A Question of Equity: Net Metering and the Costs and Benefits of Rooftop Solar

NCSL Webinar
May 1, 2014
Helping Utilities Make Smart Solar Decisions

About SEPA

Educational 501(c)3 non-profit

Membership

460+ Utilities

52% of electricity customers

400+ solar companies & stakeholders

94% of installed solar capacity

Utilities

Joint Action Agencies, G&Ts, RTOs, FPAs

Wholesale Marketers, IPPs

Affiliates

Business & Professional Services

Project Developer/ Installer/ Distributors

Manufacturers
MARKET DYNAMICS
Growing DG Penetration

- Penetration and rate of growth varies greatly across the U.S.
  - HI: more than 10% of customers have rooftop solar
  - San Diego: more than 1,200 customers a month installing solar
Assuming solar system prices decline from sub $3/W currently to sub $2.50/W over the next 12-18 months, solar LCOE in existing grid parity states could decrease further to 9-14 c/kWh driving further acceleration in solar shipments in these markets. At these system price levels, solar has the potential to reach grid parity in 12 additional states as LCOE approaches 11-14 c/kWh in these states.

Deutsche Bank Market Research – Sept 2013
NET METERING & RATE DESIGN
<table>
<thead>
<tr>
<th>Types of Utility Charges</th>
<th>Allocation of Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Typical Residential</td>
</tr>
<tr>
<td>Customer Charges ($/month)</td>
<td>• Metering</td>
</tr>
<tr>
<td>Demand Charges ($/kW)</td>
<td>• Not typically applicable</td>
</tr>
</tbody>
</table>
| Volumetric Energy Charges ($/kWh) | • Generation, Transmission, and Distribution capital investments  
|                            | • Fuel costs         | • Fuel costs  
|                            | • Variable O&M expenses | • Variable O&M expenses |
| Adjustor Clauses ($/kWh) | • Fuel adjustment clauses  
|                           | • Renewable program costs |

For more information, see SEPA’s “Ratemaking, Solar Value and Solar Net Energy Metering – a Primer” (July 2013)
Rate Design Alternatives

**Fixed Cost Recovery**
- Amend rate design to recover fixed costs by broadening the application of demand charges (or similar) to customers.

**Cost of Service Model**
- “Line-item” accounting of services provided by utility to customer and by customer to utility (e.g., interconnection, integration, energy, capacity, system deferrals, etc).
- Net services are billed to customer or utility (as applicable).

**Dual Rate Alternative**
- Customer billed for all consumption under currently applicable utility retail rate.
- Utility purchases solar output based on predetermined rate.
<table>
<thead>
<tr>
<th>RATE CONSTRUCT</th>
<th>Single Transaction (Rate) Approach</th>
<th>Two or More Transactions (Rates)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reform Existing Rates (all customers or solar only)</td>
<td>Reform All Rates</td>
</tr>
<tr>
<td>MODEL</td>
<td>Increased Fixed Charge</td>
<td>Demand Charge</td>
</tr>
<tr>
<td>ATTRIBUTES</td>
<td>• Add or increase basic service charge ($/month)</td>
<td>• Add or increase customer fee for demand ($/kW/month)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Reforming the Solar Customer Transaction (NEM reform)

<table>
<thead>
<tr>
<th>Single Transaction (Rate) Approach</th>
<th>Two or More Transactions (Rate)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Apply NEM</strong></td>
<td><strong>Reform All Rates</strong></td>
</tr>
<tr>
<td>Increased Fixed Charge</td>
<td>Increased Fixed Charge</td>
</tr>
<tr>
<td>Demand Charge</td>
<td>Demand Charge</td>
</tr>
<tr>
<td>Stand-by or Solar Charge</td>
<td>Stand-by or Solar Charge</td>
</tr>
<tr>
<td>Cost of Service</td>
<td>Cost of Service</td>
</tr>
</tbody>
</table>

## Implementation Attempts/Examples

<table>
<thead>
<tr>
<th>Implementer</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMUD</td>
<td>2013</td>
</tr>
<tr>
<td>Xcel Energy</td>
<td>2010</td>
</tr>
<tr>
<td>aps</td>
<td>2013</td>
</tr>
<tr>
<td>SDGE</td>
<td>2013</td>
</tr>
<tr>
<td>Austin Energy</td>
<td>2011</td>
</tr>
<tr>
<td>SDGE</td>
<td>2011</td>
</tr>
<tr>
<td>Dominion</td>
<td>2011</td>
</tr>
<tr>
<td>aps</td>
<td>2013</td>
</tr>
<tr>
<td>Georgia Power</td>
<td>2013</td>
</tr>
</tbody>
</table>
COSTS, BENEFITS & VALUE OF SOLAR
Iowa, Arizona, Minnesota, Louisiana, and Utah have all initiated processes to understand the benefits and costs from distributed solar.

DOE recently issued an RFI on solar benefits/costs and what role they could play.

EPRI developing a Value of the Integrated Grid methodology.

