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OCTOBER 15-17, 2018 • MARRIOTT DENVER WEST • GOLDEN, CO

Distributed Energy Conference CHP Presentation

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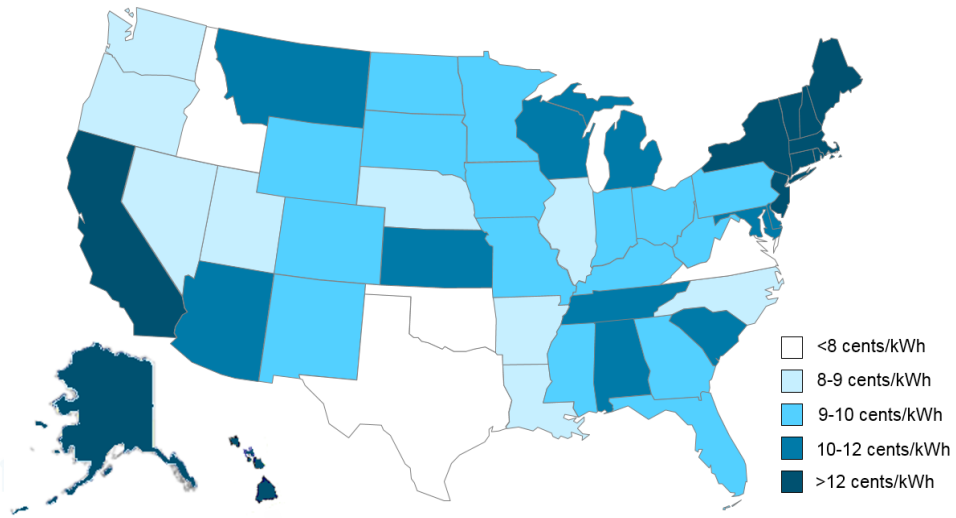
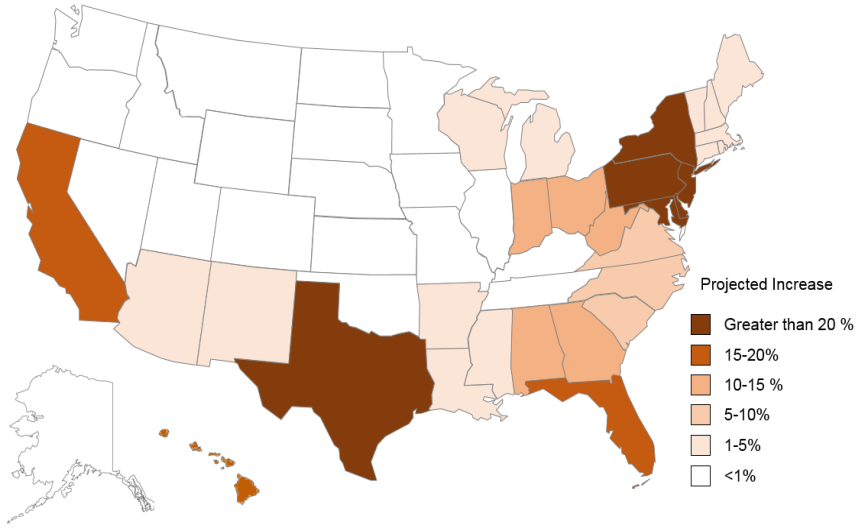
CHP/CCHP Value Proposition

CHP is Increasing as Electricity Prices Rise

Average Electricity Price for Commercial Customers



Projected 20 Year Growth in Electricity Prices



Energy Information Administration, Electricity Price Data, 2017 and Annual Energy Outlook

