Advancing the Milwaukee Regional Medical Center Thermal Systems

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Mike Burns, Ever-Green Energy (Operator)
Introduction – What is MRMC?

Both a company and a location

• Company
  - Consortium composed of 6 members operating on the campus.
    • Froedtert Memorial Lutheran Hospital
    • Children’s Hospital of Wisconsin
    • The Medical College of Wisconsin
    • Blood Center of Wisconsin
    • Milwaukee County Behavioral Health
    • Curative Care

  - Provides central planning, shared services, and infrastructure for the member entities
Introduction – What is MRMC?

Both a company and a location

• Location
  - 250 acre Milwaukee Regional Medical Center campus
  - Part of original “Milwaukee County Grounds” which provided a variety of county-delivered services starting in the 1850s

• Among those county-provided services was district heating and district cooling to buildings on the campus
Introduction – The Original System

• Campus Thermal Energy Systems
  - Built by County in 1955 as coal-fired steam with steam turbine electric generators
  - Chilled water added in 1970s
  - Purchased by the local electric utility in late 1990s

• Acquired by MRMC Thermal, a wholly-owned subsidiary of MRMC, in April 2016
  - MRMC and its members had a vision for the thermal energy systems that serve the campus
## Introduction – Goals for the MRMC Thermal Initiative

### Aspirations for a Steam and Chilled Water Future

<table>
<thead>
<tr>
<th>Redundancy</th>
<th>A second plant to provide continuous supply of critical thermal service with geographic source diversity, on site alternate fuel backup</th>
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<tbody>
<tr>
<td>Reliability</td>
<td>Investment in plant and distribution infrastructure to enhance uninterrupted, consistent source of thermal service</td>
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<td>Environmental</td>
<td>Reduce noxious emissions through elimination of coal</td>
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<td>Growth</td>
<td>Creating capacity for growth including and beyond the new Center for Advanced Care at Froedtert &amp; The Medical College of Wisconsin POB</td>
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<td>Transparency and Control</td>
<td>Engaging member organizations in decision making from the source to the user to align clinical, economic, &amp; accreditation values in decision making</td>
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<td>Rate</td>
<td>Improved rates for steam and chilled water</td>
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What Was Done? - Steam

• Installed four temporary natural gas and distillate oil steam boilers
• Demolished three existing coal-fired stoker grate steam boilers and one existing (1960s-vintage) natural gas steam boiler including ESPs and fuel conveyors
• Demolished three steam turbine electric generators
• Installed four permanent 70,000 pph 135 psi natural gas and oil-fired boilers
• Installed emergency diesel generators to provide full steam capability on loss of offsite power
• Installed fuel oil storage to assure continuity of operation
• Separated production capacity between two facilities
What Was Done? – Chilled Water

• Upgraded electrical feeders and all plant electrical switchgear to increase power supply diversification
• Installed emergency diesel generators to provide more than half of the peak cooling load
• Replaced chillers
  - Removed five 1000 ton absorption chillers
  - Installed three 2500 ton centrifugal chillers – two with VFD-drives
  - Installed new cooling towers and pumping
• Separated production capacity between two facilities
Introduction – A Starting Point
What Was Done?

- North Plant Expansion
- Main Fuel Storage
- New Pump house
- New Cooling Tower
- West Plant Emergency Generators
- Stair tower
- Elevated steam line
- New Cooling Tower
- East Plant Emergency Generator
- New Vault (Condensate)
- Main Entry
Chilled Water Distribution - 2016
Chilled Water Distribution - 2018
Steam Distribution - 2016
Steam Distribution - 2018

[Map showing steam distribution network with labels for existing and new infrastructure.]
How Was It Done?
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Questions?

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West Plant - Initial
West Plant - Rendering