MICRO-GRIDS
USING THE DISTRICT HEATING SYSTEM AS THE GRID TO REDUCE COSTS

Presentation to: 2019 IDEA Campus Energy Conference
February, 2018
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THE PROBLEM (OPPORTUNITY)
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• Build a micro-grid to serve the State of New Jersey office buildings located in Trenton New Jersey
• Minimize costs associated with construction
• Minimize costs associated with operating the system
• Take advantage of existing assets associated with the District Energy system
• Lower emissions and reduce carbon footprint
EXISTING SYSTEM
EXISTING SYSTEM
PROPOSAL
PROPOSAL

• To build a Micro-grid for the State buildings that combines:
  • The use of the thermal piping as the backbone for the grid with decentralized steam turbines placed at State facilities, powered by the plants thermal loop.
  • Install CHP at the plant to replace existing boilers and engines to provide uninterruptable back up power to the plant.
  • Meets States Goals
STATE GOALS

• Long term thermal contract
• Improved reliability for thermal production and delivery
• Micro-grid to provide resiliency to State building
• Reduce energy costs
PLANNED EQUIPMENT

• 2x5 MW Gas turbines with Heat Recovery Hot Water Generators
• Energent 275 kW Microsteam Turbines to be used at Prison and State House
• Siemens SST0-40 300 kW Steam Turbines for use at State Buildings
STEAM TURBINES

Energent

Siemens
PROPOSED SYSTEM
OPERATIONS

• Operate gas turbines as merchant electricity producers
• Use waste heat from turbines to supply heat to thermal loop.
• 88,767,000 kWh produced.
• Sell up to 7 MW of output (energy only) to PJM and have available capacity for backup for internal plant loads Approx. 60,000,000 kWh.
• Install 7 Micro Steam turbines along with Steam generators on State buildings to provide up to 50% electricity demand of each building. Assume 500 kW per site 8760 hours base load 4,400,000 kWh per year per site.
PROS & CONS
RISK / BENEFITS OF PROPOSED MICRO-GRID

**Risks**
- PJM Market Risk
- State closes facilities
- Repair costs to maintain thermal loop

**Benefits**
- Improved thermal system
- Increased sales of thermal energy
- New sales of electricity
- Improved relationship with State
- Reduction in Carbon footprint
- No Wheeling fees to Electric utility
- Reduced cost to build and operate
USE IN CAMPUS LOCATIONS
CAMPUS APPLICATION

Benefits

• Increased Reliability
• Reduce energy costs
• Reduce carbon Emissions
• No Wheeling Fees
• Optimize existing assets of thermal system
• Can be retrofitted to existing systems easily
QUESTIONS?
THANK YOU

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