Net Metering: Quantifying Benefits and Sharing Costs

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Agenda

- Company background
- Net metering landscape
- Net metering alternatives
- Examples
- Conclusions
Founded in 1998 with the mission to ‘power intelligent energy decisions’

- **SOLAR PREDICTION**: Most widely used solar resource database
- **ECONOMIC VALUATION**: > 22 million solar estimations performed
- **PROGRAM OPTIMIZATION**: 2.75 GW of renewable incentives processed
Net Metering Landscape

Camp 1: Net metering is fine, don’t change it

Camp 2: Net metering needs reevaluation

One Rate Structure

Cost of services

Value of Solar

Two Rate Structures
Camp 1: Net Metering is Fine – Don’t Change It.

End the Utility Power Grab in California:
SOLAR CUSTOMERS DESERVE FAIR CREDIT WITH NET METERING

Like rollover minutes on a cell phone bill, net metering gives renewable energy customers fair credit on their utility bills for the excess clean power they contribute back into the grid. This simple billing arrangement is one of the most important state policies for encouraging investment in solar – and it benefits solar and non-solar ratepayers alike!

Net metering grid benefits outweigh the costs by: $92.2 Million per year

http://votesolar.org/resources-impacts-of-net-metering-in-california/

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Option 1: Value of Solar (aka Solar Rate or Smart FiT)
• Treat consumption separately from production

Option 2: Cost of Services
• Retain single rate but redesign it based on the net cost for the utility to serve the PV customer
Cost of Services Approach

1. Identify utility services to PV customers
2. Identify PV customer services to utilities
3. Determine cost of each service
4. Bill charges & credits for each service
Sample List of Services

**Net Cost of Service = (Customer Cost) – (Utility Cost)**

<table>
<thead>
<tr>
<th>Service</th>
<th>Customer Cost</th>
<th>Utility Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resource Adequacy Capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ancillary Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grid Management</td>
<td></td>
<td></td>
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<tr>
<td>Transmission Capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transmission O&amp;M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribution Station Capacity</td>
<td></td>
<td></td>
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<tr>
<td>Distribution Line Capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribution Voltage Regulation and Reactive Supply</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribution O&amp;M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interconnection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metering, Billing, and Customer Service</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Value of Solar Approach

1. Separately meter consumption & production
2. Calculate savings from PV production
3. Bill consumption using existing tariffs
4. Credit production using Value of Solar
## Value of Solar to the Utility (typical)

<table>
<thead>
<tr>
<th>Value Component</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoided Fuel Cost</td>
<td>Cost of natural gas fuel to operate a gas turbine (CCGT) plant operating on the margin to meet electric loads and T&amp;D losses.</td>
</tr>
<tr>
<td>Avoided Plant O&amp;M Cost</td>
<td>Costs associated with operations and maintenance of the CCGT plant.</td>
</tr>
<tr>
<td>Avoided Generation Capacity Cost</td>
<td>Capital cost of generation to meet peak load and planning margins.</td>
</tr>
<tr>
<td>Avoided T&amp;D Capacity Cost</td>
<td>Cost of money savings resulting from deferring T&amp;D capacity additions.</td>
</tr>
<tr>
<td>Avoided Environmental Compliance Cost</td>
<td>Cost to comply with environmental regulations and policy objectives.</td>
</tr>
<tr>
<td>Fuel Price Hedge Value</td>
<td>Cost to minimize natural gas fuel price uncertainty.</td>
</tr>
<tr>
<td>(Solar Penetration Cost)</td>
<td>Additional cost incurred to accept variable solar generation onto the grid.</td>
</tr>
<tr>
<td>Other Components</td>
<td>Utility specific considerations, as applicable.</td>
</tr>
</tbody>
</table>
## Value of Solar to Ratepayers and Taxpayers

<table>
<thead>
<tr>
<th>Value Component</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Price Reduction</td>
<td>Wholesale market costs incurred by all ratepayers associated with a shift in demand.</td>
</tr>
<tr>
<td>Environmental Value</td>
<td>Future cost of mitigating environmental impacts of coal, natural gas, nuclear, and other generation.</td>
</tr>
<tr>
<td>Economic Development Value</td>
<td>Enhanced tax revenues associated with net job creation for solar versus conventional power generation.</td>
</tr>
<tr>
<td>Security Enhancement Value</td>
<td>Avoided economic impacts of outages associated due to grid reliability of distributed generation.</td>
</tr>
</tbody>
</table>
Use \textit{dg VALUATOR}™ to Perform Analysis

- Enable objective and transparent analysis

- Employ established methodologies

- Correlate solar data to utility loads

- Quickly evaluates alternate scenarios
Employ Established Methodologies

- Austin Energy distributed PV value study
- Validated SMUD Results
- Quantified societal benefits of distributed PV using Value of Solar methodologies
- Applied Value of Solar methodology to Carissa Plains 6 MW PV plant
- Published Capacity Value of solar method
- Published Kerman PV Plant analysis
- Block Island Power study
- Okanagan County Electric Coop study
- Nevada Power ELCC study
- New Jersey ELCC study
- NJ & PA dist. PV studies
- Austin Energy study to design new solar tariff
- Analyzed ability of distributed PV to meet New York City’s electricity needs
- We Energies study to site distributed PV
- Value of Solar analysis for SMUD, a municipal utility
- QuickScreen Software for Dist. PV Evaluation
- Applied Value of Solar methodology to Carissa Plains 6 MW PV plant
- Published Capacity Value of solar method
- Published Kerman PV Plant analysis
- Block Island Power study
- Okanagan County Electric Coop study
- Nevada Power ELCC study
- New Jersey ELCC study
Correlate Solar Data to Utility Loads

SolarAnywhere® irradiance data
- Satellite-derived time-series data
- Historical values from 1998 through latest hour
- Forecasts up to 7-days in advance

SolarAnywhere® analytical tools
- PV system modeling (FleetView™)
- Benchmark to site data (DataCheck™)
- PV fleet variability
How does Austin Energy…

- Design a solar tariff representing utility value for customer-side distributed solar?
- Allow utility to collect and recover actual costs for serving customer loads?
Nodal Price Analysis (Energy Value)

Nodal Price ($/MWh)

PV Output (kW)

Typical Day

$80

Transmission Constrained Day

$4,000

Clean Power Research®
Nodal Price Analysis Results (Energy Value)

![Graph showing solar premium and average nodal price for different orientations: Horizontal, South-30°, SW-30°, West-30°, West-45°, 1-Axis, 1-Axis-30°]
Update Value of Solar Based on Nodal Price Analysis
Example 2: MSEIA Value of Solar Study

Note: Results were developed for multiple locations. Figure presents results for Philadelphia, PA. 

How Do Austin Energy and MSEIA Results Compare?

(1) Proportionately allocate Loss Savings across categories for Austin Energy.
(2) Group Fuel Cost Savings, O&M Cost Savings, and Fuel Price Hedge into Energy for MSEIA.
(3) Allocate Solar Penetration Cost to utility benefits for MSEIA.
(4) Location is Philadelphia for MSEIA.
Conclusions

- **Two camps**
  1. Net metering is fine, don’t change it
  2. Net metering needs to be reevaluated

- **Alternatives under consideration**
  1. Value of Solar
  2. Cost of Service

- **Perspective is critical when using Value of Solar approach – it determines which values to include**
Next Steps: Broadening the Discussion By Examining Soft-Cost Implications

• How do different transaction models impact the costs associated with:
  – Customer acquisition
  – Utility billing systems
  – Metering requirements
  – Finance risk

Source: Eran Mahrer, SEPA
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