



JUNE 8-11

# 2020 SUMMIT

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U.S. DEPARTMENT OF  
**ENERGY**



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# **Best of the Betters: 2020 Better Project and Better Practice Presentations**

Wednesday, June 10  
11:00 am-12:30 pm ET



Jeff White

Ford Motor Company

Submit Questions

[www.slido.com](https://www.slido.com) event code **#bbsummit**  
then go to room “**Best of the Betters**”



# Ford & DTE's Central Energy Plant

A Private CHP Facility with Local Utility Participation

Jeff White, Energy Manager, Ford

# Outline



Who



What



Where



When

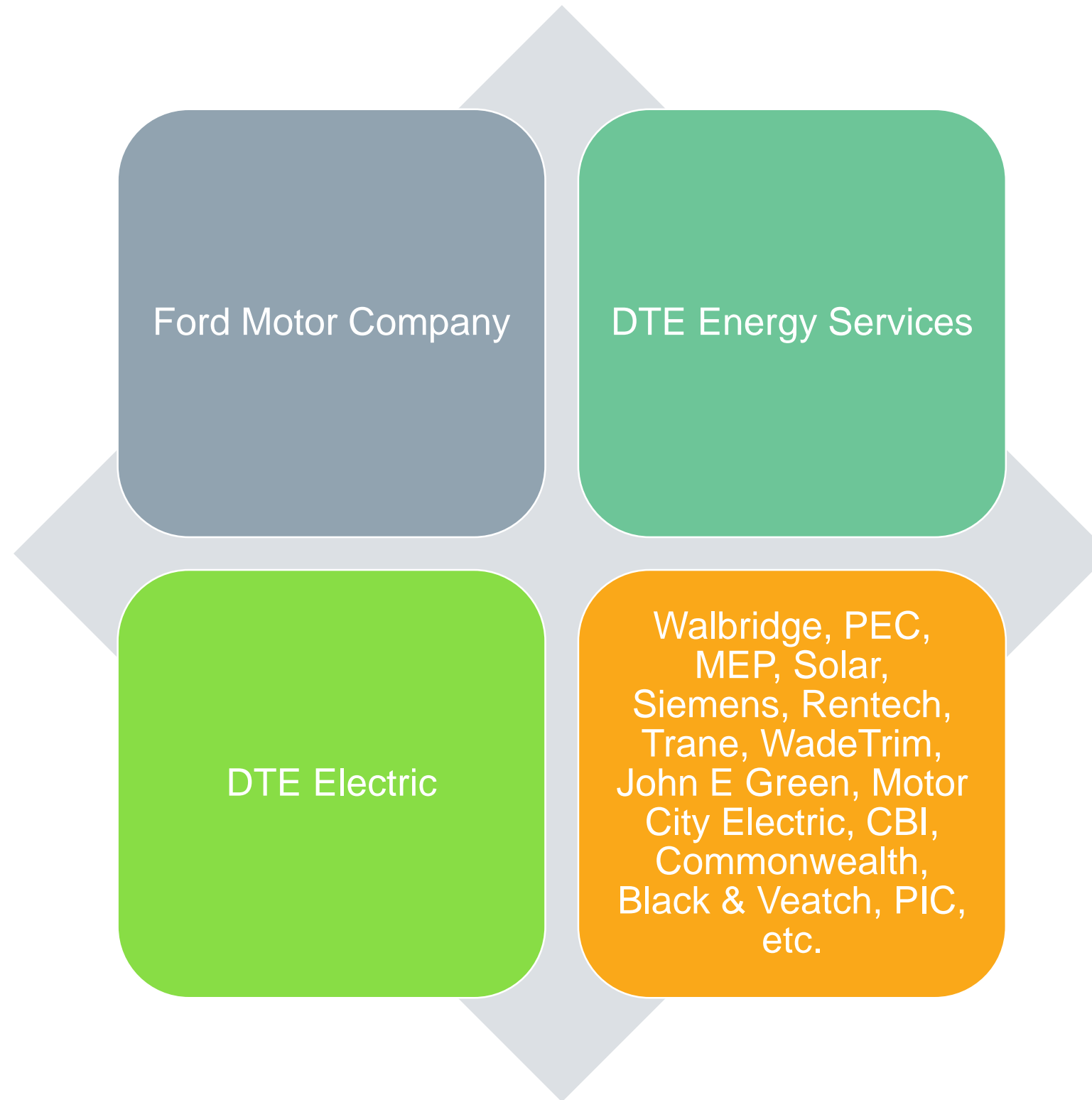


**WHY**



**HOW**

# Who



# What

## Dearborn Campus

Modern  
campus in  
Dearborn, MI

Collocate  
30,000  
employees

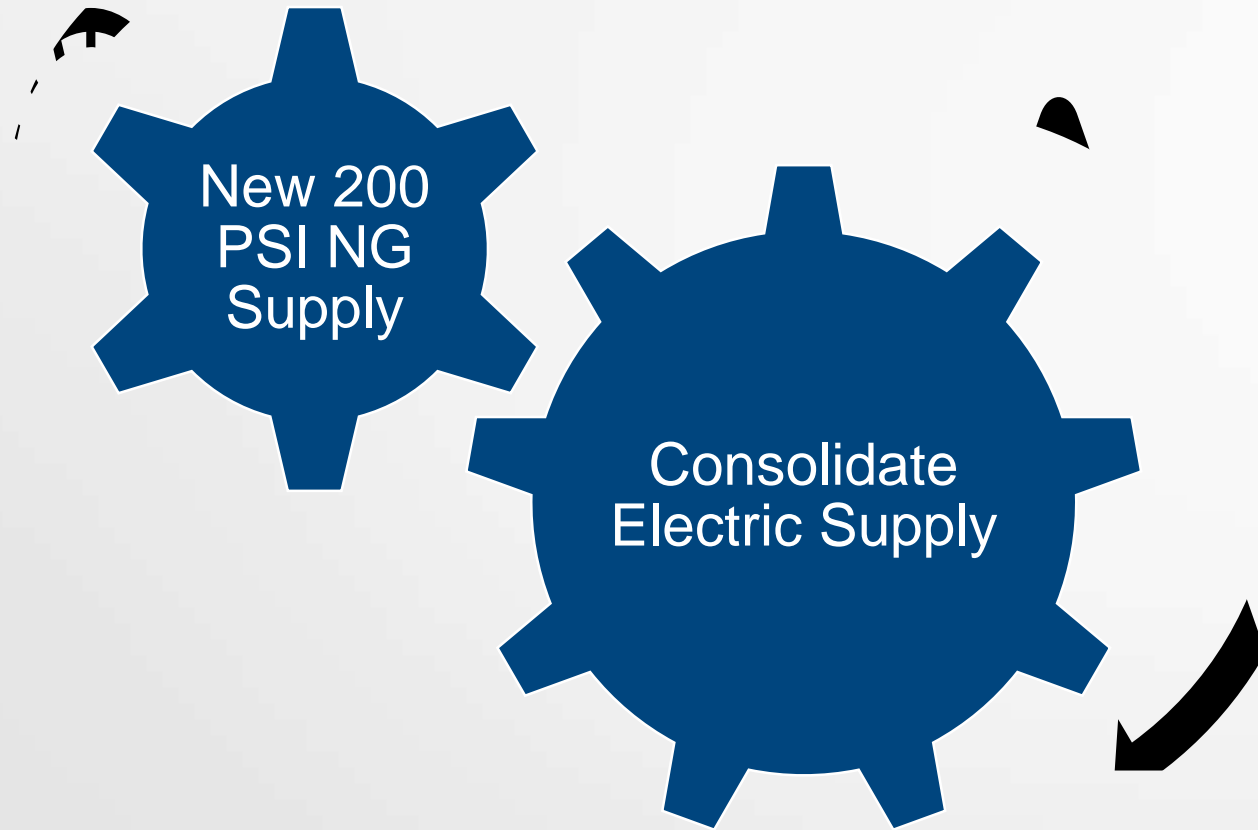
Improve  
overall  
efficiency

Improve  
reliability



# What

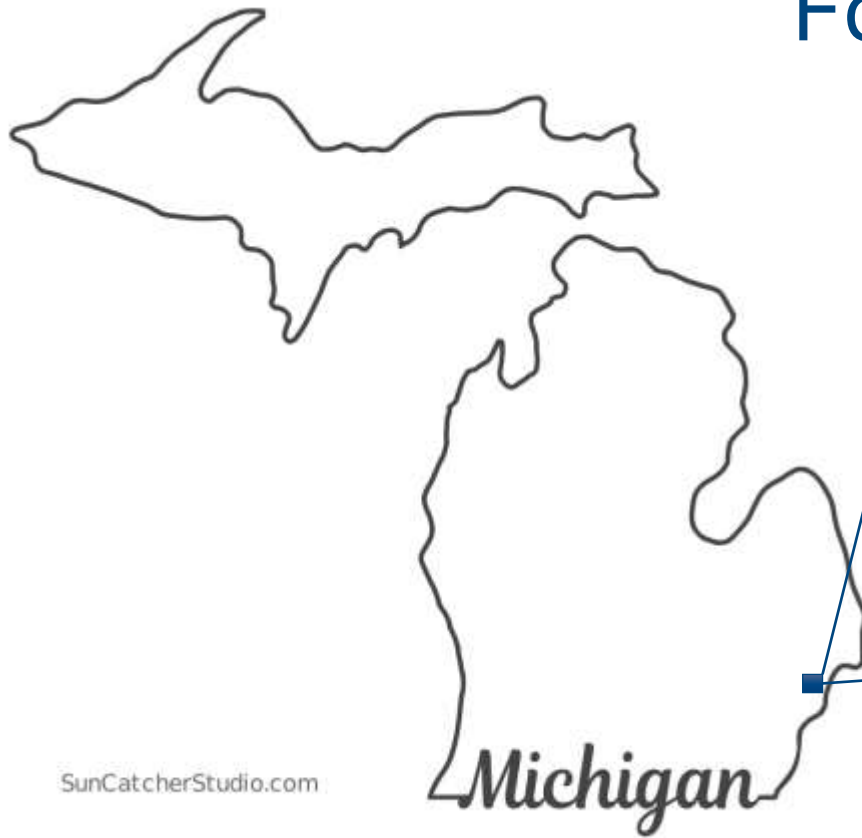
Utilities Upgrades:





# Where

Ford Dearborn REC



DTE Dearborn CHP

SunCatcherStudio.com



# What

## Project Goals

# Retiring Elm Street Steam Plant

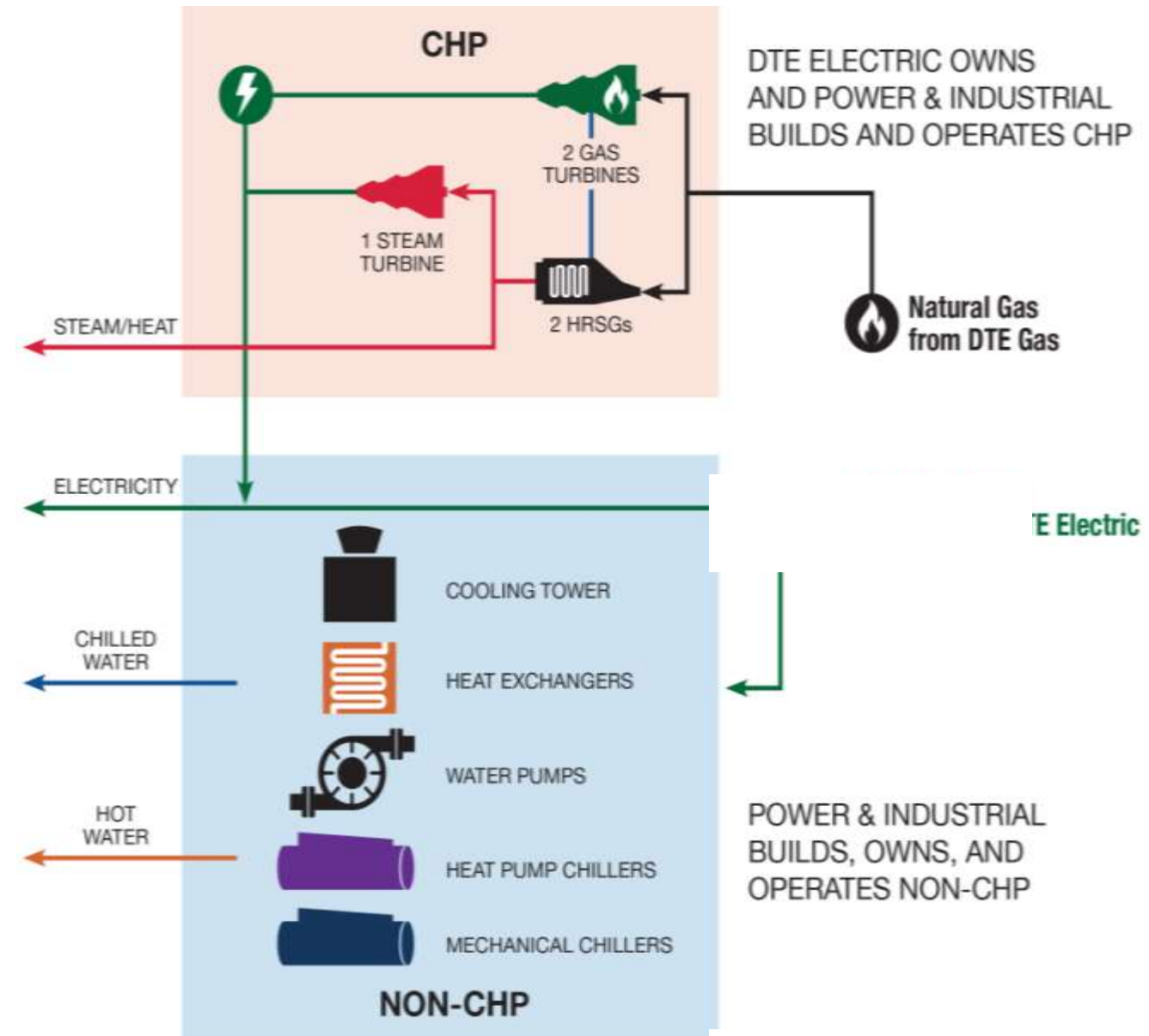
New 40,000 ton-hr thermal energy storage tank