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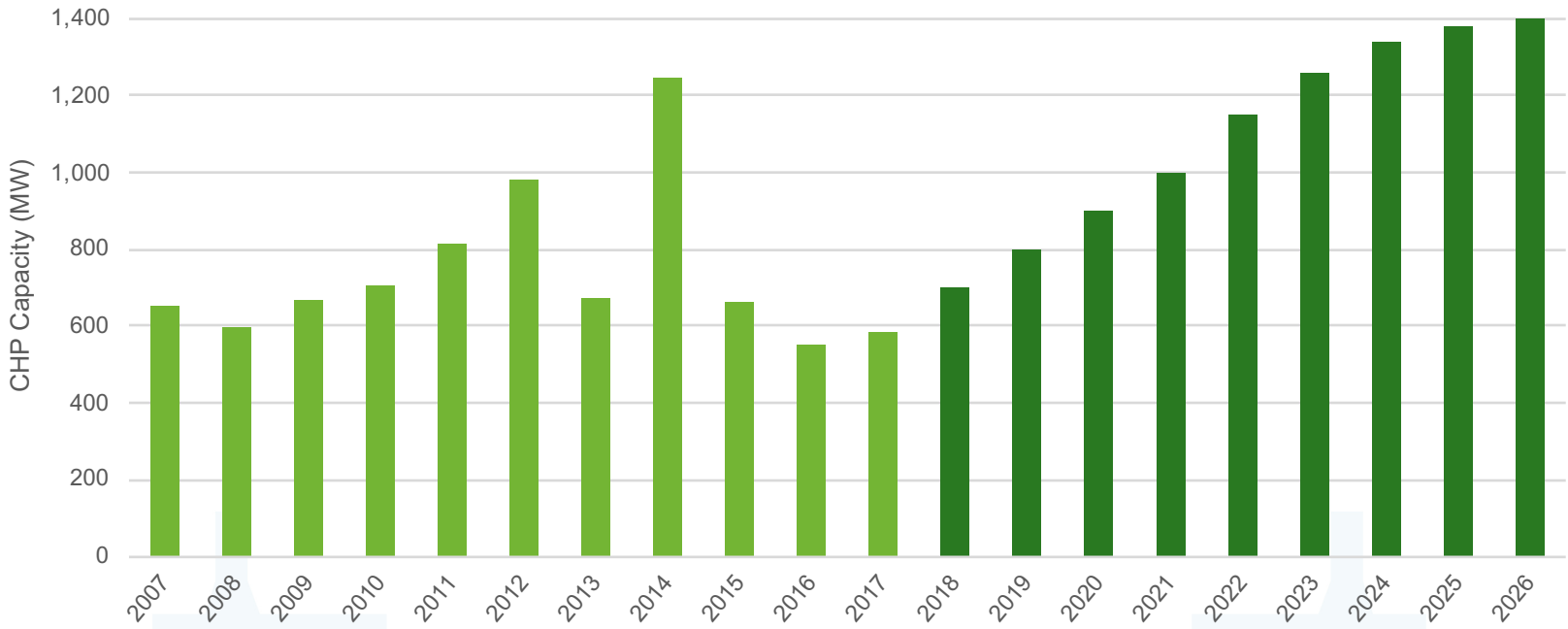
Projected CHP Market Growth

