KEEPING UP WITH THE SOLAR LANDSCAPE IN OHIO
& Leveraging Onsite Power to Reduce Operating Cost

August 28, 2018

Presenters: Tom Armstrong & Jason Slattery
About Arcadis and GEM Energy

• Arcadis serves many communities throughout Ohio to provide safe and secure water and wastewater technology that is designed and built to withstand the demands of a rapidly changing world. From source to tap and then back to nature, the planet’s most precious resource should be cherished.

• GEM Energy provides multiple services and technologies to improve customer business performance and reduce facility operation costs. The company is part of the Rudolph Libbe Group, a one-stop provider of construction and facility services that range from site selection and construction to energy solutions and ongoing facility management.
Agenda

• Current Status of Ohio Energy Policy
• Options to consider for an Onsite Power Generating System
• A look at the financial variables related to an Onsite System
• Review several case studies
Energy Market in Ohio

Partly Sunny…

• 2008 Alternative Energy Portfolio Standard (AEPS) – Senate Bill 221
  • Including 12.5% energy from Renewables by 2025 via an annual ramp up
Energy Market in Ohio

Then, Frozen…
• 2014 Senate Bill 310
  • Froze the multi-year renewable ramp up plan for 2 years
Energy Market in Ohio

Now, Sunny again in 2018…
• …Freeze has been lifted!
• New governor – all candidates pro energy
• HB114
  • Mercantile opt out for large users
  • Wind set backs
  • Reduction of RPS percentages
• Bankruptcy of First Energy Solutions
• Retirement of Coal Plants
What doors does this open??

• More economical to add on-site power
• Larger generating systems allowed
• More credits/subsidies available
• Opportunity to lock in long term electric rates
What size and type of options?

• Up to 5 megawatts (MW) behind the electric utility meter (net meter in Ohio)
  • Installed close to the load that will consume the generated power
  • 5 MW = ~525 houses = ~6,700 total HP
• Renewable energy sources
  • Solar – ground, roof, walkway cover/ elevated structure
  • Combined Heat & Power (CHP)
  • Biomass
  • Wind
• Storage options – backup; peak load; short backup
Ground Mount  
Roof Mount  
Walkway/Carport
Combined Heat & Power (CHP)

9.3 MW installed generation
127,000 metric tons of avoided CO₂ emissions as of 2017
30 customer sites
103 Capstone microturbines in use
$31.7mm in total electricity expense avoided
Gasoline prices at the pump – have they remained low?

If only you could lock in your rate...

Save $1MM over 20 years with Solar
Natural Gas & Crude Oil – Volatile commodities

Lots of Volatility; Little Correlation

- Brent Crude Oil Spot Price % Change
- Henry Hub Natural Gas Spot Price % Change

Source: EIA

© Arcadis 2018
# Utility Procurement

<table>
<thead>
<tr>
<th>NATURAL GAS CUSTOMER</th>
<th>Estimated Term MMBTU's</th>
<th>Term (Month's)</th>
<th>Term Savings</th>
<th>% Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel Fabrication Plant</td>
<td>54,870</td>
<td>36</td>
<td>$51,089</td>
<td>63.7%</td>
</tr>
<tr>
<td>Commercial Office Building</td>
<td>3,000</td>
<td>12</td>
<td>$2,881</td>
<td>42.6%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ELECTRICITY CUSTOMER</th>
<th>Estimated Term kWh's</th>
<th>Term (Month's)</th>
<th>Term Savings</th>
<th>% Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Union Hall</td>
<td>830,167</td>
<td>34</td>
<td>$33,447</td>
<td>41.0%</td>
</tr>
<tr>
<td>Charter School</td>
<td>996,412</td>
<td>24</td>
<td>$7,489</td>
<td>11.4%</td>
</tr>
<tr>
<td>Full Service Media Distributor</td>
<td>1,451,720</td>
<td>12</td>
<td>$23,304</td>
<td>33.0%</td>
</tr>
</tbody>
</table>
What is next??

- System evaluation – space, location
- Load profile developed upfront
- Review existing electrical infrastructure for interconnection point
- Evaluate economics/rate structure
- Implement an on-site power project
Implement an Onsite Power Project

- D/B/B
- D/B
- No money down solutions
- Leases
- PACE funding
- Incentives
Ohio Northern University, Ada, OH
3 MW ground array covering 12 acres
Power Purchase Agreement (PPA) no-out-of-pocket solution
Generates 15% of ONU’s annual electricity needs
Toledo Zoo – Brownfield Development

2 MW on 22 acre former brownfield
Power Purchase Agreement (PPA) no-out-of-pocket solution
Generates 30% of the Zoo’s annual electricity needs
AEP Energy

6 MW on 35 acres
Watervliet, MI
DTE Energy

750 kW ground array
Romulus, MI
Owens Corning

2.4 MW carport array
Toledo, OH
Questions?

Thank you!