DTE RETRO-COMMISSIONING AT BEAUMONT

4/18/2018
ABOUT BEAUMONT HEALTH

Beaumont Health is a not-for-profit organization formed in September 2014 by Beaumont Health System, Botsford Health Care and Oakwood Healthcare to provide patients with extraordinary, compassionate care, no matter where they live in southeast Michigan.

The organization consists of eight hospitals with 3,429 beds, 187 outpatient sites, nearly 5,000 physicians, 38,000 employees, and 3,500 volunteers.
+187 outpatient sites
ENERGY MANAGEMENT AT BEAUMONT HEALTH

2016
- Start of current program.
- Set initial energy and cost savings targets.
- Focused on investigating energy saving opportunities at founding Beaumont hospitals and Farmington Hills additions.
- Started DTE Retro-Commissioning at Royal Oak, Troy and Grosse Pointe.

2017
- Finalized Beaumont Health Energy Policy.
- Completed major LED retro-fit.
- Finalized DTE Retro-Commissioning of Royal Oak and Grosse Pointe.
- Added founding Oakwood hospitals into program.

2018
- Finalized DTE Retro-Commissioning of Troy.
- Enrolled all 8 hospitals into the DTE Hospital Strategic Energy Management Pilot Program.
- Have facilities operator attend Building Operator Certification training.
- Start monitoring based commissioning program (pending funding).
- Further LED installations, though generally much smaller scope than in 2017.
- Complete incorporating energy efficiency standards into design specifications.
ENERGY MANAGEMENT AT BEAUMONT HEALTH: CURRENT GOAL

Reduce energy costs of all 8 hospitals by $4,000,000, or by 17% relative to a 2015 baseline, by 2021 while improving patient, family, and medical staff comfort, health, and safety.
ENERGY MANAGEMENT AT BEAUMONT HEALTH: PROGRESS TO DATE

Projected progress towards cost savings goal due to complete and ongoing projects:

<table>
<thead>
<tr>
<th>Building or Campus</th>
<th>% Towards Savings Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dearborn</td>
<td>44%</td>
</tr>
<tr>
<td>Farmington Hills</td>
<td>109%</td>
</tr>
<tr>
<td>Grosse Pointe</td>
<td>52%</td>
</tr>
<tr>
<td>Royal Oak</td>
<td>54%</td>
</tr>
<tr>
<td>Taylor</td>
<td>77%</td>
</tr>
<tr>
<td>Trenton</td>
<td>66%</td>
</tr>
<tr>
<td>Troy</td>
<td>71%</td>
</tr>
<tr>
<td>Wayne</td>
<td>43%</td>
</tr>
<tr>
<td>Total</td>
<td>58%</td>
</tr>
</tbody>
</table>

Projected annual and cumulative savings from complete and ongoing projects:

- **2016**: $1,000,000
- **2017**: $2,000,000
- **2018**: $3,000,000
- **2019**: $4,000,000
- **2020**: $5,000,000
- **2021**: $6,000,000

Cumulative

Annual
ENERGY MANAGEMENT AT BEAUMONT HEALTH: PROGRESS TO DATE

Anticipated energy **cost reduction ($$$)** from completed and ongoing projects by ECM source:

- Lighting: 34.38%
- Controls: 21.35%
- Cooling: 25.30%
- Heating: 12.68%
- Envelope: 0.12%
- Process: 0.28%

Anticipated energy **demand reduction (MBH)** from completed and ongoing projects by ECM source:

- Lighting: 17.40%
- Heating: 24.96%
- Cooling: 12.32%
- Envelope: 0.27%
- Process: 0.17%
- Air Handling: 5.89%

Mostly DTE RCx, kWh and Therms combined
**WHAT IS DTE RETRO-COMMISSIONING?**

<table>
<thead>
<tr>
<th>What it is</th>
<th>Program requirement</th>
<th>What you get</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Free, fully-funded study of your facility.</td>
<td>• Facility is 75,000+ sf.</td>
<td>• Investigative retro-commissioning study fully funded by DTE Energy</td>
</tr>
<tr>
<td>• Identifies low-cost, energy saving operational improvements.</td>
<td>• DTE Electric customer.</td>
<td>• Study valued at up to $80,000.</td>
</tr>
<tr>
<td></td>
<td>• Peak demand &gt;= 300 kW.</td>
<td>• Energy projects with a ROI of 18 months or less.</td>
</tr>
<tr>
<td></td>
<td>• Have an operational BAS – <em>not actually listed on DTE’s website.</em></td>
<td>• Energy savings of 1 – 2% of total electric spend.</td>
</tr>
<tr>
<td></td>
<td>• <strong>Willing to spend $5,000 - $25,000 based on size of facility.</strong></td>
<td></td>
</tr>
</tbody>
</table>

[http://dteenergyrcx.com/](http://dteenergyrcx.com/)
DTE RETRO-COMMISSIONING PROCESS

1. Customer Engagement
   Customer concern sparks revelation and engagement. Customer and Service Provider complete an application.

2. Review & Kick Off Meeting
   Application is reviewed and approved. Customer and Service Provider review project goals, timeline and responsibilities.

