

# IES – CHP Laboratory

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# Oak Ridge National Laboratory

# (ORNL)

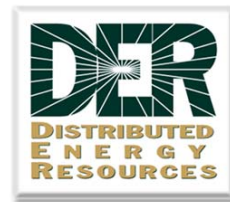
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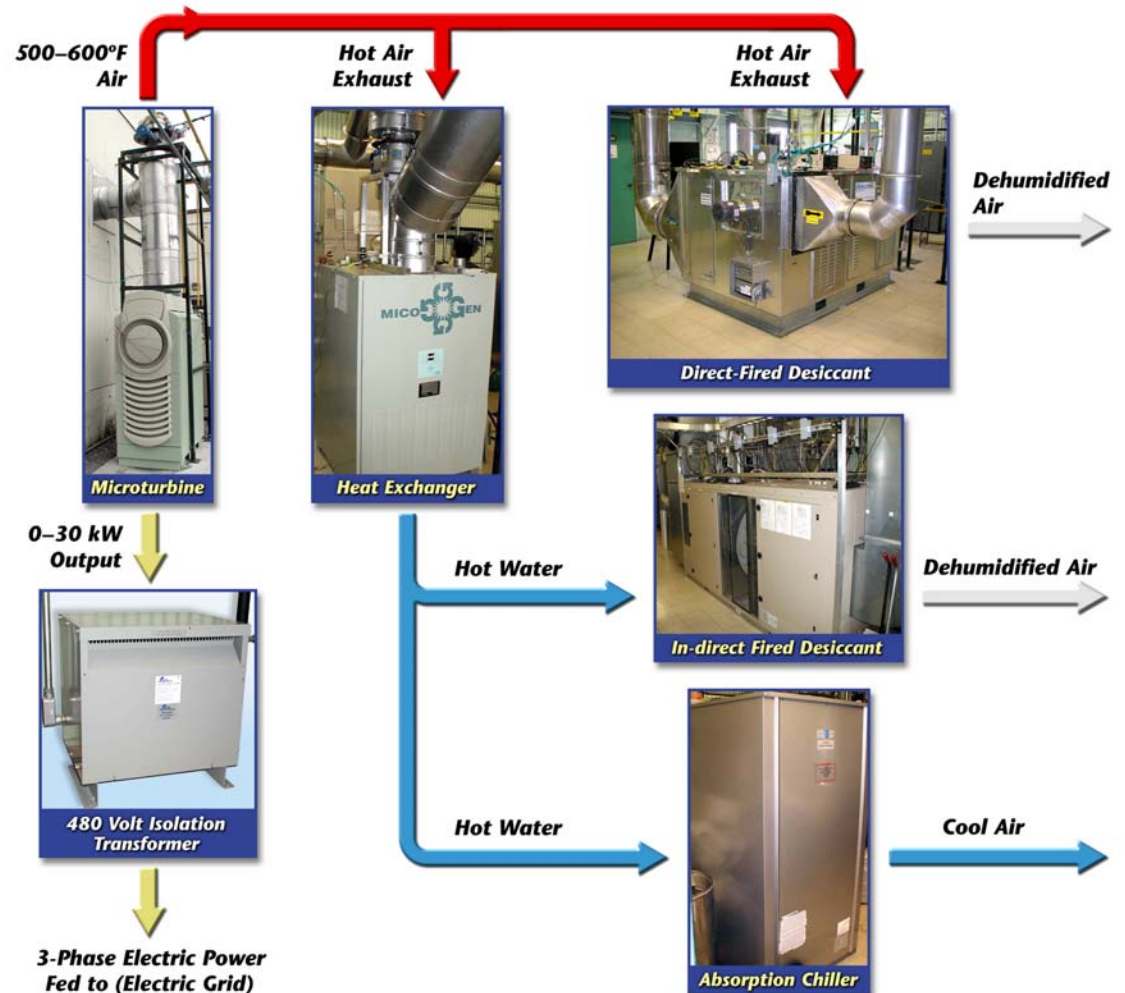
Cooling, Heating, and Power (CHP) Group  
Engineering Science and Technology Division



# ORNL IES – CHP Laboratory

## System Optimization Tests in Progress

- Currently based on 30 kW microturbine
- Heat recovery unit (HRU) – exhaust to water heat exchanger
- Indirect-fired desiccant dehumidifier
- Direct-fired desiccant dehumidifier
- Indirect-fired absorption chiller and turbine inlet air cooling
- Plans to test other DG/TAT equipment including SEMCO Integrated Active Desiccant Module



# IES – CHP Laboratory

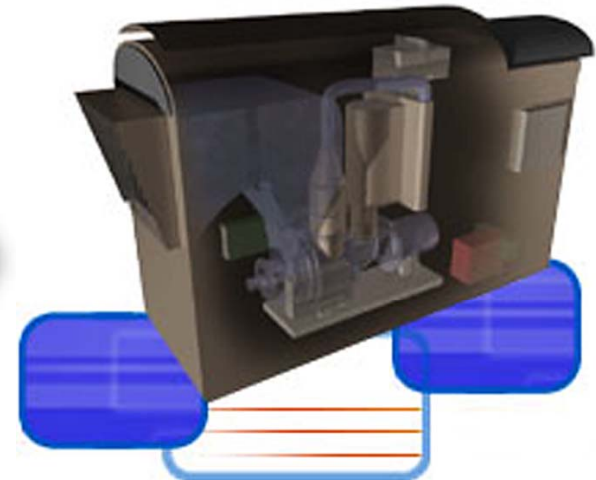
## User Center for Industry Partners

- Seven industry teams selected for multiyear DOE/ORNL contracts with 43% industry cost share

