchers have created models to better understand how upwind turbines impact downwind turbines—leading to reduced cost of electricity. Overall, the demand for computational capability to support the EERE mission is nearly twice the available computational capability. Demand for computing from well-established R&D efforts supported by EERE's Wind, Solar, and Bioenergy Offices alone is sufficient to fully saturate the current HPC. Thus, there is a critical need to increase current HPC capabilities from 1 to 2 petaflops at NREL; to meet growing demand from traditional users; and to meet anticipated rapid growth in demand in areas including energy system integration, grid modernization, and other new program initiatives.
- **ESIF Research Electrical Distribution Bus:** Operations at ESIF continued to grow; 14 partner projects utilized ESIF's Research Electrical Distribution Bus (REDB) and the REDB associated fixed equipment (grid, photovoltaic, and load emulators). These projects focused on grid issues, including the ability of devices to provide grid services, such as reactive power and voltage support for the grid; microgrid devices and architectures to enhance the energy security of forward operating and domestic military bases; and technology solutions to enable high penetrations of clean energy technologies, such as plug-in electric vehicles, smart appliances and variable renewables (e.g., solar). As a result of these successful partnering efforts, ESIF's REDB infrastructure was operating at capacity for much of the year, with wait times now on the order of 4–6 months. Because of the unique capabilities for megawatt-scale testing, the demand for REDB testing is expected to continue to grow. Future upgrades of the REDB will greatly enhance ESIF capabilities to accommodate more concurrent experiments with industry partners, as well as experiments at higher power levels and reduced wait time.