

**Buildings
Technology Center**
<http://www.ornl.gov/btc/>

**Cooling, Heating, and Power
Integration Laboratory**
<http://www.bchp.org/>

**National Transportation
Research Center**
<http://www.ntrc.gov/>

**Fuels, Engines, and Emissions
Research Center**
<http://feerc.ornl.gov/>

**Power Electronics and Electric
Machinery Research Center**
<http://www.ornl.gov/estd/peemrc>

ESTD is the home of five U.S. Department of Energy (DOE)–designated National User Facilities. These research laboratories are designed to serve not only our staff scientists and engineers, but also researchers from universities, industry, foreign institutions, and other government laboratories. They simultaneously advance national research and development and fulfill DOE missions by minimizing unnecessary duplication of effort, promoting beneficial scientific interactions, and making the most effective use of costly and, in many cases, unique equipment.

Buildings Technology Center

The **Buildings Technology Center (BTC)** is devoted to the development of technologies that improve the energy efficiency and environmental compatibility of residential and commercial buildings. The BTC identifies, develops, and deploys sustainable, energy-efficient building system technologies by forming partnerships between the public sector and private industry for analysis, well-characterized experiments, technology development, and market outreach.

Facility

The BTC contains 20,000 ft² and state-of-the-art experimental equipment valued at more than \$7 million. It has a permanent R&D staff of 50, with 10–20 guest researchers.

Research Capabilities

- Efficiency improvement
- Electric power systems technology
- Modeling
- Analysis



Energy Secretary Spencer Abraham's visit to BTC

Cooling, Heating, and Power (CHP) Integration Laboratory (Integrated Energy Systems Facility)

The designation of the **Integrated Energy Systems (IES) Laboratory** as a National User Facility greatly increases ORNL's flexibility to work directly with business and industry in developing and testing the performance of effective designs of IES. This laboratory capability is important for meeting both near-term and future needs for IES. In the laboratory's role as a National User Facility, its purpose is to model and test modular IES package systems for industry to improve the technology and accelerate its introduction to the market.

Facility

The CHP, or IES, facility currently has a user agreement in place to test a 60-kW microturbine. It will soon also be used to test larger microturbines. The immediate testing at the IES Laboratory includes microturbine-based IES; it will be extended in the future to encompass many other distributed generation systems such as reciprocating engines and fuel cells.

Research Capabilities

- Integration of distributed generation
- Heat recovery
- Thermally activated cooling and humidity control technologies in high-efficiency CHP systems



The IES Lab's gas-fired microturbine

National Transportation Research Center

The **National Transportation Research Center (NTRC)** is a window to transportation research programs at Oak Ridge National Laboratory and the University of Tennessee. It offers one of the most diverse concentrations of transportation researchers in the United States. The NTRC works on national and regional transportation issues and develops and evaluates advanced transportation systems.

Facility

The NTRC building contains about 83,000 ft² of space, about two-thirds of it dedicated to research laboratories that support some of the most advanced transportation research in the world.

Research Areas

- > Energy efficiency
- > Environment
- > Information systems and logistics
- > Transportation safety



National Transportation Research Center

Fuels, Engines, and Emissions Research Center

The **Fuels, Engines, and Emissions Research Center (FEERC)** located at the NTRC is a User Facility that specializes in detailed characterization of internal combustion engine emissions and efficiency. Our comprehensive capabilities include a wide range of engine and vehicle dynamometers, bench-top engine exhaust simulators, and several unique diagnostic and measurement tools. Our research is aimed at aiding the development of advanced engine, fuel, and emission-control technologies.

Facility

The research facility includes six dynamometer stands ranging from 25 to 600 hp, some with motoring ability; single and multicylinder diesel and spark-ignition engines; a chassis dynamometer; a bench flow reactor to evaluate and screen catalyst materials and emission reduction concepts in a fully controlled emission stream; high-speed data acquisition; and advanced real-time measurement and exhaust speciation.

Research Capabilities

- > Post-combustion emissions control
- > Diagnostic and analytical technology
- > Modeling/simulation/nonlinear dynamics
- > Fuels technology
- > Stationary power
- > Engine technology



Chassis dynamometer

Power Electronics and Electric Machinery Research Center

DOE's broad-based research center for power electronics and electric machinery and associated technologies is located at the NTRC. Researchers in the **Power Electronics and Electric Machinery Research Center (PEEMRC)** develop prototypes of the next generation of cost-effective converters, adjustable-speed drives, electric utility and distributed-generation applications, motor controls, and efficient, compact electric machines.

Facility

The laboratory area of the PEEMRC has more than 700 m² (9000 ft²) of space for developing and building the next-generation prototypes of inverters, rectifiers, and electric machine technology. Team members use and develop the latest analysis, simulation, and design software to provide proof of principle before hardware implementation of their circuit and motor designs. Equipment includes

- > a 600-V/600-A bi-directional dc power supply
- > a 100-hp 10,000-rpm, 4-quadrant dynamometer
- > a high-speed rotational equipment safety tank

Research Capabilities

- > Advanced inverters and adjustable speed drives
- > Power transmission and distribution R&D
- > Electric machines



AC dynamometer for testing of AEMD units