AES-NJ Cogen CHP in New York State



Small Engine CHP in NYC June 24, 2004

Host Facility Description: Greenpark Care Center

≻400 Bed Multi-Care Nursing Home [Brooklyn NY]

Electric Utility: Con-Ed [sc-9/10]

Pre-Cogen Peak Electric Load: 538 kW



- Pre-Cogen Annual Average Electric Load: 1,680,000 kWH
- Pre-Cogen Annual Electric Cost: \$351,540

Natural Gas Supplier: KeySpan Energy Delivery [TC-Commercial]

- Pre-Cogen Annual Average Gas Load: 15,080 Mcf
- Pre-Cogen Peak Winter Load: 2,078 Mcf/Mo.
- Pre-Cogen Natural Gas Cost: \$147,849

Energy Conservation Measures Previously Implemented

- Energy Efficient Lighting
- Boiler Plant Replacement

AES-NJ Cogen Company, Inc.

➢ Performance Contractor

 Selling Electricity/Thermal Energy from Micro-Cogeneration Systems in New York/New Jersey Area

► Owns ~ Operates ~ Maintains

— 76 Cogeneration Systems

First 60 kW Project Installed in 1989

 North Shore University Hospital -- still operating

► January 1995

 Purchased 17 Operating Cogeneration Projects in NJ from EUA/Cogenex Corporation



AES-NJ Cogen Company, Inc.

►2003

- Generated 18,116,492 kWH of electricity
- Began Implementation of Greenpark Project with NYSERDA Award
- Partnered with AmericanDG Inc. to Develop Greenpark & Other Projects



AmericanDG Inc.

▶On-Site Utility

- Own & Operate Cogeneration and Cooling Systems
- Sell Energy
 - Electricity
 - Thermal (Hot Water)
 - Cooling

► National Reputation

➤ Operations & Service Support

► Affiliated with Tecogen Inc.

Equipment Manufacturer

Equipment: Tecogen

Modular, Compact Units

- Over 800 Units Shipped
- Over 35 Million Hours of Operation
- -75 KW
- Natural Gas Fueled
- Over 90% Efficiency
- 490,000 Btu/Hr Hot Water
- 954,000 Btu/Hr (HHV) Fuel Consumption
- 70 dBa @ 20'
- Low Emissions Option





NYSERDA Grant

>\$150,000 Grant from NYSERDA

Project Cost Breakdown

- Equipment
- Installation
- Telecommunications
- Utility Interconnection
- Design & Permitting
- Project Development

\$ 148,610
\$ 87,285
\$ 3,500
\$ 11,900
\$ 12,000

36,705

\$

TOTAL \$ 300,000





NYSERDA Grant Application

Low Emissions Reciprocating Engine Design
 Micro-Cogeneration Concept

► Goals of Demonstration: Prove Economic Viability

- Incorporating Emissions Reduction System Into an Internal Combustion-Based Cogeneration System
 - Initial Capital Cost
 - Maintenance Costs
 - Reliability
- Implementing Cogeneration In The Down-State Market
 - Initial Capital Cost
 - Maintenance Costs: Engine & Emission Reduction System
 - Fuel Cost

Project Development & Financing

➤ Greenpark Considerations

- Minimize Capital Investment
- Minimize Operational Risks
- Maximize Financial Benefit
- Selected Performance-Based Contract to Develop, Design, Install, Own & Operate System in September 2002

➢ Project Financing & Implementation

- NYSERDA Grant Award
- AES-NJ Cogen & AmericanDG Inc. Partnered in 2003 to Jointly Implement Project

First Year Results



- Hours of Operation
 - Electric Production
 - Thermal Production
- Fuel Consumption
 - **Energy Cost Savings**
- Residual Purchased Electricity
- Residual Purchased Natural Gas 2,26

7,328 Hours 1,067,492 kWH 5,929 MMBtu 13,736 MMBtu \$92,271 (12 months) 612,508 kWH 2,268 MMBtu

*Note: Project commenced operation in May 2003

Project Implementation

➤ Development

- Host Facility Performance Contract Approval
- Con-Ed Electrical Interconnection Approval
- NYCDEP Permit Registration
- City of New York Building Permit

► Installation & Start-Up Requirements

- Floor Space
- Ventilation & Exhaust
- Thermal Interface
- Electric & Thermal Tie-Ins
- Module Start-Up
- Utility Protective Relay Testing (zero export)

Operational Issues

Running Engine To Minimize Emissions

(with catalytic converter) @ Stoichiometric Level

- Increases Cylinder Temperatures
- Increases Fuel Consumption
- Decreases Top End Engine Life

Maintenance Required on Catalytic Converter

> Thermal Sales Optimization

Minimizing Host Facility Boiler Operation

Project Benefits & Considerations

▶Permitting

- Smaller system footprint allows for installation in or adjacent to existing boiler/mechanical room
- Per unit fuel consumption is less than 1 MMBtu/hr, allowing for reduced permit compliance issues

► Maintenance

- Increased average availability of multiple smaller units at multiple sites vs. single larger unit at a single site
- Utilization of common equipment and prime mover allow for "fleet" mentality for spare parts
- Adoption of geographic service territory to increase maintenance staff effectiveness

Project Benefits & Considerations

Operating Risk

- Reduced capital exposure for any major equipment failure (typically less than \$10,000 per event)
- Individual equipment failure will not cause irreparable financial loss to owner/operator

➤On-Site Utility Business Model

- Preserve Customer Capital
- Outsource All Operations To Expert