Solar Energy for Publicly Owned Treatment Works

Edith Makra, Metropolitan Mayors Caucus
Elena Savona, Elevate Energy
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Solar Energy for POTW

CENTRAL STATES – WATER ENVIRONMENT ASSOCIATION

MARCH 23, 2016

2016 GOVERNMENT AFFAIRS SEMINAR
Overview

Introductions
Solar Background
Why POTW’s
Finance and Funding Issues
Case Studies
Introductions

Metropolitan Mayors Caucus and Elevate Energy
- Non-profit groups. MMC is a council of governments.
- Initiated partnership. Responsible for outreach and coordination.

Grow Solar
- An initiative of the Midwest Renewable Energy Association. Promotes solar in MN, IL and WI.
- Funded by the US Department of Energy.

Illinois Green Economy Network (IGEN)
- Grow Solar grant manager for activities in Illinois.

IAWA & CSWEA
- Project guidance, outreach and coordination.

The Power Bureau
- Grow Solar technical advisor responsible for site evaluations and solicitations.
Solar Background: Technology

Solar Photovoltaic (PV) Technology
- Converts solar irradiance into electricity

Applications
- Single panels or multiple panels (‘arrays’)  
- Roof-mounted or ground-mounted  
- Distributed (on-site use) or grid connected (exported off-site)

Benefits
- Sustainable and non-emitting source of energy
- Long life-cycle for equipment (20+ years)
- Can offset all or a portion of traditional utility costs
Solar Background: Federal Policy

**Investment Tax Credit (ITC)**
- 30% tax credit for solar projects (commercial and residential)
- ITC Just extended through 2019, ramping down incrementally through 2021, and remaining at 10% starting in 2022

**Accelerated Depreciation**
- Commercial solar installations qualify to be depreciated on a 5-year property MACRS schedule
- With 50% Bonus Depreciation, owners may claim further depreciation in the first year
- Bonus Depreciation just extended through 2017, ramping down incrementally through 2019, 0% beyond 2020

**NOTE:** Tax credits available only to organizations paying taxes
Solar Background: IL Policy

Renewable Portfolio Standard (RPS)

- Sets a goal of 25% renewable energy by 2025
- Applies to areas in Illinois served by Commonwealth Edison, Ameren, and MidAmerican
- Goals must be met by electricity supply provider (either the utilities or a retail electricity supplier)
- Renewable Energy procurement facilitated by the Illinois Power Agency (IPA)

Solar Specific Items

- Solar Carve Out: 6% of annual RPS goal
- Allows for net metering
- Compliance verified by the purchase of Solar Renewable Energy Credits (SRECs)
Solar Background: IL Policy

Supplemental PV Procurement

• Flaw in RPS and dynamics of municipal aggregation market caused backup of funding
• Renewable Energy Resources Fund (RERF) had $150 million +
• Only $30 million saved and set aside for “Supplemental Procurement” of SRECs generated by qualified PV systems on 5-year contracts
• The IPA is managing 3 procurement events – June & November 2015; March 31, 2016
• Future uncertain – legislation pending to fix the RPS and allow spending
Solar Background: Cost Trends

Note: Median installed prices are shown only if 20 or more observations are available for a given year and customer segment.
Solar Background: Finance

Typical sources finance for solar PV installations

Avoided Energy Costs
- Peak Period Energy Supply + Capacity

Tax Incentives
- Investment Tax Credit (30% of capital cost for installation) + Accelerated Depreciation (MACRS)

SREC Sales (1 SREC per 1,000 kWh of solar generation)
- $20-150 per SREC

Grants
- Illinois Department of Commerce and Economic Opportunity
- Illinois Clean Energy Community Foundation (Not Currently Available)
Why POTWs

**Large energy users**
- Can support a range of potential solar project sizes and configurations
- Bears full cost of electricity

**Net-Zero-Energy**
- Focus on generating on-site power resources to support water treatment activities

**Nimble and Capable Public Agencies**
- Sustained focus on engineering and capital project planning
- Nimble decision-making authorities
- Suitable physical sites

**Creditworthiness**
- Make an attractive counterparty for solar developers
Key Considerations
Regarding Solar PV Contracting Options

<table>
<thead>
<tr>
<th>Key element</th>
<th>Own</th>
<th>Lease</th>
<th>PPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are there up-front costs?</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Is there technology risk?</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Can outside grants still be used</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Can public sector monetize Investment Tax Credits?</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Can public sector monetize MACRS Depreciation credits?</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Is buyer responsible for Insurance?</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Is buyer responsible for Operations and Maintenance?</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Finance and Funding: Self-Finance

Host finances project on its own, but cannot capture tax incentives
  ◦ Cash Reserves
  ◦ Operating Funds
  ◦ Grants

Advantages
  ◦ Low Cost of Capital
  ◦ Most transparent
  ◦ Only internal parties

Disadvantages
  ◦ Long term payback
  ◦ Cannot capture tax benefits

Cash Purchase without tax incentives (1MW, $2M, $0.09/kWh)

