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 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

- Ford Motor Company
- DTE Energy Services
- DTE Electric
- Walbridge, PEC, MEP, Solar, Siemens, Rentech, Trane, WadeTrim, John E Green, Motor City Electric, CBI, Commonwealth, Black & Veatch, PIC, etc.
Dearborn Campus

Modern campus in Dearborn, MI

Collocate 30,000 employees

Improve overall efficiency

Improve reliability
Utilities Upgrades:

- New 200 PSI NG Supply
- Consolidate Electric Supply
Where

Ford Dearborn REC

DTE Dearborn CHP
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

What
When

2016
- RFP Process for CEP May 2016

2017
- DTE Selected January 2017

2018
- Construction Begins April 2018
- Project Documents Executed October 2017

2019
- Commissioning of CHP Facility July 2019

2020
- Commercial Operation Date 12/31/19
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

- Develop Energy master plan
- Load Analyses
  - Current loads – future loads
- Preliminary technical solution
  - (Early engagement of engineering – PEC, MEP)
- RFP for third party
  - DBOOM structure
- Selection of DTEES as successful Bidder drove incremental value engineering

Behind-the-meter

In-front-of-the-meter
How was the final solution structured?

The transaction involved collaboration between Ford, DTEE, and DTEES

- Steam
- Electricity

- Chilled water
- Hot water
- Non-CHP O&M

* 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
Solar Titan 130 Gas Turbine
Can Produce ~70,000 lbs/hr of steam when running exhaust gases through the HRSG.
Plant Features

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

Steam can be sent to the following:

- **FORD CAMPUS - UP TO 225,000 LBS/HR**
- **STG - UP TO 90,000 LBS/HR**
- **STEAM TO HOT WATER HEAT EXCHANGERS**
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

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

OUTPUT OF THE UNITS IS 42° F ON THE CHILLED WATER SIDE AND 120° F ON THE HOT WATER SIDE
Preparation for Future Geothermal Pumps: Header Piping and Valves installed to allow for future geothermal connection while CEP is in operation.
Digital Twin implementation was engineered and incorporated in this project.
Plant Features

System Rendering for Future Operation
Open for business in December 2019
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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