Value of Solar

Minnesota Power Systems Conference
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Doug Larson – Dakota Electric Association
Topics

1. **Defining Value of Solar**
2. **2013 MN Omnibus Energy Bill**
3. **State Agency Process**
4. **Overview of VOS Methodology**
5. **Utility Concerns**
6. **Further Reading**
Value of Solar (VOS) – What

- Utility pays customer for all output of solar.
  - Pricing based on formula
    - Many cost factors included in calculation
  - Levelized price for 25 years
  - Utility recalculates VOS each year which then applies for customers adding solar that year
Example Results

25-Year Levelized Value ($/kWh)

- Avoided Environmental Cost
- Avoided Dist. Capacity Cost
- Avoided Trans. Capacity Cost
- Avoided Reserve Capacity Cost
- Avoided Gen Capacity Cost
- Avoided Plant O&M - Variable
- Avoided Plant O&M - Fixed
- Avoided Fuel Cost
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Substantial changes to net metering and solar energy requirements for investor-owned utilities.
- Allows IOUs to apply to the PUC for a Value of Solar (VOS) tariff as an alternative to net metering
- Cooperative and municipal utilities were not affected by this legislation
# 2013 Omnibus Energy Bill – Final

<table>
<thead>
<tr>
<th>Provision</th>
<th>Starting Point</th>
<th>Co–ops / Muni’s</th>
<th>IOU’s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renewable Energy Standard (RES)</td>
<td>25% → 40%</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>Solar Energy Standard (SES)</td>
<td>10% by 2030 (in addition to RES)</td>
<td>No</td>
<td>1.5% by 2020, exclusions for iron/paper industry</td>
</tr>
<tr>
<td>Net Metering</td>
<td>40 kW → 1000 kW</td>
<td>No change</td>
<td>1 MW with size/system limits</td>
</tr>
<tr>
<td>Solar Incentive Fund (tax)</td>
<td>1.33% of revenue</td>
<td>No</td>
<td>Xcel only – $5M/yr</td>
</tr>
<tr>
<td>Value of Solar / rate incentive</td>
<td>20 cents / kWh</td>
<td>No</td>
<td>Xcel only (price tbd by PUC)</td>
</tr>
<tr>
<td>Community Solar</td>
<td>Required &amp; utility cannot own</td>
<td>No</td>
<td>Required for Xcel, others optional. Utility can own.</td>
</tr>
<tr>
<td>Made in Minnesota Subsidy</td>
<td>CIP or RDF $</td>
<td>No</td>
<td>5% of CIP $</td>
</tr>
</tbody>
</table>
Subd. 10. *Alternative tariff; compensation for resource value.*

- (e) The *department must establish* the distributed solar value methodology in paragraph (c), clause(1), no later than January 31, 2014. The department must submit the methodology to the commission for approval. The *commission must approve, modify with the consent of the department, or disapprove the methodology within 60 days of its submission.* When developing the distributed solar value methodology, the department shall consult stakeholders ...
Subd. 10. Alternative tariff; compensation for resource value.

(f) The distributed solar value methodology established by the department must, at a minimum, account for the value of energy and its delivery, generation capacity, transmission capacity, transmission and distribution line losses, and environmental value.
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Value of Solar – Development Process

- MN Department of Commerce (DOC) conducted a number of stakeholder meetings
  - Included rounds of written comments
- DOC submitted VOS methodology to MN PUC January 31, 2014
- MN PUC approved VOS methodology on April 1, 2014
Value of Solar – Steps to Methodology

- Aug. 9, 2013
  - DOC Introductory Memo

- Sept. 17, 2013
  - Workshop #1 – Overview of National Efforts

- Sept. 20, 2013
  - Comments on MN VOS Methodology

- Oct. 1, 2013
  - Workshop #2 – Methodologies and Perspectives

- Oct. 8, 2013
  - Second Round of Comments

- Oct. 15, 2013
  - Workshop #3 – Stakeholder Discussion

- Nov. 19, 2013
  - Workshop #4 – Draft Methodology

- Dec. 10, 2013
  - Third Round of Comments

- Jan. 31, 2014
  - DOC submits VOS Methodology to PUC
Value of Solar – Steps to Methodology

