

# 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

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

# Floyd Bennett Field

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- 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

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- 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

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- 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

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- 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

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- 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

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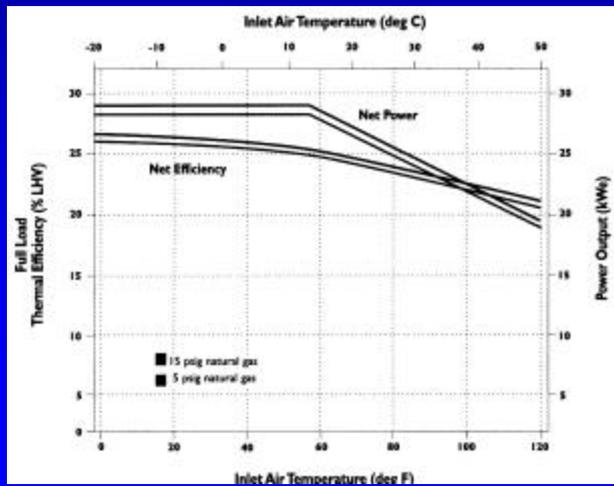
- 30 kW Advantages
  - No compressors needed - 60 psi gas available
- 60 kW Advantages
  - Produces 60 kW while powering compressors
  - Lower installed cost including compressors
  - Peak power output up to to 82F vs 58F for 30 kW
  - 2.5% more power production in NYC climate
  - Lower maintenance costs

# Design Issues

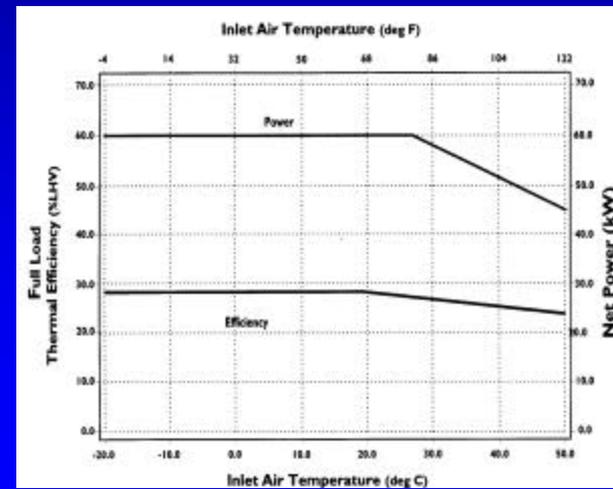
## 30 kW vs 60 kW Turbines

### Turbine Performance

30 kW



60 kW



# Design Issues

## Water Chiller vs Direct-Fired Chiller

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- 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

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- 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

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Courtesy of Aris Marantan, and The University of Maryland

# Design Issues

## Ducting Exhaust To Chiller

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- 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

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- Pre-Monitoring Completed
- Design 95% Complete
- Construction to Begin in July
- Startup Planned for Fall 2002
- Chiller Installation Planned for Spring 2003 (warranty advantages)
- Visitor's Display Planned

# Presenters

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