New CHP with up to 225 k-lb/hr steam

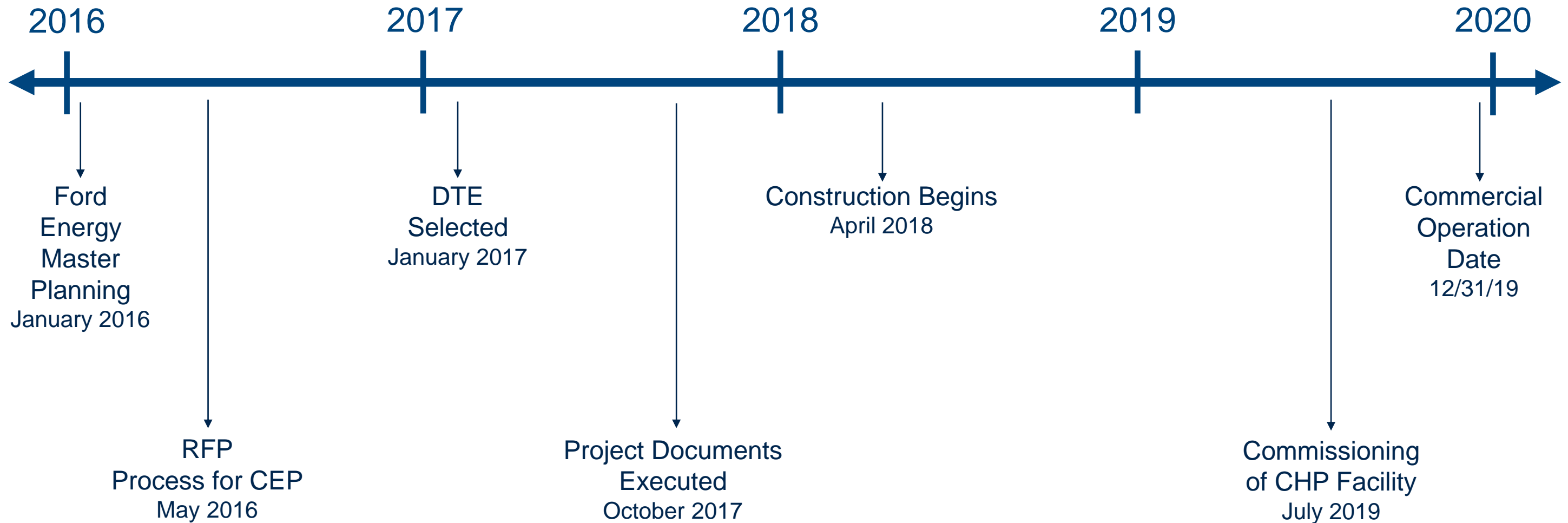
New 16,000 ton chilled water

and 34 MW electricity production

New 156 MMBtu/hr hot water



# When



# Why

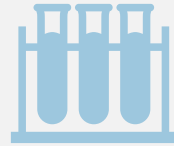
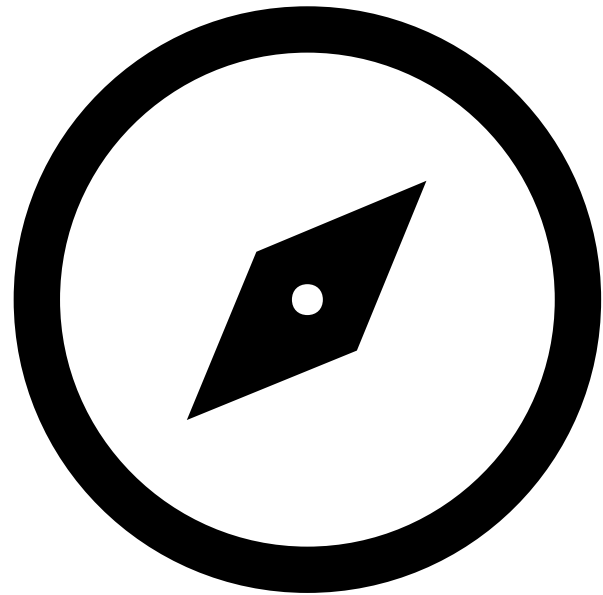
## Ensure N+1 reliability for Utilities Supply:

- Improve energy supply resilience
- Dual fuel generation to serve the campus (NG and diesel)
- Improve campus energy efficiency and carbon footprint (70,000 tons of annual carbon emissions reduction)

## Use co-design process to ensure risk mitigation and cost control

- Joint review of capital equipment selections and overall design
- Outsourced operations to single purpose entity is built in
- State of the art facility (generation, renewable energy, integrated controls, N+1/islanding)

# How



...did the final solution materialize?



