Rooftop Solar

Discom Perspective

By:
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Presentation Flow

- Renewable Energy in Delhi
- BRPL Experience in Solar
- Unique Opportunity of Rooftop Solar
- Discom Perspective
- Support Required
Renewable Energy in Delhi

- **Power Demand:** Touched 6260 MW.
  - 65% more than Mumbai, 3 x of Kolkata, 4 x of Chennai
  - Doubled in past decade
  - Increasing by over 6% each year

- **Total power requirement** to touch 33 BUs in 2017.

- **Limited Generation** in Delhi Grid dependent for over 80% of requirement

- **Solar and Waste to Energy** are the two RE sources in Delhi

- **Estimated Solar potential:** ~2000 to 2500 MW

- **Net Metering Regulations** notified by DERC in Dec 2014


- **Solar panel costs** down by over 80% since 2008. (Source: New Climate Economy Report)

Delhi, with high per capita consumption & income along with horizontal growth offers a unique opportunity to be the Rooftop Solar Capital
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BRPL Experience in Solar

Institute

Schools

Residential Complex

Commercial Complex

Stadium

Courtesy: Google Maps
BRPL scorecard in Solar Roof Top

Connections Energized
- 200 Installations
- Y1: 90, Y2: 110

Installed Capacity
- 5670 kWp (~6 MW)
- Another 4 MW in pipeline

Consumer Category Mix
- Overall Mix: Domestic: 85%, Comml: 13%
- Solar Installations:
  - Residential: 47% of nos & 12% of Capacity
  - C&I: 27% of nos & 29% of Capacity
  - Govt & Inst: 24% of nos & 54% of Capacity

Capacity range
- 1 kWp to 1 MWp

Highest Number of Installations mainly through Facilitation
BRPL’s Rooftop Journey till date

- 200 Installations, 5.67 MWp
  - Y1: 90 nos, 3.2 MWp, Y2 9 Months: 110 nos, 2.47 MWp
- Capacity of Solar 6.67 MWp against sanctioned load of 36.3 MW (18%)
- Interest from all segments
- Higher Participation from Residential (nos) & Institutions (Capacity)
BRPL – Playing the Facilitator

1st stage - Application
- **Consumer**: Receipt of Application Form
- **Discom**: Technical feasibility
- **Discom**: Application Approval/Rejection on the basis of technical feasibility

2nd stage – Registration
- **Consumer**: Receipt of Registration Form
- **Discom**: Technical evaluation
- **Discom**: Site visit of solar plant
- **Discom**: Registration form Approval/Rejection
- **Discom and Consumer**: Net metering connection agreement

3rd stage - Net meter installation
- **Consumer**: Solar plant installation & Intimation
- **Discom**: Auto debit necessary charges through electricity bill
- **Discom**: Net meter installation
BRPL – Playing the Facilitator

Net Metering

Net metering is a special metering and billing agreement between power utilities and their consumers, which facilitates connection of renewable energy-generating systems to the discos’ network. It allows consumers to export surplus power to the grid and helps reduce their electricity bills.

BERC has issued new regulations on the subject. Termed “Renewable Energy Net Metering Regulation 2014”, these regulations are applicable to consumers of the respective discos. Detailed guidelines are available on BERC website: http://www.berc.gov.in

Details of the nodal officer for net metering

<table>
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<tr>
<th>DISCOM</th>
<th>Name of Nodal officer</th>
<th>Contact No</th>
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<tr>
<td>BRPL</td>
<td>Sachin Vats</td>
<td>01133999429</td>
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<td>Krishna Sharma</td>
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<td>BYPL</td>
<td>Sandhya Srivastava</td>
<td>01133999741</td>
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<td>Sajjan Mangal</td>
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Net metering application form & DT transformation capacity details

<table>
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<tr>
<th>DISCOM</th>
<th>Forms</th>
<th>Download</th>
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<tr>
<td>BRPL</td>
<td>Net Metering Application Form</td>
<td><img src="NetMetering.html" alt="Download" /></td>
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Direct Benefits of Roof Top Solar