**Present:** Individually optimized products combined on-site.

### IES Vision

- Integrated or modular packages
- Less or little on-site engineering
- More cost effective/including installation
- Higher overall efficiency



2010: IES - single optimized package from manufacturer

# Seven Industry Teams

## Gas Technology Institute



## NiSource Energy Technologies



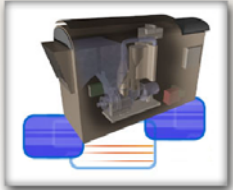
## Capstone Turbine Corporation



## Honeywell Laboratories



## United Technologies



## Ingersoll Rand



## Burns and McDonnell



# **IES – CHP Laboratory Experiments, Data Analysis, and Modeling**

## **Optimizes "Next Generation" IES – CHP Products**

- **Expertise**

- Highly qualified staff of research scientists and engineers
- User facility tests and packaged system integration
- Diagnostic support for analysis of field test data
- Support rating and certification standards for IES – CHP products
  - Working closely with SRI and GTI on test protocols for ASERTTI
  - Working on performance metrics

# **IES – CHP Laboratory Experiments, Data Analysis, and Modeling (*continued*)**

## **Optimizes "Next Generation" IES – CHP Products**

- **Component and integrated system testing**
  - Benchmark microturbine-based CHP system performance and emissions
  - Alternative configurations and performance trade-off evaluations
  - Thermal storage integration and advanced heat recovery evaluation

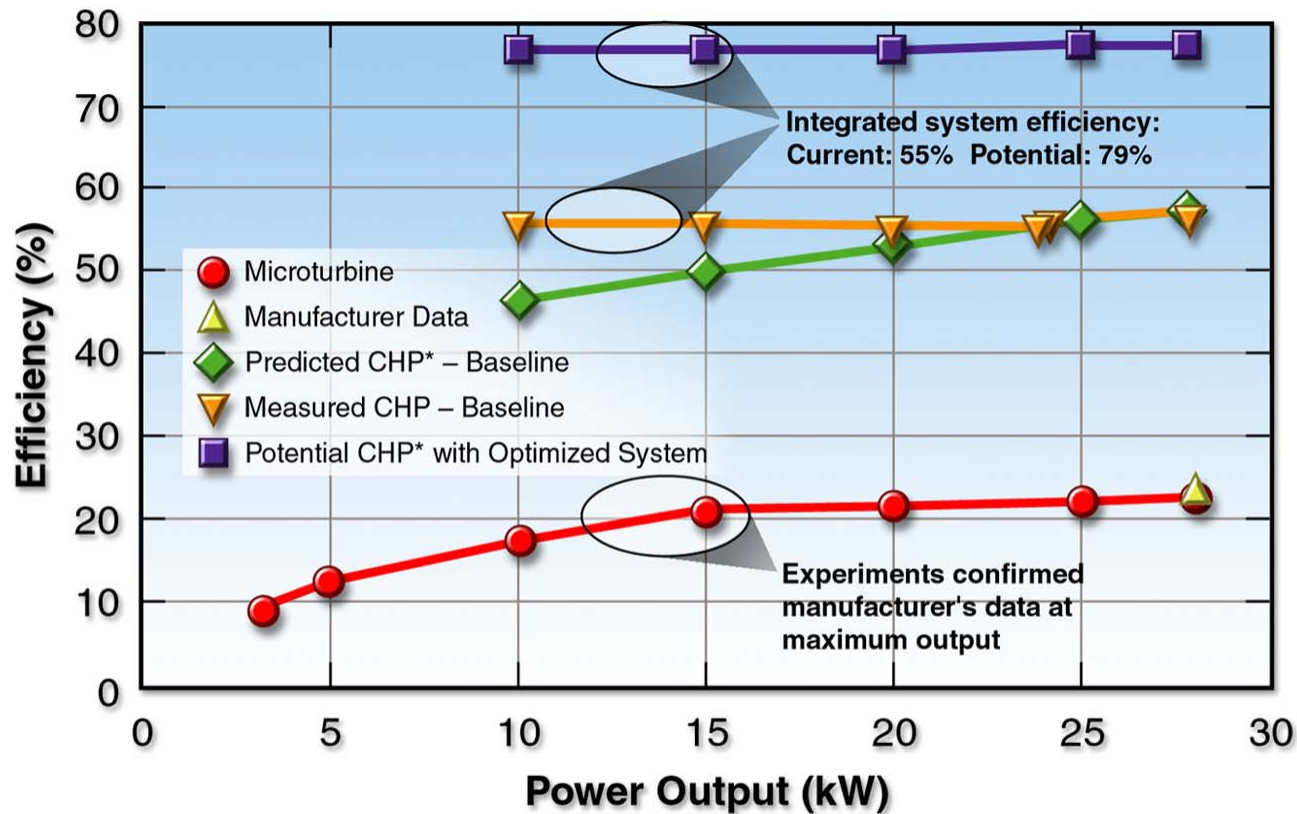
# **IES – CHP Laboratory Experiments, Data Analysis, and Modeling (*continued*)**

## **Optimizes "Next Generation" IES – CHP Products**

- **Predictive modeling**
  - Acquire data for computer algorithms, model validation
  - Model indirect-/direct-fired desiccant dehumidifiers and indirect-fired absorption chiller
    - Optimize design and operating parameters of individual units
    - Optimize CHP systems under different loads

# Results of IES – CHP Laboratory Experiments and Modeling

## Integration Research Optimizes System to Realize Potential Efficiency



\*Based on 127°C (400K) or 260°F flue gas rejected to the atmosphere, HHV for natural gas

# Results of IES – CHP Laboratory Experiments and Modeling (continued)

## Efficiency Improvement with Second-Generation HRU