3. Investigation & Implementation
   Customer chooses energy savings projects. Contractor implements selected projects.

4. Quantify Results
   Service Provider verifies savings.

http://dteenergyrcx.com/details.html
DTE RETRO-COMMISSIONING AT BEAUMONT

- Enrolled 3 hospitals in 2016.
- Used three separate service providers.
- Overall process lasted ~18 – 22 months.
What is a good retro-commissioning measure?

- Equipment function optimization (sequence of operation enhancement).
- Equipment maintenance item.
- **RCMs should be funded out of an expense budget, not out of a capital!**

### Table 5 Verification Phase (Post-Implementation) Savings Summary - Total

<table>
<thead>
<tr>
<th>RCM No.</th>
<th>Measure Description</th>
<th>Peak Electric Demand Savings (kW/mo)</th>
<th>Electrical Energy Savings (kWh/yr)</th>
<th>Electrical Cost Savings ($/yr)</th>
<th>Natural Gas Energy Savings (ccf/yr)</th>
<th>Natural Gas Cost Savings ($/yr)</th>
<th>Implementation Cost ($)</th>
<th>Simple Payback (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Economizer and Outdoor Air Control</td>
<td>0.0</td>
<td>844,804</td>
<td>$61,147</td>
<td>55,115</td>
<td>$26,124</td>
<td>$24,824</td>
<td>0.28</td>
</tr>
<tr>
<td>2</td>
<td>Supply Air Temperature Reset</td>
<td>0.0</td>
<td>251,735</td>
<td>$18,221</td>
<td>73,572</td>
<td>$34,873</td>
<td>$10,443</td>
<td>0.20</td>
</tr>
<tr>
<td>6</td>
<td>Econ/DAT Reset – Additional Measures</td>
<td>0.0</td>
<td>153,574</td>
<td>$11,116</td>
<td>45,606</td>
<td>$21,617</td>
<td>$7,650</td>
<td>0.23</td>
</tr>
<tr>
<td>7</td>
<td>Supply Air Temperature Reset - Economizer Optimization</td>
<td>0.0</td>
<td>193,483</td>
<td>$14,004</td>
<td>76,011</td>
<td>$36,029</td>
<td>$9,955</td>
<td>0.20</td>
</tr>
<tr>
<td>8</td>
<td>Supply Air Temperature Reset - Static Pressure Reset</td>
<td>0.0</td>
<td>38,184</td>
<td>$2,764</td>
<td>15,113</td>
<td>$7,164</td>
<td>$4,845</td>
<td>0.49</td>
</tr>
<tr>
<td>Electric &amp; Gas Total</td>
<td></td>
<td>0.0</td>
<td>1,481,780</td>
<td>$107,252</td>
<td>265,417</td>
<td>$125,807</td>
<td>$57,717</td>
<td>0.25</td>
</tr>
</tbody>
</table>

Please note this customer is a DTE electricity and Consumers energy gas customer, the gas savings are not claimed for DTE.

Most effective RCMs for Beaumont:

- Economizer operation optimization.
- Supply air temperature reset by 5F in non-critical areas.
- Lowering ventilation rates to meet current code.
- Condenser water reset at chilled water plant.
**DTE RETRO-COMMISSIONING: RESULTS**

<table>
<thead>
<tr>
<th>Hospital</th>
<th>% Electric Savings</th>
<th>% Natural Gas Savings</th>
<th>% Overall Savings</th>
<th>Utility Cost Savings</th>
<th>Infrastructure Expense to Implement RCMs</th>
<th>ROI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beaumont Hospital, Royal Oak</td>
<td>1.3%</td>
<td>5.1%</td>
<td>3.5%</td>
<td>$201,799</td>
<td>$57,717</td>
<td>0.29</td>
</tr>
<tr>
<td>Beaumont Hospital, Grosse Pointe</td>
<td>0.7%</td>
<td>1.0%</td>
<td>0.9%</td>
<td>$11,172</td>
<td>$12,616</td>
<td>1.13</td>
</tr>
<tr>
<td>Beaumont Hospital, Troy</td>
<td>2.2%</td>
<td>7.5%</td>
<td>5.4%</td>
<td>$118,732</td>
<td>$22,746</td>
<td>0.19</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1.4%</strong></td>
<td><strong>5.4%</strong></td>
<td><strong>3.7%</strong></td>
<td><strong>$331,704</strong></td>
<td><strong>$93,079</strong></td>
<td><strong>0.28</strong></td>
</tr>
</tbody>
</table>

**Most effective RCMs for Beaumont Health:**

- Economizer operation optimization.
- Supply air temperature reset by 5°F in non-critical areas.
- Lowering ventilation rates to meet current code.
- Condenser water reset at chilled water plant.

**Biggest Surprise:**

- Natural gas demand savings exceeded electric demand savings!
DTE RETRO-COMMISSIONING: LESSONS LEARNED

Keys to Success:

• Know your service provider!

• Know your building automation system!
WOULD BEAUMONT DO DTE RETRO-COMMISSIONING AGAIN?

Yes!

But...
ACKNOWLEDGEMENTS AND THANK YOU

- DTE
- Our service providers:
  - Grumman Butkus Associates
  - Energy Sciences
  - Environmental Systems Design
- Beaumont management and staff at the corporate level and at each of the sites.