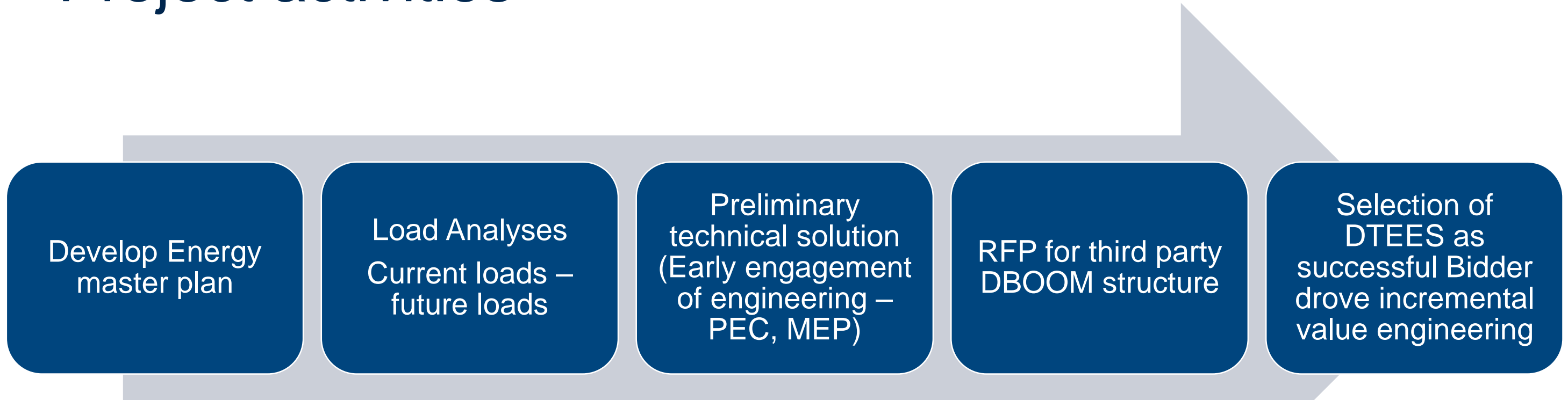
...did the participants realize value?



...is the project structured?

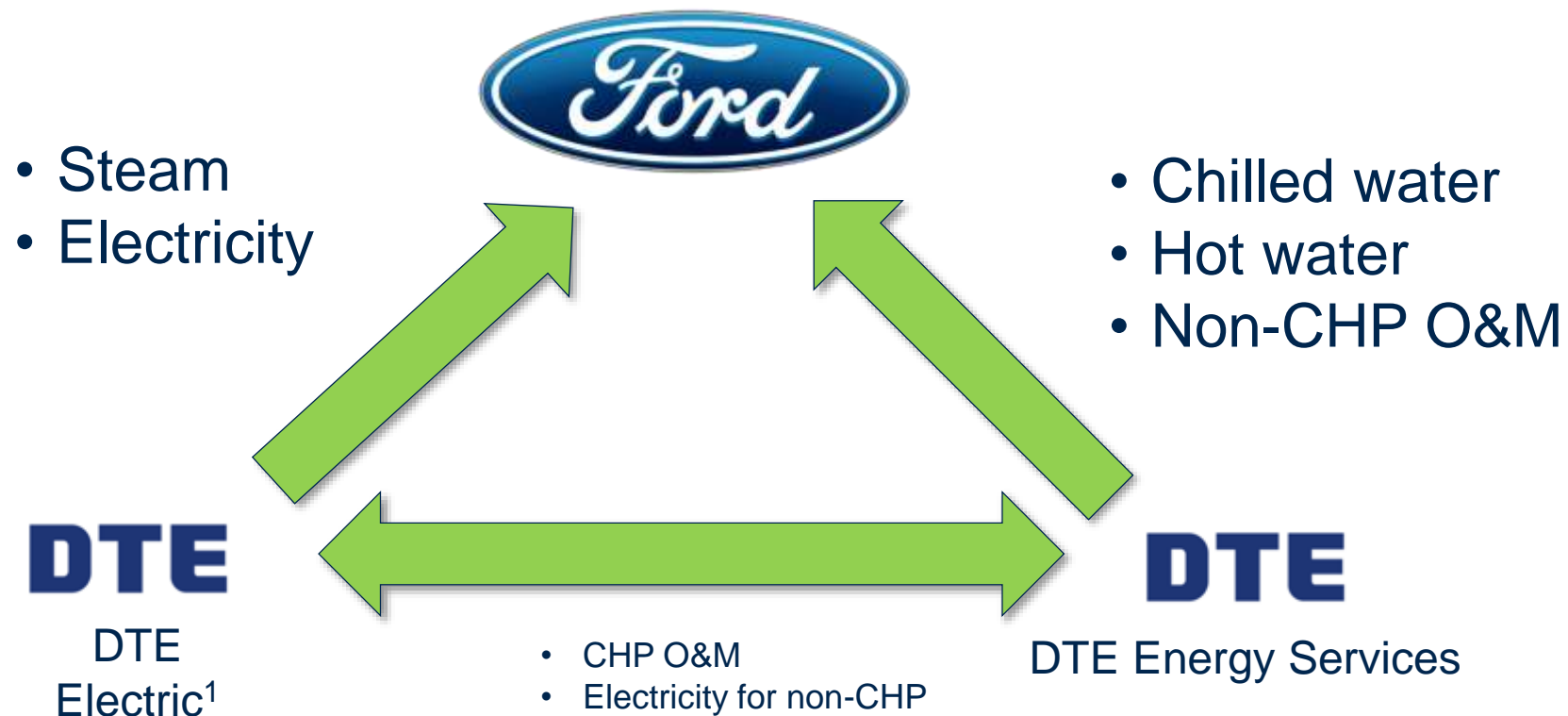
# How did the final solution materialize?

