Spotlight 2019-2021: Best energy efficient projects

Dane Dillon
Emerson Merem
Energy Efficiency Program for Business

- MI Public Act 295 (2008)
  - Energy Optimization Surcharge
  - Cash incentives:
    - Target specific energy-saving equipment and technologies
    - Encourage energy-efficient building and systems design

- MI Public Act 341 & 342 (2017)
  - Increases the state's renewable energy portfolio
  - Increases energy efficiency expectations
    - 35% of electric needs to be met by EE & renewables
Total Projects Paid

- 2018: 4000
- 2019: 2729
- 2020: 2716
- 2021: 2322

Energy Efficiency Program for Business
Total Savings Claimed

<table>
<thead>
<tr>
<th>Year</th>
<th>MCF Savings (Gas)</th>
<th>MWh Savings (Electric)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>740,000</td>
<td>350,000</td>
</tr>
<tr>
<td>2019</td>
<td>680,415</td>
<td>322,062</td>
</tr>
<tr>
<td>2020</td>
<td>683,255</td>
<td>374,303</td>
</tr>
<tr>
<td>2021</td>
<td>825,387</td>
<td>455,792</td>
</tr>
</tbody>
</table>

*We've hit our goal every year! Fluctuates based on energy portfolio demand utility*
DTE Energy Efficiency Program for Business

2019-2021 summary:

- Ann Arbor Public Schools
- Indoor Agriculture: C3 Industries
- SOZO
- Corteva
- Roskam Bakery
Ann Arbor Public Schools

• Covering 125 square miles (320 km2)
• District consisting of:
  – 19 elementary schools
  – 2 K-8 schools
  – 5 middle schools
  – 5 high schools
  – 1 preschool
• 4th largest school district in Michigan
  – 640+ acres of real estate, 3.5 million square feet of building space
Ann Arbor Public Schools- Building Management System

• Installing and Upgrading BMS at 27 locations
• Monitor, control and optimize performance of HVAC equipment
• Metasys by Johnson Controls
Ann Arbor Public Schools - Building Management System
Ann Arbor Public Schools- Building Management System
Ann Arbor Public Schools - Results

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Measure description</th>
<th>Annual energy savings</th>
<th>Unit</th>
<th>Total incentive</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Chiller Tune-up</td>
<td>69,097</td>
<td>kWh</td>
<td>$10,357</td>
</tr>
<tr>
<td>2</td>
<td>Lighting</td>
<td>8,873</td>
<td>kWh</td>
<td>$582</td>
</tr>
<tr>
<td>27</td>
<td>Building Management System</td>
<td>2,741,742</td>
<td>kWh</td>
<td>$92,686</td>
</tr>
</tbody>
</table>
Ann Arbor School Testimonial

“The Ann Arbor community recognizes that we all have a role to play in reducing energy waste and minimizing harmful emissions, so it only made sense that the children in this community learn the value of energy efficiency at a young age.”

- Emile Lauzzana, Executive Director of Physical Properties
Indoor agriculture
Cannabis industry

- Michigan Regulation and Taxation of Marijuana Act (passed 2018, enforced December 2019)

- Some of the largest energy usage at these facilities
  - 24/7 HVAC
  - 12 to 18 hr/day lighting
Cannabis industry

Indoor agriculture projects submitted to DTE

- **2019**: 1 paid project, $99,330.52 paid, 1.986 million kWh saved
- **2020**: 9 paid projects, $744,000 paid, 15 million kWh saved
- **2021**: 103 paid projects, $4.73 million paid, 81.5 million kWh saved

Greenhouse gas emissions avoided since 2019 – eliminating 15,197 passenger cars from the roads.
SOZO

• 1st Cannabis company to partner with our program
• Installed LED Lights and efficient HVAC equipment
  – LED grow lights recently added to DLC site
• Used reverse engineering to capture savings
SOZO - Lighting

• 3 Tier lighting system
• Flower room
  – 994 631W LEDs ~ 994 1,100 DE HPS (prescriptive measure)
• Veg Room
  – 336 345W LEDs ~ 672 8L 4' T5 HO (custom measure)
SOZO - Lighting
SOZO - HVAC

