

Development, Installation, Testing and Demonstration of a Combined Cooling Heating & Power System at Floyd Bennett Field

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CHP in New York State - June 20, 2002

CHP Project at Floyd Bennett Field

- Floyd Bennett Field
- Project Development
- Description of Floyd Bennett Field Project
- Design Issues
- Project Status

Floyd Bennett Field

- Part of Gateway National Recreation Area
- Only National Park with Camping in New York City
- Air Field Was Historically Important in the 1930s and 1940s
- Park Includes Pine Forests and Wetlands
- NPS Center for Sustainable Design in Eastern Half of the U.S.

Project Development

- Facility Energy Audit Performed
- Park is pursuing adaptive re-use of existing buildings
- Interest in Energy efficiency Projects
- Interest in Public Education and Demonstration

Floyd Bennett Field

- Landsberg Engineering, Inc. - Project Manager
- Originally 6 30-kW Capstone Microturbines
- Heat recovery: space heating and cooling
- Funding:
 - NYSERDA: \$425,000
 - National Park Service: \$200,000
 - KeySpan Energy R&D: \$100,000
 - Oak Ridge National Lab \$100,000 - In-Kind
 - Office of Power and Technology: \$50,000
 - FEMP \$50,000



Building Description

- Two story 17,000 sf
- Building to be developed as a Human Ecology Laboratory
- Requires 40 tons of cooling
- Heating system is 650 MBH output
- 60# gas available at building line
- Existing hvac system is 4-pipe fancoil

Design Issues

- 30 kW vs 60 kW Turbines
- Water Chiller vs Direct-Fired Chiller
- Ducting Through Heat Exchanger to Chiller

Design Issues

30 kW vs 60 kW Turbines

- 30 kW Advantages
 - No compressors needed - 60 psi gas available
 - Longer experience with unit (but being phased out)

Design Issues

30 kW vs 60 kW Turbines

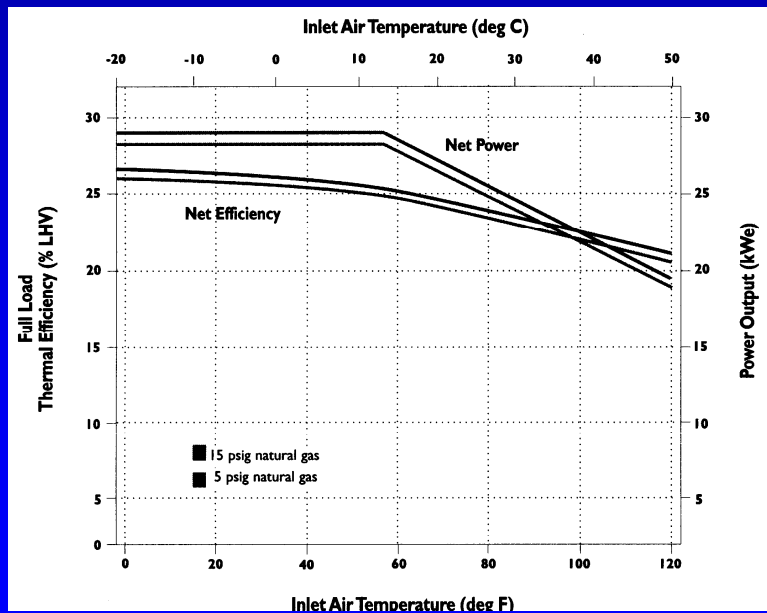
- 60 kW Advantages
 - Produces 60 kW while powering compressors
 - Lower installed cost including compressors
 - Peak power output up to to 82F vs 58F outside air temperature for 30 kW
 - 2.5% more power production in NYC climate
 - Lower maintenance costs

Design Issues

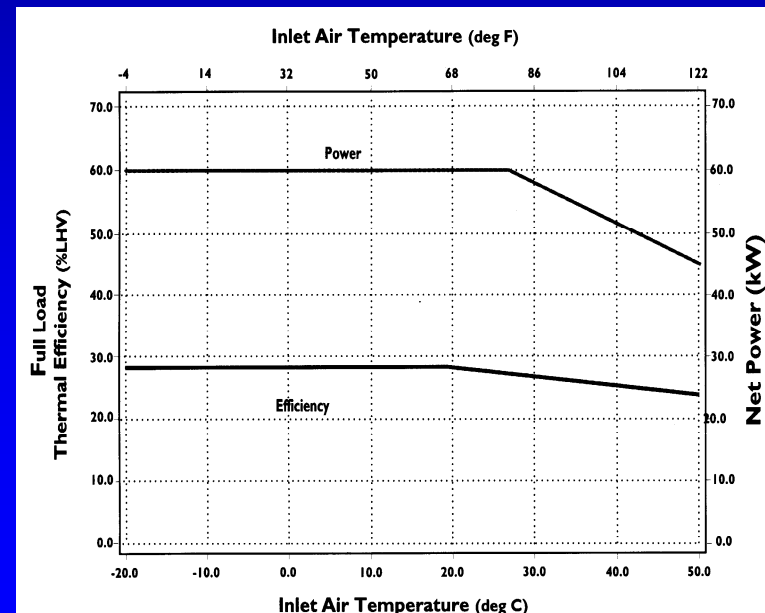
30 kW vs 60 kW Turbines

Turbine Performance

30 kW



60 kW



Design Issues

Water Chiller vs Direct-Fired Chiller

- Direct-Fired Chiller
 - Eliminates need for heat exchanger for cooling
 - Can eliminate need for heat exchangers in new building (180F water needed for heating)
 - Broad Direct-Fired Chiller less costly than Yazaki, but air damper makes pricing roughly equal

Design Issues

Water Chiller vs Direct-Fired Chiller

- Water Chiller
 - Requires heat exchanger for operation
 - 10-ton Yazaki units used to date expensive to buy and install
 - 40-ton Yazaki more costly than Broad direct-fired unit
- Direct-Fired selected - advances state-of-art

60 kW Capstone with Broad Chiller



Courtesy of Aris Marantan, and The University of Maryland

Design Issues

Ducting Exhaust To Chiller

- Ducting Through Heat Exchanger
 - Less complex system
 - Adds 4” water back pressure (8” maximum)
 - In-line fan might be needed
- Ducting Around Heat Exchanger
 - More costly and complex system
- Probably Duct Through Heat Exchanger

Project Status

- Pre-Monitoring Completed
- Design Nearing Completion
- Construction to Begin in July
- Startup Planned for Fall 2002
- Chiller Installation Planned for Spring 2003
- Visitor's Display Planned