University of Cincinnati Campus Energy Update: Projects and Developments

CIBO EE Meeting
September 21, 2022

Main Campus Footprint

- 31,650 student FTE
- ~10,000 faculty & staff
- 236 acres
- 106 buildings
- 7,633,260 square feet
- Academic, residential, athletic

next lives here

University of CINCINNATI

East Campus Utility Plant

next lives here

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Central Utility Plant

next lives here

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University of Cincinnati Utilities

Utilities Services Include Annual Production/Distribution of:

- 297 million kilowatt hours of electric
- 864 million pounds of steam primarily for heating
- 67 million ton hours of chilled water for air conditioning
- 944 million gallons of domestic water

Utilities Distribution Network:

- 35,509 linear feet of steam pipes
- 32,889 linear feet of chilled water pipes
- 13,947 linear feet of utility tunnels

Utilities Equipment

Electricity:

- Two Solar Titan 130 gas/oil-fired 12.5 MW combined cycle turbines
- Two 98.5 MMBtu/hr gas-fired HRSGs + shared 21.5 MW STG
- Four diesel peaking generators (1.5, 2, 2, and 2.7 MW)

Steam:

- Four gas/oil-fired boilers (200, 200, 99.8, and 60 MMBtu/hr)

Chilled Water:

- Two gas-fired chillers (1,850 tons each)
- Thirteen electric chillers (2,000 – 5,200 tons)

Emissions Monitoring System:

- Predictive (PEMS) – CTGs and 200 MMBtu/hr boilers

Sustainability Commitments

50% Carbon Reduction by 2030

(Cincinnati 2030 District)

Carbon Neutral by 2075

(American College University Presidents' Climate Commitment)

Implemented Initiatives

Increased Energy Efficiency:

- CTGs (2003) – 2,000,000 RECs generated since installation
- 6.8 MMgal capacity underground chilled water storage (2008)

Fuel Changes:

- 1.5 MW peaking generator permitted for up to 10% blend of biodiesel (2010)
- Coal boilers converted to wood pellets (Boiler MACT), solid fuel boilers removed (2018)

Current Initiatives

Increased Energy Efficiency:

- Replacement of aging chiller equipment with state-of-the-art magnetic bearing multi-compressor smart chillers (three 2,400 ton units 2019-2020, two 1,000 ton units 2023)

Current Initiatives

Purchase of Green Power:

- Purchase of 100% renewable (wind) power for four regional campuses + satellite properties (2018) – reduction of ~25,000 tons CO_2 annually

Increased Energy Efficiency:

- Implementing OSI PI (2024)
  - Single platform for utility and building data will help identify opportunities for energy savings
  - Real-time data on occupancy and other conditions will allow more efficient scheduling of heating and cooling
  - Building dashboards will enhance student and staff engagement

Fuel Changes:

- Ongoing electrification of utility fleet

Future Initiatives/Considerations

Solar Power (Clermont Campus) – 1.5 MW Array:

- Have usable acreage and interested partner

Biodiesel/Diesel Blending:

- Biodiesel available and units capable of doing
- Minimal oil usage so minimal impact (Boiler MACT + permit limits)
- PEMS

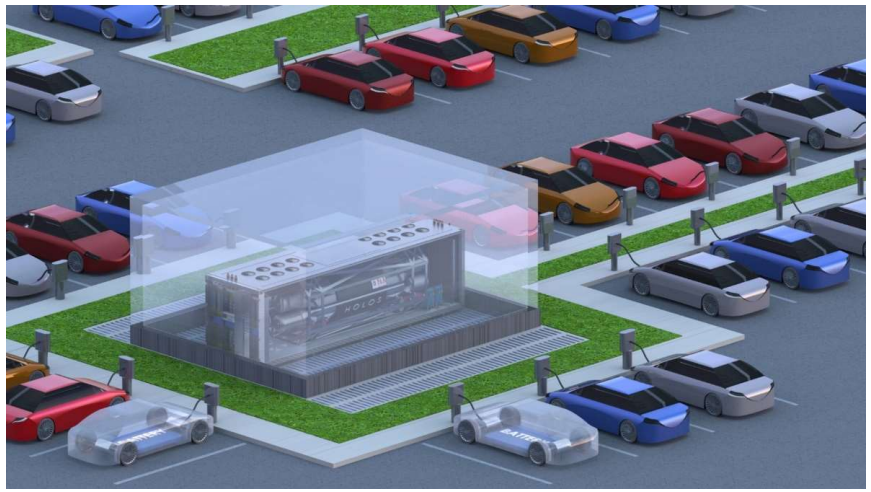
Hydrogen/Natural Gas Blending (CTGs):

- Units capable of doing
- Hydrogen supply/storage
- PEMS

Future Initiatives/Considerations

Small Nuclear Micro-Reactors:

- Optimal carbon reduction power production technology
- Engaged engineering students and faculty
- Compact urban campus
- Technology still developing, $$$$$$



Recognition

2020 AEE International Institutional Energy Management Award

2020 AEE Region III Innovative Energy Project of the Year

2020 AEE Region III Energy Manager of The Year

Midwest Sustainability Summit Innovation Award

AEE Southwest Ohio Chapter Institutional Energy Management Award

2022 AEE International Energy Manager of the Year

2022 AEE Region III Institutional Energy Management Award

Thank you!

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