Lexington Avenue Pump Station’s Award Winning 1 MW PV System

• Ryan Christopher, PE
Agenda

- Project Background
- Project Goals
- Design Challenges
- Project Outcome
DuPage Water Commission

- Established in 1985 to ensure sufficient and economical water supply to DuPage County, IL
  - Serves almost 1 million people
- Wholesale agreements with 25 customers
- Purchases water from Chicago Department Water Management (CDWM)
  - Largest single customer of CDWM (average 80 mgd)
Lexington Pump Station

- Existing water pumping station (1990)
- Currently owned and operated CDWM
- 220 MGD pump station
- 30 million gallon covered reservoir with 4.3 acre turf surface
Pump Station Reliability

• Largest water pumping station in State of Illinois
  – Only pumping station to supply water to DuPage Water Commission from Lake Michigan

• Generation facility
  – Minimizes potential for hydraulic surge in pipelines caused by power failure
Project Goals

- System reliability
- Meet sustainability goals
- Maximize existing facilities
Pump Station Improvement

- Addition of (4) 2500 kW generators
- Provision for additional 2500 kW portable generator
- Paralleling and peak shaving/base loading/island
- Photovoltaic system added to meet sustainability goals of City of Chicago
- Financed by DuPage Water Commission
PV System Summary

- 4,470 PV modules (200 W/each)
- 15 modules/sub-array (3.0 kW)
- 149 PV modules/inverter (447 kW)
- 2 inverters (894 kW DC)
- Operated in parallel with local electrical grid
- Utilizes a single power transformer to transfer energy to the auxiliary building systems
  - Excess energy is transferred to either the pumps or the local electric utility
## Construction Costs

<table>
<thead>
<tr>
<th>Critical Variables</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Cost (PV System Only)</td>
<td>$8,250,000</td>
</tr>
<tr>
<td>Capital Costs</td>
<td>$10 / Watt</td>
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<tr>
<td>Grant Funding (Illinois DCEO)</td>
<td>$250,000</td>
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<tr>
<td>Annual Cost Savings</td>
<td>$70,000 - $100,000</td>
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</tbody>
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Design Challenges

- **Load limits**
  - Lightweight equipment required due to load limits
  - Concrete ballasts used instead of anchoring to reservoir

- **Site constraints**
  - CTA Blue Line underground tunnel nearby
  - Busy expressway
  - State of Illinois DMV
Lexington Pump Station

I-290 EB

CTA Blue Line

State of Illinois
Design Challenges
Design Challenges
Solar Panel Assembly
Overall View Looking East
Row Spacing to Avoid Shadowing
500 kW Inverter
2.5 MW Diesel Engine Generators
Lexington Pump Station
Lexington Pump Station
Project Outcome

• Operational in 2010
• Reduces total process energy by 17%
• Over 860,000 kw-hr per year
• $70,000 in annual savings
• Sustainability Goal
  • LEED Gold Certified
• Maintenance
THANK YOU