Growth in Overall CHP MARKET Driven by Smaller Commercial Applications

Historical and Forecast CHP Capacity Additions



Source: ICF Internal Forecast

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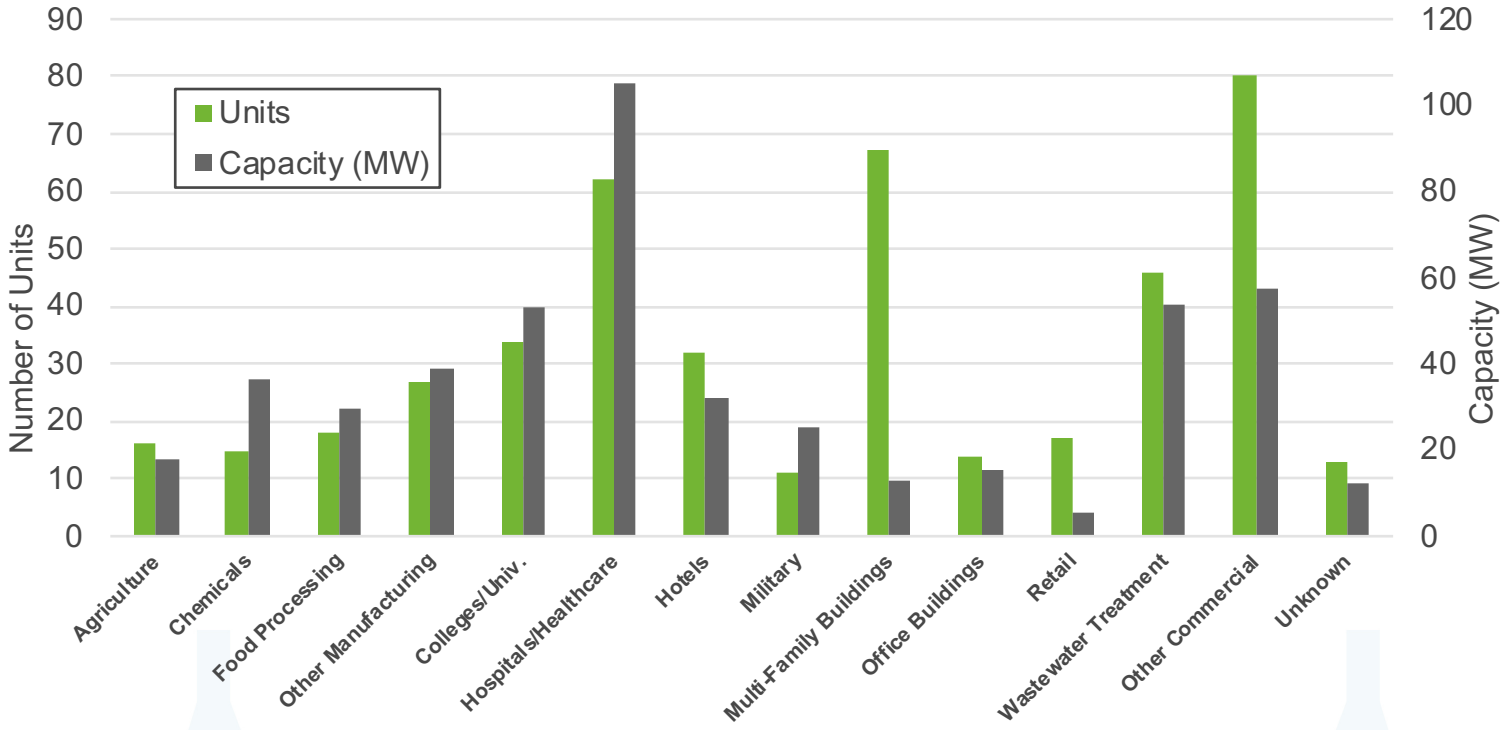
DOE Watch List of New CHP Applications