Break Even
Finance and Funding: Third-Party Lease

Developer finances project capital with outside financial sources, and the host makes scheduled payments to the developer

- Lease payments
- Power purchases

Advantages
- All tax incentives monetized, projects that were impossible without incentives now are viable

Disadvantages
- Higher cost of capital to host
Finance and Funding: Third-Party (PPA)

A. Negotiated Agreement
   ◦ Duration, prices, deliverables, etc.

B. Energy Deliveries
   ◦ As metered

C. Regular Payments
   ◦ Purchase the energy generated
   ◦ Negotiated price and schedule

D. Export Excess Energy to Grid
   ◦ Through local utility

E. Receive regular Utility Services
   ◦ Continued relationship

**Developer**
- Coordinates finance, design, construction on Host’s site
- Captures all incentives
- Monitors and maintains PV system

**Host**
- Receives power from on-site PV system and utility
- Pays developer for delivered electricity

**Utility**
- Provides regular electricity service
- Provides net metering
- May reset PLC/NSPL to reflect on-site peak generation capacity

**A. Agreement**
**B. kWh/kW deliveries**
**C. Regular Payments**
**D. Excess kWh**
**E. Regular kWh/kW services**
## Participating Agencies

<table>
<thead>
<tr>
<th>Participating Agency</th>
<th>Type</th>
<th>Sites Analyzed</th>
<th>Received Bids</th>
<th>Favorable</th>
</tr>
</thead>
<tbody>
<tr>
<td>DeKalb Sanitary District</td>
<td>POTW</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Downers Grove Sanitary District</td>
<td>POTW</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>Glenbard Wastewater Authority</td>
<td>POTW</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Wheaton Sanitary District</td>
<td>POTW</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Greater Peoria Sanitary District</td>
<td>POTW</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
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<tr>
<td>Will County</td>
<td>County</td>
<td>Y</td>
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<td>N</td>
</tr>
<tr>
<td>Lakes Region Sanitary District</td>
<td>POTW</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
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<tr>
<td>Village of Schaumburg</td>
<td>Muni</td>
<td>Y</td>
<td>Y</td>
<td>TBD</td>
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<tr>
<td>Lake County</td>
<td>POTW</td>
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<td>City of Elmhurst</td>
<td>POTW</td>
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<td>N</td>
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<tr>
<td>Fox River Water Reclamation District</td>
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<td>City of Joliet</td>
<td>POTW</td>
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</tr>
<tr>
<td>Rock River Water Reclamation District</td>
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<td>N</td>
<td>--</td>
</tr>
<tr>
<td>City of Wood Dale Wastewater Operations</td>
<td>POTW</td>
<td>N</td>
<td>N</td>
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POTW Solar Project Approach

**Objectives**
- Identify sites where solar could have high potential value
- Provide a pathway for soliciting offers from qualified solar developers

**Benefits**
- Provides a preview for project economics
- Allows POTW to eliminate low-value projects

**General findings regarding solar value**
- Higher value in ComEd region
- Power Purchase Agreements allowed for better economics than direct purchases

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<tr>
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</thead>
<tbody>
<tr>
<td>Reviewed potential sites for solar arrays</td>
<td>Array capital costs, PPA payments, NPV</td>
<td>Request for Qualifications</td>
<td>Identified 9 qualified bidders</td>
</tr>
<tr>
<td>All-in pricing</td>
<td>Allowed for alternates</td>
<td>Focused on total cost</td>
<td>Compared prices to baseline</td>
</tr>
</tbody>
</table>
Case Study: DeKalb Sanitary District

Initial Project
- Identified 10 potential sites
- Ground- and roof-mounted systems

Economic Evaluations
- Using very conservative assumptions
  - 2 vacant sites eliminated
  - 6 remaining sites showed potential
  - 3 ground sites had the best potential (assuming a 1% per year increase in grid electricity supply)
- Current site electricity costs: $0.069/kWh
  - Electricity supply (volume related elements only)
  - Distribution (volume-related elements only)
  - Taxes (volume-related elements only)
Case Study: DeKalb Sanitary District

Bid Results

- Lead bidder combined the three ground-mount locations into a single offer:
  - kW AC Capacity: 1,360.80
  - kWh AC Output Year 1: 1,805,509
  - kWh AC Output 20-Years: 34,394,955
  - Total Area Requirement: 208,200 sq. ft.
- Also included utilizing battery storage to improve system functionality

Economics (20 Year PPA)

- Fixed price without escalations
  - SRECs sold at $100: $0.049/kWh
  - SRECs sold at $0: $0.059/kWh
Thank you for your time and consideration

Edith Makra, Director of Environmental Initiatives  
Metropolitan Mayors Caucus  
emakra@mayorscaucus.org,  
312-201-4506

Elena Savona, Technical Program Manager  
Elevate Energy  
elena.savona@elevateenergy.org,  
773-439-1136