# 2002 ENERGY WORKSHOP & EXPOSITION

FORT DRUM'S MICROTURBINE DEMONSTRATION REPORT

JUNE 2002

## FORT DRUM'S MICROTURBINE PROJECT

- Fort Drum has installed a 30 KW Capstone micro turbine in a large barracks complex
- This a demonstration project to support the Army's desire to successfully demonstrate new technologies on Army Installations
- It was funded by a DOE Grant

## REASONS FOR THE PROJECT

- Demonstration of new technology to support Army's desire to field new technologies in Army applications
- Project saves energy dollars (But not Btu's)
- Microturbine provides generator backup for the boiler room equipment only
- Projects costs to Fort Drum are zero

## PARTICIPATING AGENCIES

- Fort Drum provides the host site for the demonstration
  - Pacific Northwest Labs (PNL) helped get the $100 K DOE grant and will do measurement and verification effort.
  - FORSCOM helped get management interest and provided $30 K for necessary work
  - CERL is the contracting agency, will assist in the technical design review and M&V testing.
  - JW Mechanical (local contractor) is the installing contractor and will provide two years of operations and maintenance

## THE APPLICATION SITE

- Barracks building P-175 is a 500 man barracks and administration complex with a full (3 meals a day) dining hall. It is 118,940 sq. ft
- It has the single largest usage of domestic hot water. Approx. 8876 therms/ month
- The boiler room has ample space for installation. A 1250 gal storage tank is available
- A DDC control system is available to control connected loads. Req'd for emergency startup

## PROJECT SCHEDULE

- Rec'd DOE Grant - April 2001
- Scope of Work by CERL-August 2001
- Design/ Build Bids received Mid Sept
- Award in November 2001
- Construction started Dec 2001
- Design complete March 2002
- Construction complete by May 2002
- Initial testing 24 May 2002
- Operation for at least two years under a Maintenance contract

## Microturbine Design

- The 30 KW Capstone microturbine has been installed to provide 30 kW at 208 volts to power boiler room equipment.
- The microturbine exhaust is ducted through a Microgen plate/fin type heat exchanger to recover heat for preheating of DHW for the barracks and dining hall.

## Microturbine Design ( Electrical)

- The 30 KW Capstone microturbine has been installed to provide 30 kW at 208 volts to power boiler room equipment. The turbine generator is manufactured to provide 480 3 Phase power so a step down transformer has been provided
- The 30 kW output is not sufficient to power the entire building( 500 kW req'd) but will be used as emergency back up for boiler room equipment.

## Microturbine Design ( Electrical)

- In the event of a grid outage :
- The Capstone will shut down and open the grid isolation switch. After brief 10 minute pause it  is programmed to restart itself.
- The Trane Tracer 100, DDC control system, is programmed to sequentially start the following boiler room equipment.

## Microturbine Design ( Electrical)

- Boiler room equipment to start in 3 minute intervals
  - One 15 Hp Main circulation pump (Low voltage motor starter required
  - One 2 mbtu/hr Weil McClain hydronic boiler
  - One DHW AO Smith Boiler
  - Boiler room lights
  - One DHW circ pump.

## Microturbine Design (Mechanical)

- The microturbine exhaust will be ducted through a Microgen plate/fin type heat exchanger to recover heat for preheating of DHW for the barracks and dining hall.
- Cold make up water will be preheated through a continuous closed loop circulation system with a combined storage capacity of 2220 gallons
- DHW for the building needs will be drawn from the preheat storage system to the existing DHW system for final heating