- MN PUC (Docket No. E999/M–14–65)
  - Jan. 31, 2014
    - Notice of Expedited Comment Period
  - Feb. 13, 2014
    - Initial Comments
  - Feb. 20, 2014
    - Reply Comments
  - Mar. 12, 2014
    - Oral Argument & PUC Deliberation
  - April 1, 2014
    - PUC Order Approving VOS Methodology
Xcel filed a motion to reconsider Value of Solar on April 21, 2014
- Concerned VOS will tip balance to stimulate solar rather than moderate rates
- Prefers more market based approach combined with solar incentives
  - VOS is double Xcel’s preferred VOS method
  - VOS is triple avoided cost rates

MN PUC rejected motion to reconsider VOS in Order issued on May 16, 2014
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VOS Methodology Objectives

- Accurately account for all relevant value streams
- Simplify input data set, where possible
- Simplify methodology, where warranted
- Create clear steps (procedures, equations, tables, etc.) that can be understood and duplicated by all stakeholders
- Easy to modify, if necessary, in future years

* MN Department of Commerce
Value of Solar Factors

- Avoided Fuel Cost
- Avoided Plant O&M Cost
- Avoided Generation Capacity Cost
- Avoided Reserve Capacity Cost
- Avoided Transmission Capacity Cost
- Avoided Distribution Capacity Cost
- Avoided Environmental Cost
- Fuel Price Guarantee
- Voltage Control
- Market Price Reduction
- Disaster recovery
Avoided Fuel Cost

- Long term, guaranteed fuel prices are used, and discounting/levelizing is done using risk-free rates.

- Methodology assumes that PV displaces natural gas during solar operating hours

- Considers MISO market experience

- Three options for obtaining guaranteed fuel prices:
  - Futures Market
  - Long Term Price Quotation
  - Utility–guaranteed Price
Based on costs of two technologies: peaking CT and intermediate CCGT
- CT has high heat rate, low cost
- CCGT has low heat rate, high cost

The “displaced capacity” must be consistent with the “displaced fuel” (i.e., from the same “displaced resource”)

Therefore, the capital cost of the displaced resource is assumed to be between the CT and CCGT
Avoided Environmental Cost

- Environmental costs are included as a statutory required component

- Avoided environmental costs are based on the federal social cost of CO2 emissions, plus Minnesota PUC–established externality costs for non–CO2 emissions
Example Results

25-Year Levelized Value (\$/kWh)

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Example Results

Inflation–adjusted VOS schedule calculated from levelized VOS

![Graph showing inflation-adjusted VOS schedule](image-url)
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Utility Concerns

*Fuel cost escalation factor*

- If gas prices were to rise at such a high rate for such a long time, “basic supply and demand principles suggest users will find alternative sources of energy that are less costly”
Utilities questioned whether a long–term price guarantee adder should be included at all.
  ◦ Guarantee goes beyond the statutory requirement and is inconsistent with industry practice.

Long–term guarantee should be an optional component for the VOS, and should be separated from the avoided energy cost calculation.
Utility Concerns

Avoided Generation Capacity Costs

- Utilities disagreed with calculation of avoided generation capacity costs.
  - Recommended that the calculation be based solely on CTs.

- Methodology does not allow for delaying avoided generation capacity costs for utilities that do not currently need additional generation capacity.
Utility Concerns

Avoided Environmental Costs

- Utilities disagreed with the calculation of avoided environmental costs.

- There are two primary contested issues:
  - Use of the EPA’s Social Cost of Carbon (SCC), and
  - Inclusion of pollutants other than CO2.
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Value of Solar (VOS) links

- MN Department of Commerce – VOS Stakeholder Process

- Austin, Texas
  http://www.austinenergy.com/Energy%20Efficiency/Programs/Rebates/Solar%20Rebates/residential.htm

- Rocky Mountain Institute, Value of Solar studies
  http://www.rmi.org/elab_empower
Questions