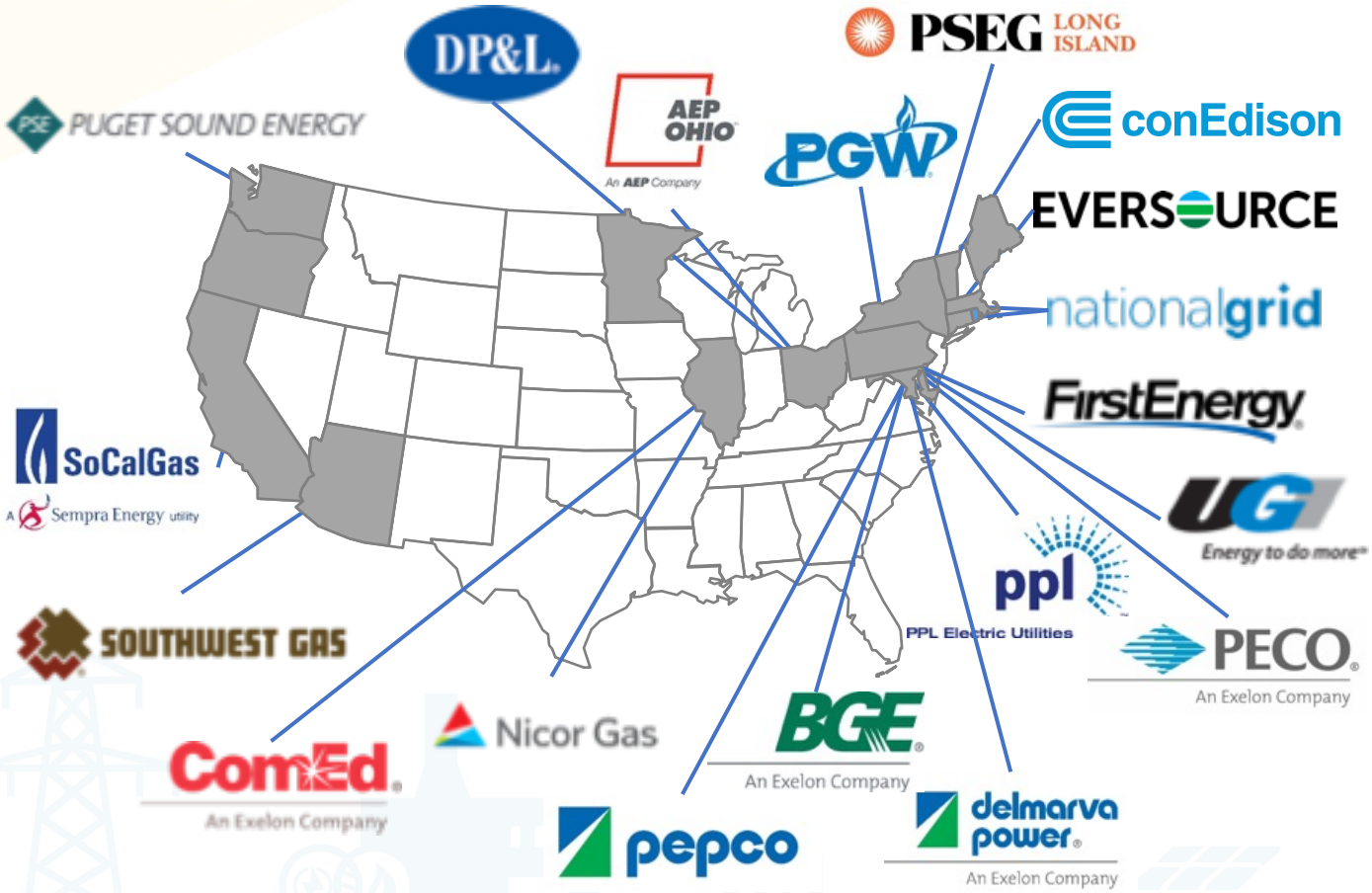
CHP "Watch List": Projects in Development, 100 kW – 5 MW



