Solar rooftop for Residential Sector

10th January, 2017
Solar Potential in India

- Tropical Country
- More than 300 sunny days
- Highest global radiation received in Rajasthan & Northern Gujarat
- Almost all parts of India receive 4-7 kWh of solar radiation per sq metre
- Around 5000 trillion kWh/year energy incident over India
- Potential: 600 GW
India Sets Year-on-Year Targets to Reach Ambitious 2022 Solar Goal

Rooftop solar to account for 40% of the target (40 GW)

Notes: FY = All years in chart are fiscal year from April 1 to March 31; 1 GW = 1,000 MW.
Sources: Bloomberg New Energy Finance (BNEF); The Economic Times.
Global PV installations projections

Source: IEA

Residential sector expected to be the major contributor
Key Benefits for Consumers

- Reduces the dependency on grid power, Long term reliable power source
- Reduction in Utility Electricity Bill; Higher benefits in TOD regime
- Option for revenue generation through Net Metering Framework
- One time investment provides 25 years’ solar generation
- Accelerated Depreciation Benefits for I&C consumers
- Levelized cost of generation vis-à-vis increasing fossil fuel cost makes economically viable project
Growth Drivers for Residential Consumers

- 30% Capital Subsidy by MNRE
- Generation Based Incentive (GBI)-Provision of GBI under Solar Policy @ Rs. 2/unit for 3 years; applicable to solar plants which generate > 1100 units /KW/annum
- Option to Sell extra power to Discom under Net Metering Framework
- Value creation from unutilized roofs
- No Maintenance Cost
Rooftop Solar: Benefits for Discoms

- Minimal technical losses as power generation near to the place of consumption
- Enable Discom to meet its RPO obligation
- Partial Coincidence of Solar Power with Utility’s Peak Demand Period - Avoids the need to buy short term expensive power
- Improved tail end grid voltage and reduction in system congestion
- Decentralized Generation reduces pressure on Grid
- Avoided Network Augmentation Cost
80% Solar Generation Off-sets Normal Hours & 20% Off-sets Peak Hour Load for ToD Consumers

Impact on System Peak Load

Summer Peak Periods
Afternoon - 3pm to 4:30pm
Evening – 11pm to 1am

Winter Peak Periods
Morning- 9am to 11am
Evening – 6pm to 8pm

Peaking of Rooftop Solar Generation is partly co-existent with Peak Demand of Discom
Barriers in Large Scale Deployment: Residential Consumers

- High Upfront Investment under CAPEX Model
- Solar Projects still not commercially attractive for residential consumers owing to low utility tariffs-Arising Need for subsidy
- Non availability of attractive financing schemes by Banks
- Apprehensions about the technology
- Lack of successful demonstration projects in residential sector
Challenges: Discom Perspective

- Reduced Electricity Sale
- Shift of I&C consumers (High Paying consumers) to solar result in revenue loss for Discoms
- Issue of Cross subsidy to be handled
- Regulators don’t often compensate for the cost of the grid support provided by Discoms to the solar consumers (Network Augmentation and Management Cost; Up gradation of IT softwares for net meter billing etc.)

Financial Challenges

- Financial Incentives required to address these challenges

Technical Challenges

- Grid Operation Stability (Non Controllable Variability, intermittent supply)
- Unintentional Islanding
- Reverse power flow
- Quality and Reliability of Power (Harmonics, Flicker, Voltage fluctuation and imbalance)
Way Forward: Road Map for Discoms

**Identify key markets for solar** - Focused Consumer Awareness campaign, Utility can begin offering Commercial & Industrial customers quality and financially attractive rooftop solar systems.

**Standardize and improve quality** - Streamline the interconnection process for customer Solar Plant.

**Develop standards to ensure quality of solar installations**; monitor and track system performance and costs.

**Manage Utility Portfolio**: Further develop complementary programs: Demand Side Management / Energy Efficiency, Demand Response to maximize utility value from the solar.

**Manage Supply portfolio**: As the installed solar increases, manage the conventional supply portfolio in a complementary manner.
• Issues of variability and uncertainty can be solved using improved measures in grid operations, enabling balancing reserves and implementing load shifting/curtailment techniques.
• Smart grids through its various applications help in seamless RE integration by enabling the above solutions.