

Building Technologies Research and Integration Center (BTRIC) User Facility

America's Premier Buildings Technologies Research Center

The BTRIC User Facility at ORNL is the premier U.S. research facility devoted to the development of technologies that improve the energy efficiency and environmental compatibility of residential and commercial buildings. The Center's mission is to identify, develop, and deploy energy-efficient building system technologies by forming partnerships between DOE and private industry for technology development and analysis, well-characterized laboratory and field experiments, and market outreach. The BTRIC offers 20,000 square feet of space and state-of-the-art experimental facilities valued at more than \$7 million. A permanent staff of 50, supplemented by ~20 guest researchers, operate the center. Annual program expenditures are about \$27 million.

A National User Facility

The BTRIC was established by DOE's Office of Building Technology State and Community Programs as a designated "National User Facility." The facilities are available to manufacturers, universities, and other organizations for proprietary and nonproprietary R&D. Access to these unique facilities and capabilities is obtained through user agreements, Work for Others arrangements, and cooperative research and development agreements (CRADAs).



Conservation and Energy Technologies at the BTRIC User Facility

- Combined cooling, heating, and power (CHP) (DOE Office of Power Technology) Heating and cooling equipment (vapor compression, absorption, and desiccants)
- Thermal engineering (geothermal heat pumps [GHPs], heat pump water heaters, microturbines, fuel cells)
- Envelope systems and materials (moisture control, roofs, walls, foundations, insulation, and fenestration)
- Building design and performance (Rebuild America, Building America, residential and commercial housing)
- Weatherization assistance to state energy programs (DOE's Office of Building Technology)
- Federal Energy Management Program (FEMP) (CHP and GHP technical assistance)
- Power systems research (dispersed generation and ancillary services)

R&D Capabilities Supporting America's Energy Security

- Efficiency improvement — Technology development for heating, cooling, water heating, and refrigeration equipment; building thermal envelopes; existing building retrofit research; weatherization; CHP; residential and commercial appliances
- Testing — Testing of energy-efficient building materials and roof, wall, and foundation systems; HVAC systems; and appliances in the BTC's unique facilities
- Modeling — DOE-2, BLAST, EnergyPlus, Power DOE (whole buildings), HEATING (heat transfer), MATCH, MOIST, WUFI ORNL/IBP Moisture-Expert (heat and moisture transfer), Heat Pump Design Model (HPDM), NEAT (building energy audits)
- Analysis — Analyzing advances in HVAC design, optimization, and control; benchmarking thermal performance of components, systems, and whole buildings; residential electric load

R&D Capabilities (continued)

- Monitoring performance of buildings and facilities for technology demonstration
- Preparing facility/utility energy plans
- Quantifying energy savings and cost-effectiveness of retrofits
- Developing energy audit and management techniques
- Developing alternative (non-HCFC) refrigerants and blowing agents
- Identifying causes of building moisture problems and developing moisture control solutions
- Electric power systems technology — Transmission, distribution, automation, and control; high-voltage ac and dc equipment; distributed generation and storage
- Energy market assessment

Recent Success Stories

The BTRIC has developed technologies that can lead to 20–50% energy savings:

- 1-kW/day refrigerator, a 40% improvement in efficiency over commercially available models
- Triple-effect absorption chiller, a 20% efficiency improvement over current double-effect chillers
- Whole-wall ratings for >100 residential wall systems
- National Energy Audit Tool (NEAT), which saves taxpayers >\$70 million/year by identifying effective weatherization measures for low-income housing
- Replacement heat pump water heater, which is 2.6 times more efficient than the best electric water heaters
- Moisture Control Educator for Architects software program
- Insulation Fact Sheet, the second most widely used DOE publication
- National User Facility—the Cooling, Heating, and Power (CHP) Laboratory—sponsored by the DOE office of Power Technology
- Deployment of CHP in six federal facilities in California, with third-party financing through FEMP to be completed in the summer of 2001
- Performance evaluation of DOE's Weatherization Assistance Program



*A test attic being loaded into the BTRIC
Large-scale Climate Simulator*

Accessing the User Facility

Access to user facilities is a two-fold process. Prospective users submit research proposals directly to the facility of interest. Acceptance of proposals depends on scientific merit, suitability of the facility for the project, selection of a collaborator, and appropriateness of the work to DOE objectives. Concurrently, a contractual agreement is executed between ORNL and the user institution. This User Facility Agreement, which can be either proprietary or nonproprietary, stipulates the terms and conditions (including disposition of intellectual property) for the project. Some facilities are available for nonproprietary research at no cost, while some facilities must recoup the actual costs incurred for staff and equipment time. More information can be found on ORNL's Partnerships Directorate website at: <http://www.ornl.gov/adm/partnerships>.

Point of Contact:

Patrick Hughes, Director
Building Technologies Research and Integration Center
Energy and Transportation Science Division
Oak Ridge National Laboratory
P.O. Box 2008, Bldg 3147
Oak Ridge, Tennessee 37831-6070
www.ornl.gov/btric