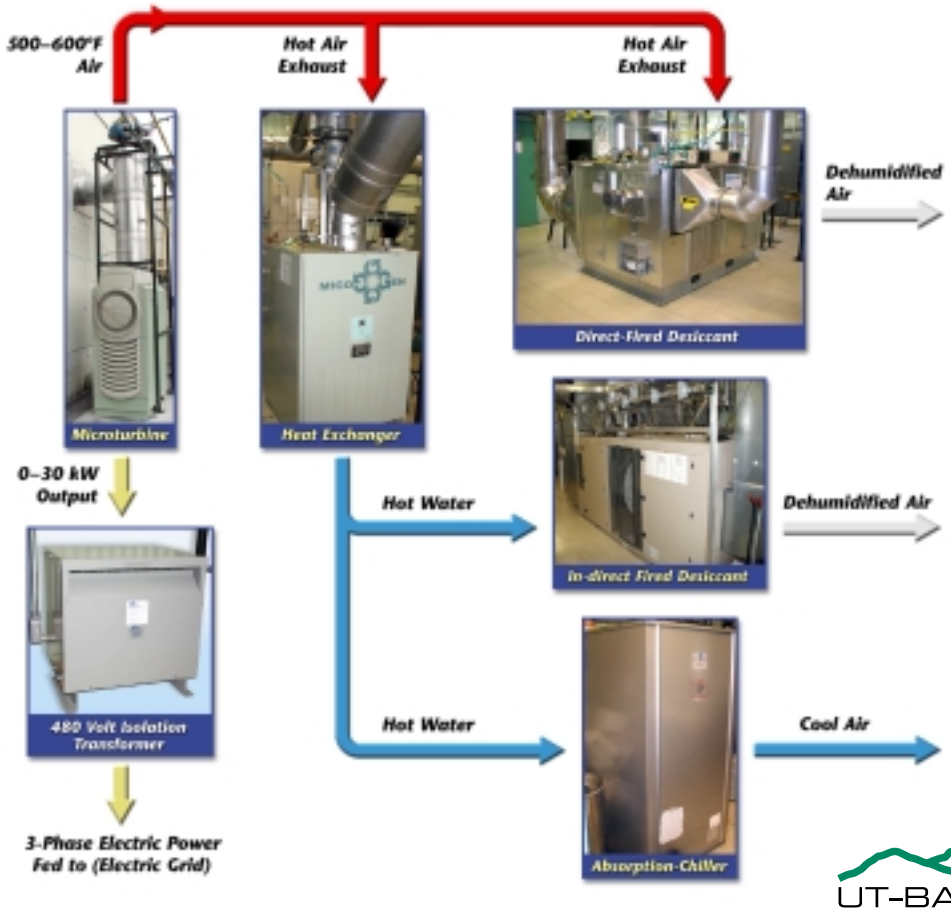
ORNL's Combined Cooling, Heating, and Power (CHP) Integration Laboratory

A New National User Test Facility

Supporting Research and Development of CHP Systems for Industry

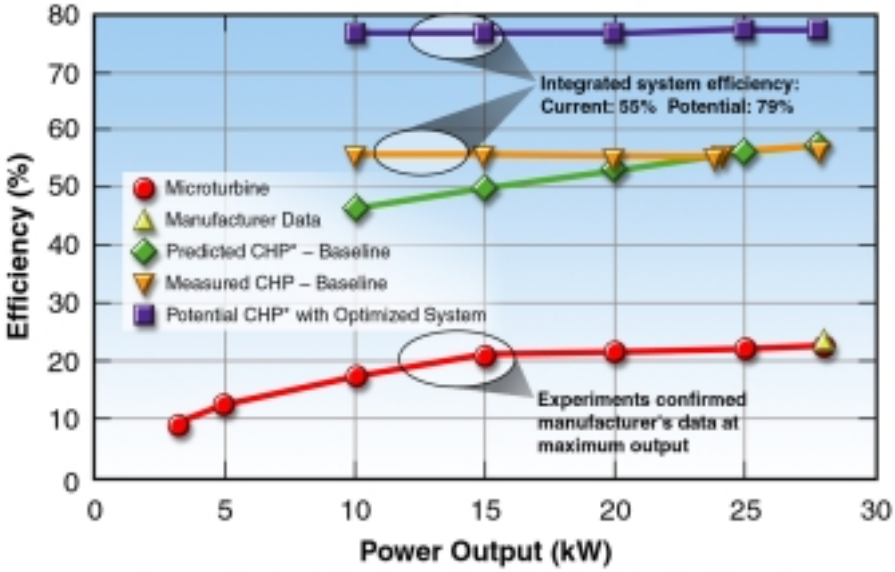
The new CHP Integration Laboratory at the Oak Ridge National Laboratory (ORNL) is part of the U.S. Department of Energy's (DOE) effort to encourage the use of energy-efficient distributed energy (DER) generation systems, in which users generate part or all of the electricity they use on their own sites. The work of the CHP Integration Laboratory:

- Supports the National Energy Policy's use of energy-efficient distributed generation systems in the supply of electricity and thermal energy to business and industry
- Demonstrates the use of integrated cooling, heating, and power (CHP) systems in recapturing and using thermal energy that is wasted as discarded heat in conventional power plants
- Tests the ability of CHP systems to achieve efficiency levels to 60% or greater above conventional facilities
- Focuses on research in the areas of innovative integration of distributed generation, heat recovery, and thermally activated cooling and humidity control technologies into high-efficiency CHP systems
- Includes work on integrated systems performance evaluation, advanced thermal components, and system modeling and optimization.
- Offers access as a National User Facility to business and industry in assessing system components for improved performance



Providing Component and Integrated System Testing
The CHP Integration Laboratory provides performance testing on individual units, as well as the integrated sytem, within the thermal energy loop. Equipment being tested includes:

- Microturbine – measuring efficiency, emissions, and power quality
- Heat Exchanger – measuring efficiency of heat transfer and advanced heat exchange materials and design
- Direct/Indirect Dessicant Dryers – testing efficiency of latent cooling
- Single-Effect Absorption Chiller – measuring efficiency of cooling



*Based on 127°C (44K) or 260°F flue gas rejected to the atmosphere, HHV for natural gas

Conducting Extensive
Data Analysis and Modeling to Minimize Performance Risks
The CHP Integration Laboratory has developed the CHP System Mathematical Model, a predictive modeling tool that provides the framework for how CHP systems should perform. Throughout testing data is collected on individual component and system performance. This information is then used to optimize performance and design of the components and the system, reducing the potential risk to business and industry of operating CHP systems.

Operating as a National User Facility
The CHP Integration Laboratory's designation as a National User Facility expands options for working directly with business and industry in effective performance and design of systems that will meet future needs. In this role the Laboratory will test package systems and model modular systems. A newly awarded contract of $18.5million to seven industry teams based on competitive proposals, provides an opportunity for the Laboratory to negotiate to test smaller units from these partners, which include: Burns and McDonnell, Capstone Turbine Corporation, Gas Technology Institute, Honeywell Laboratories, Ingersoll-Rand, NiSource Energy Technologies, and the United Technologies Research Center. Work is also planned to assess controls and advanced diagnosis and thermal energy storage in conjunction with the expanded role of a National User Facility.

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