### Valuing Distributed Solar Benefits & Costs

#### Capacity
- Capacity Value
- Avoided Generation Capacity
- System Orientation

#### Security & Reliability
- Grid Security
- Grid/Service Reliability

#### Grid Support Services
- Ancillary Services
- System Integration Costs

#### Environmental
- Water Consumption
- Environmental Compliance
- Health Effects
- Non-Compliance Environmental Effects

#### Avoided Costs / Financial Risk
- Capital
- Fuel/Purchased Power & Fuel Hedging
- Line Losses
- T&D System Investment
- RPS Compliance
- Utility Administration
- Market Price Mitigation
- Fixed & Variable O&M
- Power Plant Decommissioning

#### Social
- Economic Development & Jobs
- Civic Engagement / Conservation Awareness
- Ratepayer / Consumer Interest
- Ratepayer Cross-Subsidization
- Technology Synergies
- Energy Subsidies (incentives, rebates, tax credits, etc.)

#### Security & Reliability
- Grid Security
- Grid/Service Reliability

#### Grid Support Services
- Ancillary Services
- System Integration Costs
In Spring 2013, the Minnesota legislature passed a law requiring the Department of Commerce (DOC) to establish a solar value methodology. Once established, affected utilities may apply to the MN PUC for a VOS tariff that compensates for operating distributed PV systems. The utility filing must comply with the methodology established by the DOC, and once approved it would be used as an alternative to net metering.

Utilities not required to adopt the VOS tariff. Owner must be paid the same kWh rate generated each year for the term of the contract. (Annual updates required but those apply to new customer systems that in year.)
# Minnesota VOS Calculation

$$\text{Gross Value} \times \text{Load Match Factor} \times (1 + \text{Loss Savings Factor}) = \text{Distributed PV Value}$$

<table>
<thead>
<tr>
<th>Description</th>
<th>Gross Value</th>
<th>Load Match Factor</th>
<th>Loss Savings Factor</th>
<th>Distributed PV Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoided Fuel Cost</td>
<td>GV1</td>
<td>(%)</td>
<td>LSF-Energy</td>
<td>V1</td>
</tr>
<tr>
<td>Avoided Plant O&amp;M - Fixed</td>
<td>GV2</td>
<td>ELCC</td>
<td>LSF-Energy</td>
<td>V2</td>
</tr>
<tr>
<td>Avoided Plant O&amp;M - Variable</td>
<td>GV3</td>
<td>ELCC</td>
<td>LSF-Energy</td>
<td>V3</td>
</tr>
<tr>
<td>Avoided Gen Capacity Cost</td>
<td>GV4</td>
<td>ELCC</td>
<td>LSF-ELCC</td>
<td>V4</td>
</tr>
<tr>
<td>Avoided Reserve Capacity Cost</td>
<td>GV5</td>
<td>ELCC</td>
<td>LSF-ELCC</td>
<td>V5</td>
</tr>
<tr>
<td>Avoided Trans. Capacity Cost</td>
<td>GV6</td>
<td>ELCC</td>
<td>LSF-ELCC</td>
<td>V6</td>
</tr>
<tr>
<td>Avoided Dist. Capacity Cost</td>
<td>GV7</td>
<td>PLR</td>
<td>LSF-PLR</td>
<td>V7</td>
</tr>
<tr>
<td>Avoided Environmental Cost</td>
<td>GV8</td>
<td></td>
<td>LSF-Energy</td>
<td>V8</td>
</tr>
</tbody>
</table>

**Value of Solar**

Helping Utilities Make Smart Solar Decisions
Customer pays for total consumption at applicable residential rate, same as non-solar customers
  – Retains retail rate designed to promote efficiency and ensure collection of applicable system costs
Customer is credited for solar production ($0.128/kWh at launch in 2012)
VOS complimented by an up-front incentive ($2.00/watt at launch)
VOS reassessed periodically; applied to the Residential Solar Rate
### Austin Energy Methodology Study Comparison

#### Graph

- **2013 Study**
  - Loss Savings
  - Environmental
  - T&D Cost Savings
  - Gen. Capacity Value
  - Guaranteed Fuel, O&M Value

- **Previous Study**
  - Guaranteed Fuel, O&M Value

#### Bar Chart

- **Axes**
  - Y-axis: Cost ($0.00 to $0.12)
  - X-axis: Year (2013 Study, Previous Study)

Helping Utilities Make Smart Solar Decisions
Helping Utilities Make Smart Solar Decisions

Net Metering Evolution
Which Way Will the Tide Turn?

Viewpoint A
• Increased adoption of fixed charges with minimum bill
• MN VOS process will not be replicated often
• Focal point on rate cases

Viewpoint B
• Move towards attribute pricing
• VOS intermediate step; foresee unbundling of all value propositions
• Focal point on processes similar to MN
• DG penetration rising, but at significantly varied pace across U.S.
  – Valuable to address issue now, but urgency exists in some markets more than others
• Multiple rate design solutions are emerging
  – Approach of separating into two transactions is gaining traction in some locations
• Current focus on value calculations likely to continue in near- to mid-term
Julia Hamm
President & CEO
jhamm@solarelectricpower.org
202-559-2025
www.solarelectricpower.org

Helping Utilities Make Smart Solar Decisions