Panel Discussion on

Accelerating Large Scale Deployment of Rooftop SPV in India

December 23, 2013
Rooftop SPV can be a good solution for reducing demand-supply gap and distribution losses.

Huge potential for Rooftop SPV

Various central and state government initiatives for promoting Rooftop SPV

Still Rooftop SPV market has not developed in India??

One of the possible solutions could be commoditization
About the Project

Evaluate market preparedness and policy status in India, for commoditizing Rooftop SPV for different consumer categories

Work methodology:

• Primary survey and market research
• Design and development of business models
• Except Gandhinagar there is power outage in other 5 cities ranges between 1 to 2.5 hours per day
• Commercial and industrial segments adopt generator set as a power backup option
• Residential sector prefers battery-inverter set as a power backup option due to less availability of small capacity generator sets in the market
Barriers for Large Scale Deployment of Rooftop SPV

- High upfront cost
- Lack of financing schemes by banks
- Lack of awareness
- Unavailability of standardized Rooftop SPV systems
- Inadequate supply chain for Rooftop SPV system
- State policies and guidelines for Rooftop SPV are still evolving
Need for Commoditization

• Availability
  – Range of standardized products

• Accessibility
  – Wider network of suppliers and service providers

• Affordability
  – Easy financing
Standardization of Rooftop SPV System

PLOT SIZE
260 SQ. YARD

GROUND COVERAGE
55%

ROOF AREA
85%

AREA AVAILABLE FOR SOLAR PV
20%

2 kWp

End-use loads considered for system sizing

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Nos.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tube light</td>
<td>5</td>
</tr>
<tr>
<td>CFL</td>
<td>5</td>
</tr>
<tr>
<td>Fan</td>
<td>4</td>
</tr>
<tr>
<td>Cooler</td>
<td>1</td>
</tr>
<tr>
<td>Refrigerator</td>
<td>1</td>
</tr>
<tr>
<td>TV</td>
<td>1</td>
</tr>
<tr>
<td>Washing machine</td>
<td>1</td>
</tr>
<tr>
<td>CD Player</td>
<td>1</td>
</tr>
<tr>
<td>Computer</td>
<td>1</td>
</tr>
<tr>
<td>Laptop charging</td>
<td>1</td>
</tr>
</tbody>
</table>

SPV system capacity 1.8 kWp
It is a simple and cost effective Rooftop Solar PV system which doesn’t affect household grid connection and wiring.
Net Metering

- Suitable for sites with reliable grid power
- It doesn’t provide backup power during power outage

Net Metering with Backup

It provides backup power during power outage
<table>
<thead>
<tr>
<th>Parameters</th>
<th>Gross Metering</th>
<th>Net Metering</th>
<th>Net Metering with Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Sale of electricity to utility</td>
<td>Consumption at the consumer’s end</td>
<td>Consumption at the consumer’s end and also a backup source during power outage</td>
</tr>
<tr>
<td>Preferred consumer category</td>
<td>Commercial &amp; Industrial</td>
<td>Residential, Commercial &amp; Industrial</td>
<td>Residential</td>
</tr>
<tr>
<td>Tariff plan</td>
<td>PPA, FiT</td>
<td>Energy settlement, FiT</td>
<td>Energy settlement, FiT</td>
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<tr>
<td>Energy accounting</td>
<td>Two separate meters</td>
<td>A bidirectional meter</td>
<td>A bidirectional meter</td>
</tr>
<tr>
<td>End-user advantages</td>
<td>Return on investment</td>
<td>Hedging for grid electricity cost increases</td>
<td>Reliable power and hedging for grid electricity cost increases</td>
</tr>
<tr>
<td>Utility’s perspective</td>
<td>Reduced distribution loss</td>
<td>• Reduced distribution loss</td>
<td>• Reduced distribution loss</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Uncertain revenue scenario in long term</td>
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</tr>
<tr>
<td>Operating cost</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
</tr>
</tbody>
</table>
Financing Options

Rooftop Solar PV System

Self Owned

100% Equity
• Self

Debt & Equity
• Bank
• Govt. financing

Third Party Owned

100% Equity
• Self

Debt & Equity
• Bank
• Govt. financing
Business Models

Gross Metering – Self Owned

Risk for System Owner

- Revenue recovery from utility
- Grid availability
- System warrantee/Insurance
- O&M
Business Models

Gross Metering – Third Party Owned

Risks for Third Party
- Revenue recovery from utility
- Grid availability
- System performance and O&M
- Long term access to roof
Net Metering – Self Owned

- Risk Ownership
  - System Owner
  - Long Term Risk for Utility
Business Models

Net Metering – Third Party Owned

- Risk Ownership
  - Third Party
  - Long Term Risk for Utility
Discussion Points

• Should there be an upper cap on system size?

• Is there any need for certification of Rooftop SPV systems
  – Who will certify

• What should be financial mode for Rooftop SPV
  – Interest subsidy or capital subsidy or FiT
  – Should existing inverter owners be incentivized for choosing solar PV systems.
Thank You