## Project activities



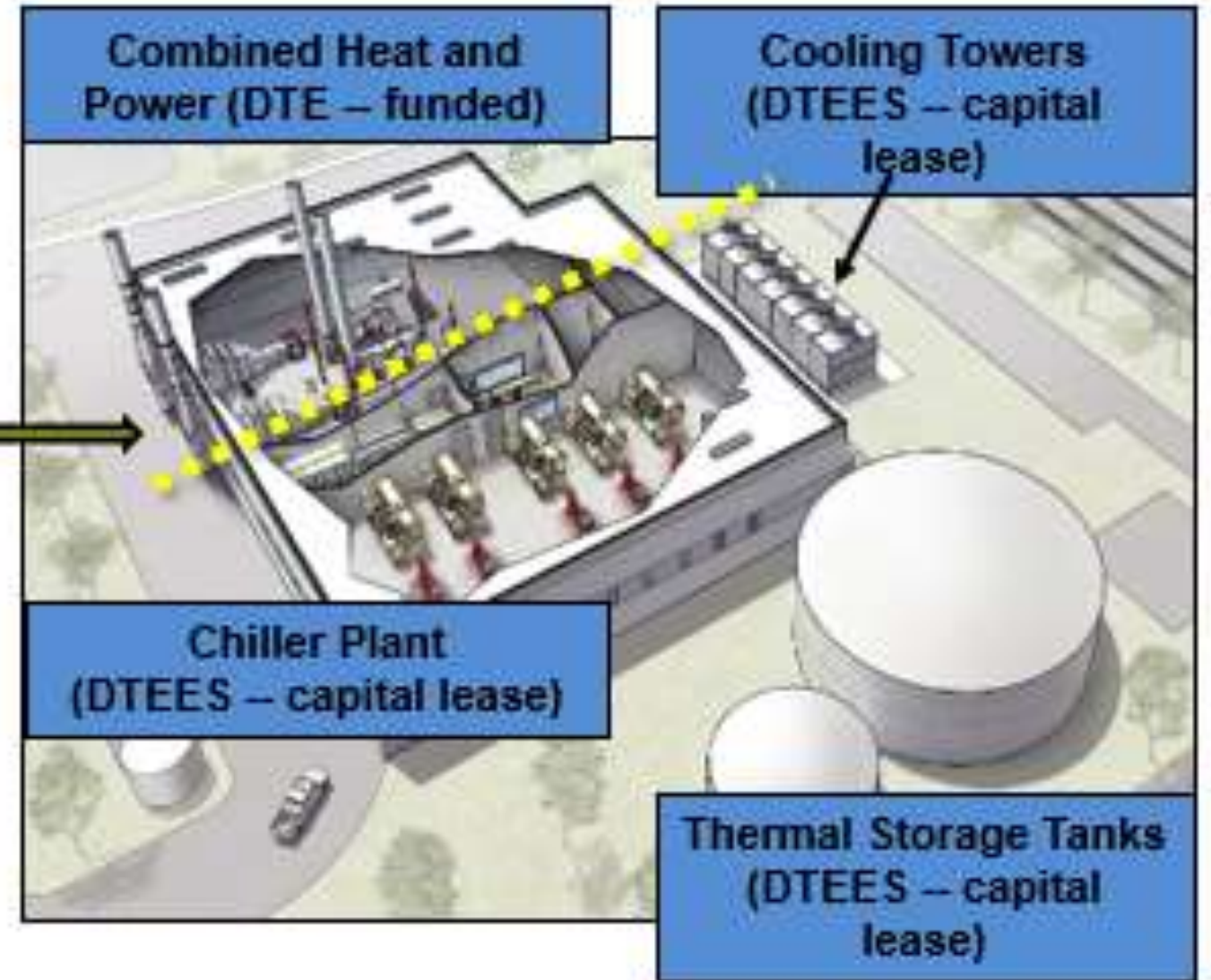
# How was the final solution structured?