• Interactive effect from LEDs due to loss of heating load
• Electric: 22 VFDs on units, dehumidifier and economizers, complete BMS
• Gas: Insulation and water heating
SOZO - Results

<table>
<thead>
<tr>
<th>Project Phase (year)</th>
<th>Total kWh savings</th>
<th>Cost Energy Savings (assuming $.10 per kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (2019)</td>
<td>1,986,610.32</td>
<td>$198,661.03</td>
</tr>
<tr>
<td>2 (2020)</td>
<td>1,331,134.6</td>
<td>$133,113.46</td>
</tr>
<tr>
<td>3 (2021)</td>
<td>3,003,126.52</td>
<td>$300,312.65</td>
</tr>
</tbody>
</table>

Simple pay back of 3.4 years
Cloud Cover Cannabis (C3)

• Installed 50% LEDs, kept 50% HPS
  – Need to achieve their ROI (return on investment) on previous fixtures
  – Unexpected additional benefits

• Implemented most efficient HVAC systems in the market as well as building management systems
C3 - System upgrades

VFDs on RTUs

Building Management System
C3 - Energy savings calculations through simulation

• Kelley Energy Management
  – Has uncovered 150GWh+ of savings thus far using simulation software
  – 60% through HVAC, 40% through lighting
  – Can simulate retro-fits and new construction projects
Trane Trace 3D Plus Software

- Based on the Energy Plus software through the Department of Energy (pictured on the left)
- Ability to input all internal/external variables: weather data, construction materials, demand loads for occupancy, desired environmental conditions, all system loads, etc.
C3 - Results

- 2.273 GWh Saved

- $227,307.81 Energy Cost Savings  
  (assuming $.10 per kWh)
Future of indoor agriculture industry

- Both companies have more projects down the pipeline
- Continuing to see projects coming in the door
- New technology emerging every day
Variable Frequency Drive (VFD)

• Lighting upgrades
• HVAC upgrades
  – Install VFD
    • Probably most efficient
    • Competitive cost
    • Grouping multiple motors may provide higher savings

• Prescriptive or custom
Corteva

• Agricultural chemical and seed company
• Unit of Dow DuPont
• Innovation and sustainability
Corteva – Agitator motors

• (3) Large motors
• 11 GWh annual energy usage
• Custom vs prescriptive approach
Corteva – Variable Frequency Drives (VFD)

- VFD's installed on agitator motor
  - Soft start up
  - Programmable ramp-up and max speed
Corteva – Results

• Simple pay back period: 14 months
• 2.2 GWh energy saved
• $228,000 cost savings per year
"This program helps to build an “act like owners” mindset internally when building the scope of a project. This also allows individuals to promote additional projects as they prove current and future cost and energy savings."

– Kevin Ramsey, Product Specialist
Roskam Baking

- Large freezer facility for storing and shipping food
  - Room set at -5 degrees Fahrenheit

- Goal: Use waste heat from the compressors cooling the facility to heat the floors
Roskam – HVAC

• Heat Recovery System – Refrigeration Compressors 350HP & 400HP
Roskam - Installation process
Roskam - Results
Roskam - Results

186 MCF Savings from efficient refrigeration condensers with waste heat recovery space heating
“...it was really a front-end design selection that has been fairly hands off and helped save energy and will continue to do so over the life of the asset..."
Noteworthy projects

• Wayne County Airport Authority
  – Terminal bag belt
    • VFD on motors
    • Over 12 miles of conveyor belt
Noteworthy projects

10 GWh <> 10,602,275.09 kWh
Noteworthy projects

10 GWh <> 10,602,275.09 kWh

141 kWh
Noteworthy projects

131,676.29 MCF
Noteworthy projects

131,676.29 MCF → 0.428 MCF
Key areas for savings (untapped markets)

• Lighting – Exterior HID
• Data centers – CRAC units
• Grocery stores – Refrigeration / condenser
• New Construction
  – LPD
  – Lighting controls
  – LEED (Platinum, Gold, Silver & Certified)
Thank you!

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