Solar Power Purchase Agreements

Brian Millberg | Energy Manager, City of Minneapolis
Direct Ownership

• **Financial:**
  Even at $3/kW installed cost, simple payback is 18 years
  (initial electricity cost of $0.10/kWh and 3%/year electricity cost inflation)

• **Politics:**
  How to justify expense with such a long payback

• If RECS begin to have some real value, this would be a positive for ownership.
PPA Advantages

• No/low up-front costs
• City can take advantage of Investment Tax Credits (ITCs)
  – This leads to low electricity costs
• Predictable electricity cost for length of contract
• Avoid direct design/rebate/permitting work
• No maintenance/operation headaches
PPA Financial Case (1 MW system)

• PPA allows a developer to reduce system cost through:
  – 30% Federal Investment Tax Credit (ITC)
  – 5 year accelerated depreciation with 50% bonus in first year (2013)

  Construction Cost: $3,000,000
  30% FIT Credit: - $900,000
  Initial Cost $2,100,000

• 5 Year MACRS*: Depr. Value Tax Savings
  – First year: $1,050,000 $441,000
  – Years 2 – 5: $262,500 $110,250

* Modified Accelerated Cost Recovery System
## PPA Financial Case for the Developer

(1 MW system)

<table>
<thead>
<tr>
<th>Initial Electricity Cost</th>
<th>Electricity Cost Inflator</th>
<th>7 Year IRR (3%) after Taxes</th>
<th>Simple Payback (Years)</th>
<th>10 Year IRR with 20% Buy Back in Year 10</th>
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<tbody>
<tr>
<td>$0.10/kWh</td>
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<td>11</td>
<td>2%</td>
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<tr>
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<td>$0.20/kWh</td>
<td>0%</td>
<td>-2%</td>
<td>8</td>
<td>6%</td>
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<tr>
<td>$0.20/kWh</td>
<td>3%</td>
<td>-1%</td>
<td>7.5</td>
<td>8%</td>
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</table>
# PPA Financial Case for Customer

## (1 MW system)

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<tr>
<th>Year</th>
<th>20 Year bond</th>
<th>Utility Costs</th>
<th>PPA Costs</th>
<th>PPA Costs</th>
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NPV Values

- $3,058,252.43
- $5,048,543.69
- $2,970,728.19
- $3,868,143.46
Minneapolis Convention Center

601kW Solar Array
Minneapolis Convention Center

- 601 kW DC completed in December 2010
- 2,613 Siliken 230W panels
- Unirac ISYS mounting system
- 6 Solectria 95kW inverters, 480V
- Maximum AC output 567 kW
- 750,000 kWh/year output
- Produces 8% - 10% of daytime electricity consumption at the site
- System owned and operated by MCC Solar, LLC
Convention Center Project Financials

- Installed cost: $3,100,000 ($5.15/Kw)
- Renewable Development Fund (RDF) grant from Xcel Energy rate payers: $2,000,000
- 20 Year Fixed price contract: $0.10695/kWh
- Buy-out provision:
  - Starting in year 7 at 14% of original cost
  - Yearly reduction in price until 8% of original cost in year 20
- RECS owned by Xcel Energy due to RDF grant
The RFP Team

• **Mandatory team members:**
  – Construction Project Manager
  – Contract Lawyer
    • PPAs can be complicated documents
  – Risk Manager
    • To cover all liability scenarios
  – Financial Consultant
    • To validate developer financial strength

• **Optional team members:**
  – Purchasing Manager
    • To ensure all proper purchasing rules are followed
  – Outside Alternative Energy Consultant or Sustainability Consultant
RFP – Invitation for Proposals

• Project Description
• Regulatory Requirements
• Detailed Site Description/Drawings
• Project Schedule Requirements
• RFP Scoring System Description
Project Description

• System size
  – In kW and kWh/year desired output
• System mounting hardware preference
• System production monitoring requirements
• Sample PPA (minus $/kWh)
Regulatory Requirements

• Grant money restrictions
  – e.g. Made in USA

• Construction code and inspection requirements

• Labor requirements
  – e.g. labor classification grades or minority/small business goals

• Intangibles
  – e.g. local business involvement, public education, or project visibility
Detailed Site Description/Drawings

• Aerial photos of site
• Legal description of property
• Architectural top view site plan
• Site/Installation requirements:
  – Preferred areas for array
  – Site remediation
  – Staging and access
  – Safety
  – Security
Minneapolis Convention Center
Original Site Plan Concept in RFP
Minneapolis Convention Center
As Built
Project Schedule Requirements

• Grant requirements, if any
• Weather horizon
• “Substantial completion” vs. actual power production
RFP Scoring Template

• RFP evaluation criteria:
  – Total kWh/year guaranteed
  – $/kWh pricing
  – Contractor experience level
  – Developer experience level
  – Financing mechanism
  – Project approach
  – Minority/small business/local labor usage
kWh/Year Guarantee

• Guarantee clause
  – Avoids outrageous claims of electricity production
  – Requires developer to reimburse customer for extra electricity charges if production falls below guaranteed kWh level
Developer Assessment

• #1 criteria – financial strength
  – Beware of first time developers
  – Require signed letter of credit with a reputable bank with the Project Proposal
  – Need your financial consultant to conduct financial due diligence

• #2 criteria – construction experience
  – Must be partnered with a general contractor with a history of large complex construction projects. Does not have to be solar experience.
    • More pertinent is complex electrical experience.
Writing the Actual PPA

• Purchase and sale of solar services
• **Financing, construction, contracts, design, installation, and testing of systems**
• Operation and maintenance of systems
• Purchase of solar services
• Price and payment
• General covenants
• **Insurance requirements; irrevocable letter of credit**
• Force Majeure events
• Term of agreement; City options
• Events of default
• Remedies following default
• Indemnification
• Miscellaneous provisions
• Lease of property space where array will be placed
The Nitty-Gritty Details

• Project financing
• Construction contract
• System design and installation
• Utility approvals/interconnection agreement
• Energy delivery
• Ownership of rebates/RECS
• Remuneration for loss of solar production
• PPA could run to 50+ pages
Hot Button Issues

• Utility approvals/interconnection agreement
  – Make sure your utility is on board at the beginning
  – Beware of “networked grid” issues
  – All costs paid by the developer

• Remuneration for loss of solar production
  – Developer should pay you for difference in electricity costs if they cannot deliver contracted amount of electricity (the guarantee clause)
Beware of Demand Reduction Claims!

Demand Curve for December 2012 Demand Charge Day
Minneapolis Convention Center

Monthly High Demand set at 7:30 AM before solar kicks in!

Xcel Demand
PV Generation
If You Decide on Direct Ownership

• Bid out a fully designed system created by an experienced solar array design firm. Have them perform contract compliance.

• Require kWh/year guarantee with a 5% retainer for the first 6 – 12 months to ensure system produces correct amount of power.

• Pick a competent General Contractor and Electrical Contractor.
Thank You

Other Resources:

– U.S. EPA: Solar Power Purchase Agreements site
  • [Overview, challenges, opportunities, resources](#)
  • [Webinar](#) (includes presentations, Q&A, and follow-ups)

– National Renewable Energy Laboratory
  • [Power Purchase Agreement Checklist for State and Local Governments](#) (PDF)

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