Day Peak shaving
Helps in reducing Afternoon Peak Load & giving relief to Network

RPO & Other Benefits
Rooftop Solar to meet RPO
Reduce Technical losses, Improve Voltage regulation

Happy Customer
Lower Bill to Consumer

Need to handle Technical Challenges associated with Reversal in Power Flow & the Variability of Solar Power

BSES
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Key Stakeholders

Government

Regulators

Utilities

Developers

Consumer

Who’s the one behind?
Unique Opportunity of Rooftop Solar

**Discom**
- Changes the nature of business – every aspect will be touched
- Different level of Consumer Engagement
- Readies for newer Technologies, challenges/opportunities – EVs, Smart Grid, Home Automation, other Value Added Services

**Consumer**
- Direct involvement in Nationally Determined Contribution
- Higher Mindshare about Electricity
- Better adoption of Energy Efficiency, Demand Response and other New Technologies

**Service Providers**
- Large scale Entrepreneurial & Employment Opportunity
- Drive Innovation in Technology, Business Models and the Energy Transformation

India can Leapfrog to Reliable, Empowered & Clean Energy
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DG Sets vs Solar Rooftop

- Polluting
- Expensive: ~ Rs. 20/- per unit
- Addresses the Reliability gap in Grid supply

- Clean Energy
- Tariff Parity: ~ Rs. 5 to 6/- per unit
- Needs Grid connectivity to provide Reliable supply

Solar Rooftop is not a direct substitute for DG Set or Grid supply
Discom Perspective

Discom’s Role: Supply Electricity in a Cost Effective, Reliable manner with Quality

Net Metering
- Very useful for initial adoption
- can lead to cost-shift, reduction in recovery of network costs
- Risk of behind the meter installations without Discom NoC
- Disparity between Fixed Costs vs Fixed Charges
Discom Perspective - Rooftop Solar Operation

• Key Considerations
  – RTS capacity can be added real quick
  – Helps defer distribution network upgrades
  – Helps reducing losses and improves voltage
  – Solar PV has limited load following capability, hence need utility source for a reliable & quality power supply

• However
  – Distribution Networks not designed to include Generation, only for one way power flow
  – Islanding poses Safety Hazard to personnel and over voltages to others in the island
  – Can disturb Protection, Voltage Regulation and insert other Power Quality problems such as flicker, harmonics, DC Injection etc
  – Reversal of power flow can bring in complex challenges thus limiting penetration at DT level
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Support Required

• Involvement of Discoms
  – Technical Specifications and Interconnection Standards
  – Build in Incentives for Discoms

• Discom Capabilities to be Developed
  – Project Development
  – Trained & Skilled Manpower for Installation and Maintenance
  – Network Analysis and Load Flow Modeling & Testing Facilities
  – Integration and Operation of various Distributed Energy Resources while ensuring stable and reliable network (DSO)
    • Newer Technologies
    • Communication Networks
    • Data Analysis
Support Required

1. **Capacity building of Stakeholders**
   - Regulators
   - Grid Operators
   - Discoms as key enablers for Rooftop Solar
   - Consumers at the heart of the sustainable energy transition

2. **Technical Impact Studies for Grid Readiness**
   - State specific studies

3. **Commercial Impact**
   - Additional cost of balancing and reserves
   - Impact of lower PLF, fixed Cost of partially stranded capacity
   - Financial Support to Discoms

4. **Regulatory Enablement**
   - Techno Commercial mechanisms
   - Mechanisms to drive Innovation and Efficiencies across value chain
   - Retail Tariff structures, incentives, penalties
Thank You

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BRPL Demand Curve and Solar Generation

Solar Generation Coincides with Summer Day Peak
BRPL’s Rooftop Journey till date

- Large Quantum of small size installations
- Large number of Vendors
- Very few focused Vendors
- Market still in early stages