CHP Applications and Microgrid Development for Gaming Facilities in Atlantic City, NJ

Jon Wohl, SVP-Project Development
DCO Energy, LLC
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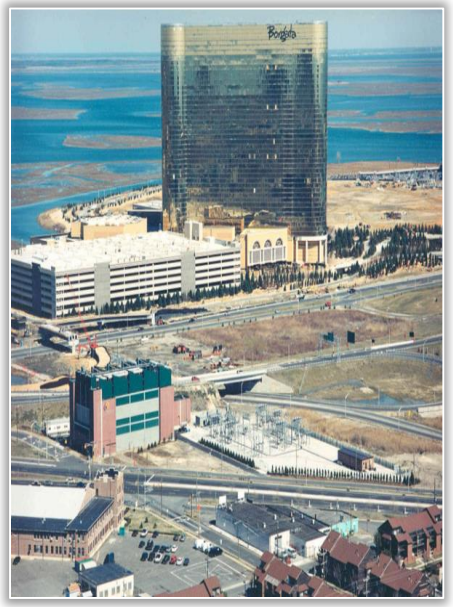
Summary of Experience

- Developer, owner, engineer, construct, finance, operate and maintain:
  - -District energy systems
  - -CHP
  - -Microgrids
  - -Distributed generation
    - Land fill gas to energy
    - Combined Cycle plants
    - Peaking Plants
- Utilize technology including combustion turbines, reciprocating engines, steam turbines, boilers, chillers, full cells, etc. utilizing natural gas, biogas, oil, biomass, coal and sun.

Marina Thermal Facility Atlantic City, NJ



CENTRAL ENERGY CENTER, DISTRICT ENERGY SYSTEM

Developed, engineered, constructed, operate and maintain a Central Energy Center and Energy Distribution System providing:

- 15,000 Tons of Chilled Water
- 200 MMBTU/hr of Hot Water
- 8 MVA of Backup Generation

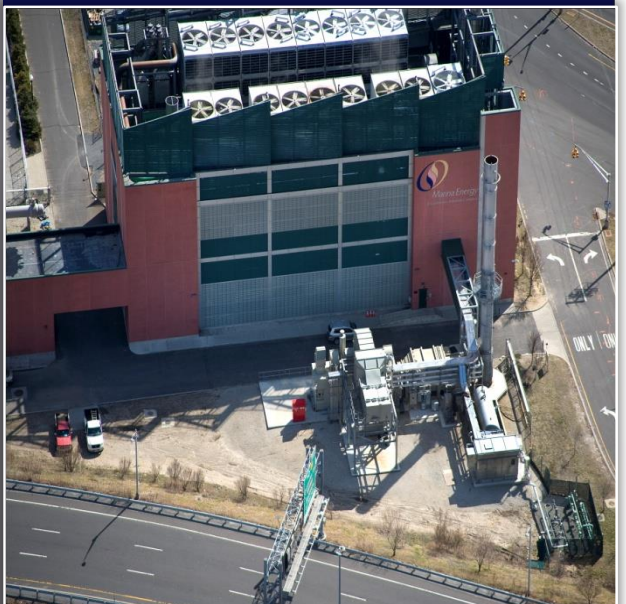
Marina Thermal Facility
Atlantic City, NJ

- Central Energy Center (CEC) was developed and built as a third party district energy system.
- Owners of the Borgata understood the benefits of using a third party ownership structure.
  - The casino/resort being built as a “Las Vegas” style casino, the first in Atlantic City.
  - The Borgata was intended to be the first of a number of casinos development in the Marina area of the City.
  - CEC had ability to expand as other development occurred.
- Reliability of heating and cooling of the resort were critical. In addition, emergency generators (8 MW) was used for load shedding.

Marina Thermal Facility
Atlantic City, NJ

- As loads grew at the Casino, a Combined Heat and Power plant was added to the (CEC).
- A natural gas fired Solar Taurus 70 (nominal 7.5 MW) was added. Waste heat from the combustion process went to 1,800 tons of hot water absorption chillers (summer) and tied into the existing hot water distribution lines.
- Average power requirements of the Casino/Resort is 15 MW, with peaks in excess of 22 MW.
- Because this is a district energy system, serving at least 2 different owners, tax benefits for the distribution portion of the project were realized.

Marina Thermal Facility Atlantic City, NJ



COMBINED HEAT & POWER PLANT

Developed, engineered, constructed, operate and maintain a Combined Heat and Power Plant providing:

- 7.5 MW of Electricity
- 1,800 Tons of Chilled Water
- 38 MMBTU/hr of Hot Water

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Marina Thermal Facility
Atlantic City, NJ

Critical Infrastructure

- Constructed with “hardening” in mind
- 6-12” above 150 year flood plain
- Black start capability & Emergency Gear on second floor of plant
- Island mode enabled
- Sensitive electronic on second floor of plant

Marina Thermal Facility
Atlantic City, NJ

Supplemental Hardening For Superstorm Sandy

Microgrids Redundancy, Resiliancy

- Weather events appear to be a constant (any time during the year) making utility power less reliable
- In New Jersey and other east coast locations, October 2012, Super Storm Sandy hit, indicating how non-reliant key infrastructure is from an energy perspective. Hospitals, WWTPs, etc. were vulnerable to long term power interruptions and outages.
- It should be noted that both projects presented earlier, ran throughout Superstorm Sandy, running in “island” mode, providing electric and thermal energy
- In 2017 the NJ Board of Public Utilities announce a program to study microgrids in 13 potential locations that were effected by Super Storm Sandy.
    - NJBPU would provide funding for Micrgord Feasibility Study potential development. Understand what is feasible from a interconnection and economic standpoint.
    - Studies are due back to NJBPU by July
    - Potential additional funding for pre-engineering for selected projects

Microgrids

Redundancy, Resiliancy

- We are in process of planning a microgrid at the MTTC facility, adding additional generation and connecting existing customers, as well as the key faciities, being able to provide electric and thermal energy while in “island” mode and having black start capability
  - Would add between 7-13 MW to the plant
  - Working with local utility on how to implement

QUESTIONS?