Source: ICF

CHP – A Good Fit for Healthcare, Multi-Family & Commercial Applications

New Utility CHP Incentives



At least
20 UTILITIES
are administering
incentive programs
specifically for
CHP

Source: ICF

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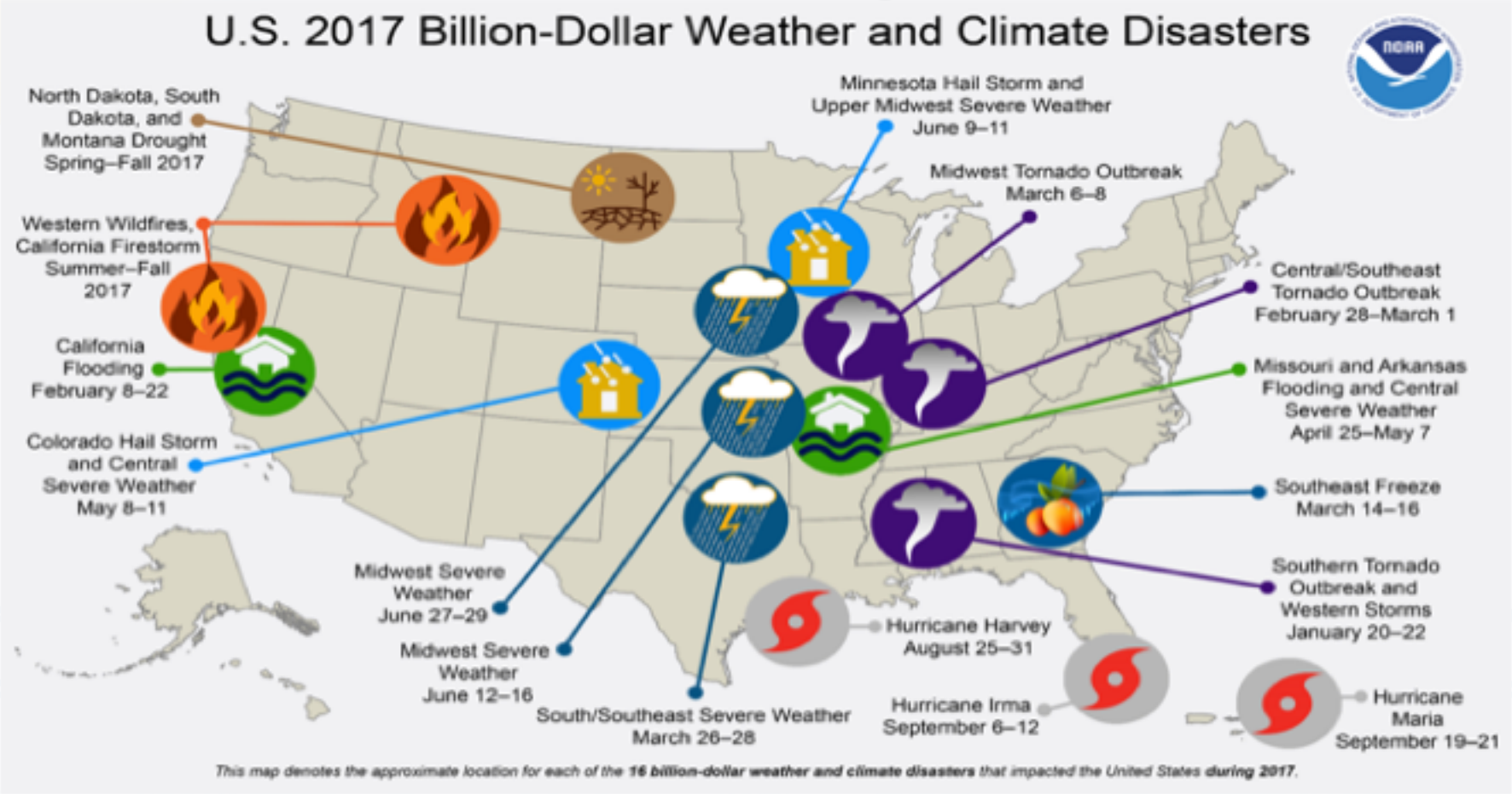
CHP Can Address the Growing U.S. Resiliency Issues



Source: National Oceanic and Atmospheric Administration

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Samples of CHP in the New York Metropolitan Area

Energy Efficiency
Residential

Residential Complex
Bronx, New York

Natural gas-fueled combined heat and power (CHP) microturbine provides primary power and hot water to the multi-family residential complex.

(1) C1000 | DM*
1 MW Electricity

Projected ROI: 3.5 yrs

Commissioned: 9/16

Energy Efficiency
Healthcare

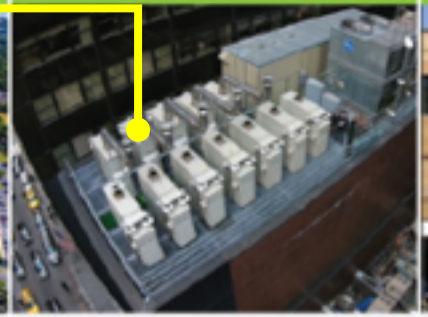
Residential Healthcare
Wyckoff, New Jersey

Assisted living facility with 292-bed capacity. Four natural gas-fueled microturbines provide combined cooling, heat and power (CCHP) to residents.