The transaction involved collaboration between Ford, DTEE, and DTEES



\* While DTEE was directly involved in the three-way agreements, DTE Gas also supported the project by investing in a new gas main line and infrastructure to serve the CEP and the Dearborn campus

# Plant Features





# Plant Features



Solar Titan 130 Gas Turbine

Can Produce ~70,000 lbs/hr of steam when running exhaust gases through the HRSG.

# Plant Features

## 5 MW DRESSER-RAND CONDENSING STEAM TURBINE



While STG is dispatched the condensing unit can utilize heating hot water return from the Ford campus to generate free hot water.

# Plant Features



# Plant Features



Chilled water distribution through 42" supply and return lines

# Plant Features



Vilter Gas Compressors

# Plant Features

**TES TANK**

- Holds 5,300,000 gallons of water
- Diameter: 64' tall x 120' wide
- Tank was erected in 5 weeks
- Tank is designed for peak shaving (11:00 AM - 7:00 PM), and can supply 5,000 tons/hr of chilled water for 8 hours
- Cost of the tank is \$3,250,000
- ROI for the tank is less than 3 years



The diagram illustrates a cross-section of a large cylindrical tank. The top portion is filled with red liquid and labeled '55°F'. The bottom portion is filled with blue liquid and labeled '39°F'. A red pipe with an arrow pointing right exits from the top of the tank, and a blue pipe with an arrow pointing right exits from the bottom of the tank. The background shows a large, curved concrete structure and a modern building with a glass facade.

Thermal Energy Storage

# Plant Features



R-1233zd EcoWise Refrigerant with Ozone Depletion Potential (ODP) of Zero and Global Warming Potential (GWP) of 1.

# Plant Features



If Ford heating load is below the required cooling load of the STG, excess heat can be rejected to the Cooling Towers via this heat exchanger.



# Plant Features



Piping for chilled and hot water

# Plant Features



Preparation for Future Geothermal Pumps: Header Piping and Valves installed to allow for future geothermal connection while CEP is in operation.

# Plant Features



Digital Twin implementation was engineered and incorporated in this project.

# Plant Features



System Rendering for Future Operation

# Open for business in December 2019



*"Plant at Dusk"*

# Other Highlights



Invaluable Lessons learned



Non-CHP features – TES (5 million gallon CW storage (40k ton-hours)), steam to HW heat exchangers, geothermal-ready



Construction-driven innovations – 3D design, 3D Construction and 3D validation tools, tip-up panels, modular/skidded equipment, etc.



Operational-driven innovations – GT gantry crane pedestals, ice-melt system



Digital Twin Operations



LEED Gold/Platinum – many things make this plant unique

# Thank You!



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