(4) C65 | DM*
Absorption Chiller
260 kW Electricity

Commissioned: 8/08

Energy Efficiency
Hospitality



Luxury Hotel
New York, New York

Twelve integrated combined heat and power (ICHP) microturbine array supplies electricity and hot water to the building and also feeds an absorption chiller.

(12) C65 ICHP
200-Ton York Absorption Chiller
780 kW Electricity
Projected ROI: 4.5 yrs

Commissioned: 10/13

Energy Efficiency
Retail

Retail Wine Store
New York, New York

2011 AEE Energy Project winner. Exhaust heat from two microturbines is used to provide 40 tons of chilling year round.

(2) C65 ICHP| GC*
40-Ton Absorption Chiller
130 kW Electricity
Projected ROI: 4 yrs

Commissioned: 12/05

Renewable Energy
Waste Water Treatment

WWTP
New York, New York

Two microturbines fueled by digester gas and natural gas blend provide power and heat to the waste water treatment plant (WWTP).

(2) C65 ICHP
130 kW Electricity

Projected ROI: 6 yrs

Commissioned: 9/14

Energy Efficiency
Residential

Residential Complex
New York, New York

Four microturbines provide combined heat and power (CHP) to multi-family high rise building. Also feeds into an integrated heating loop for winter months.

(4) C65 ICHP | GC*
260 kW Electricity

Projected ROI: 4 yrs

Commissioned: 12/10

*__DM__ – Dual Mode System (Emergency backup power feature)
*__GC__ – Grid Connect System

Case Studies can be found on www.capstoneturbine.com/case-studies
Projected ROI estimates are at time of sale

The Lotte New York Palace Hotel CHP Challenge

- The Lotte New York Palace Hotel
- Located in the heart of midtown Manhattan, New York
- After years of using city steam, the most expensive fuel source in New York City, the hotel decided it was time to save money and lower its carbon footprint
- The goal was to save operational dollars and offset electric and fuel consumption, especially in the winter months
- Had to work with local utility to run sufficient gas volume and pressure to the site in order to make a clean and green CHP system possible

- The project was approved for a significant New York State Energy Research and Development Authority (NYSERDA) grant

The Lotte New York Palace Hotel CHP Economics

- NYSERDA provided funding for 30% of turnkey installation
- Savings after four years are ahead of schedule with project projections
- Cogeneration plant was designed to achieve payback of 4.5 years
- Project represents a 25% ROI
- Average project ROIs in NYC range between 25%-35%

The Lotte New York Palace Hotel Design Concept

- Depending on the time of year, hot water produced by the microturbine skid is used to either drive the 200 ton single effect hot water absorption chiller or provide supplemental heat to the building's hot water loop via plate and frame heat exchanger
- The system alternates between the heating and cooling modes using isolation valves to dedicate the heat recovered solely to the chiller or heat exchange as deemed appropriate
- At the time it was the largest of its kind installed in New York City
- The system was designed to save the hotel 35% of its annual electric and thermal energy expense by providing cooling in the summer and heating in the winter

The Lotte New York Palace Hotel CHP Solution

Hotel Facility Description

- 903 rooms, 58 stories, 1.2 million square feet
- Utility city steam for hot water
- Utility electricity for cooling and general power

Energy Profile Before CHP Installation

- 15 million kWh of electricity per year
- 59 million BTUs of steam per year

CHP System Major Equipment

- 12 - C65 kW (780kW) Capstone microturbines
- 200 ton York absorption chiller
- Producing 4 million BTUs of hot water

Energy Profile Post CHP Installation

- Displaced 6.3 million kWh of electric per year
- Displaced 25.3 million BTUs of steam per year
- Displaced 730,000 tons of electric cooling per year

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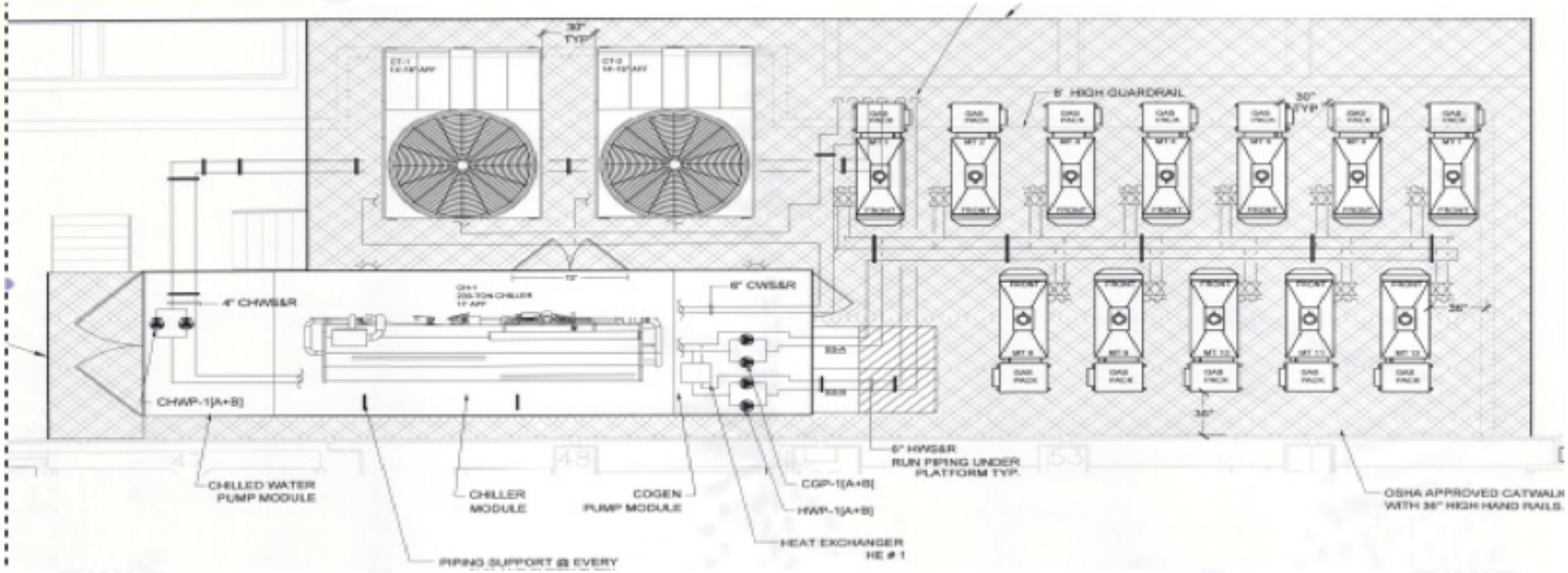
The Lotte New York Palace Hotel CHP Equipment Layout



Lotte New York Palace Rooftop Layout

Lotte New York Palace Rooftop Layout

The Lotte New York Palace Hotel CHP Results

- The CHP or CCHP system has reduced the Lotte New York Palace Hotel's carbon footprint by 481 tons per year by recapturing the thermal energy it produces and deploying the recovered heat on-site
- The system also reduces the building's operating expenses as well as its reliance on the grid with integrated on-site generation capabilities
- Monitored data is constantly being collected from the site and is available in an hourly format on the New York State Energy Research and Development Authority's (NYSERDA) DG/CHP website
- The biggest benefit comes in the winter months when the the recycled heat is used to significantly lower the hotel's energy costs. The Lotte New York Palace Hotel has also experienced moderate summer electrical savings
- Today the Lotte New York Palace Hotel saves an estimated $1.1 million per year in its annual energy spend