

Introduction to Solar Rooftop PV Generation and Net Metering Regulations

Presentation by - Prayas (Energy Group), Pune, India

www.prayaspune.org/peg

At

Pune Maximum Solar City Initiative

Pune Smart City Development Corporation Ltd. (PSCDCL)

Pune Municipal Corporation (PMC)

Tuesday, 10th May 2016, Pune



Outline

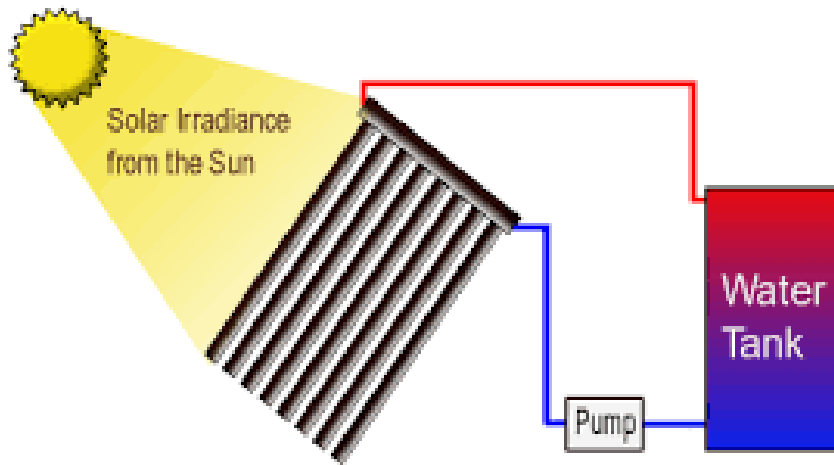
- Context
- Basic Technical Aspects of Solar Rooftop PV
- Net-metering Systems, Economics and Operations
- Net Metering Regulations and Procedures

Solar PV generation – Need of the hour

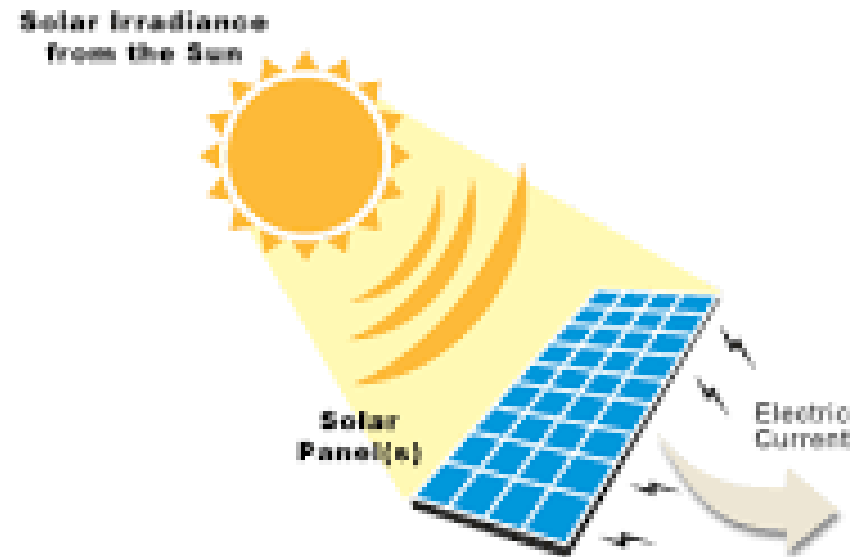
- Fossil fuel sources (coal, oil and gas) are limited and have huge social and environmental implications (local as well as global)
 - Last year India imported coal worth ~ **Rs. 73,000 Cr.**
- Reducing fossil fuel use and increasing renewable energy (RE) generation is a national priority
- National target – **1,75,000 MW of RE by 2022, of which 100 GW Solar**
- Solar rooftop – **40,000 MW**, Maharashtra - **4,700 MW** Rooftop capacity target
 - Pune total demand ~ **1,000 MW**
- **100 MW** of solar rooftop in Pune → avoided emission of **134,800 tonnes of CO₂/year** / saving **116500 tonnes of coal** / **500 acres of land for coal mining and power station**

Solar Rooftop Systems for Residential, Commercial and Industrial Use (Heat & Electricity)

Solar Rooftop Water Heaters



Solar Photovoltaic (PV) Rooftop for Electricity



Solar Rooftop PV system – key components

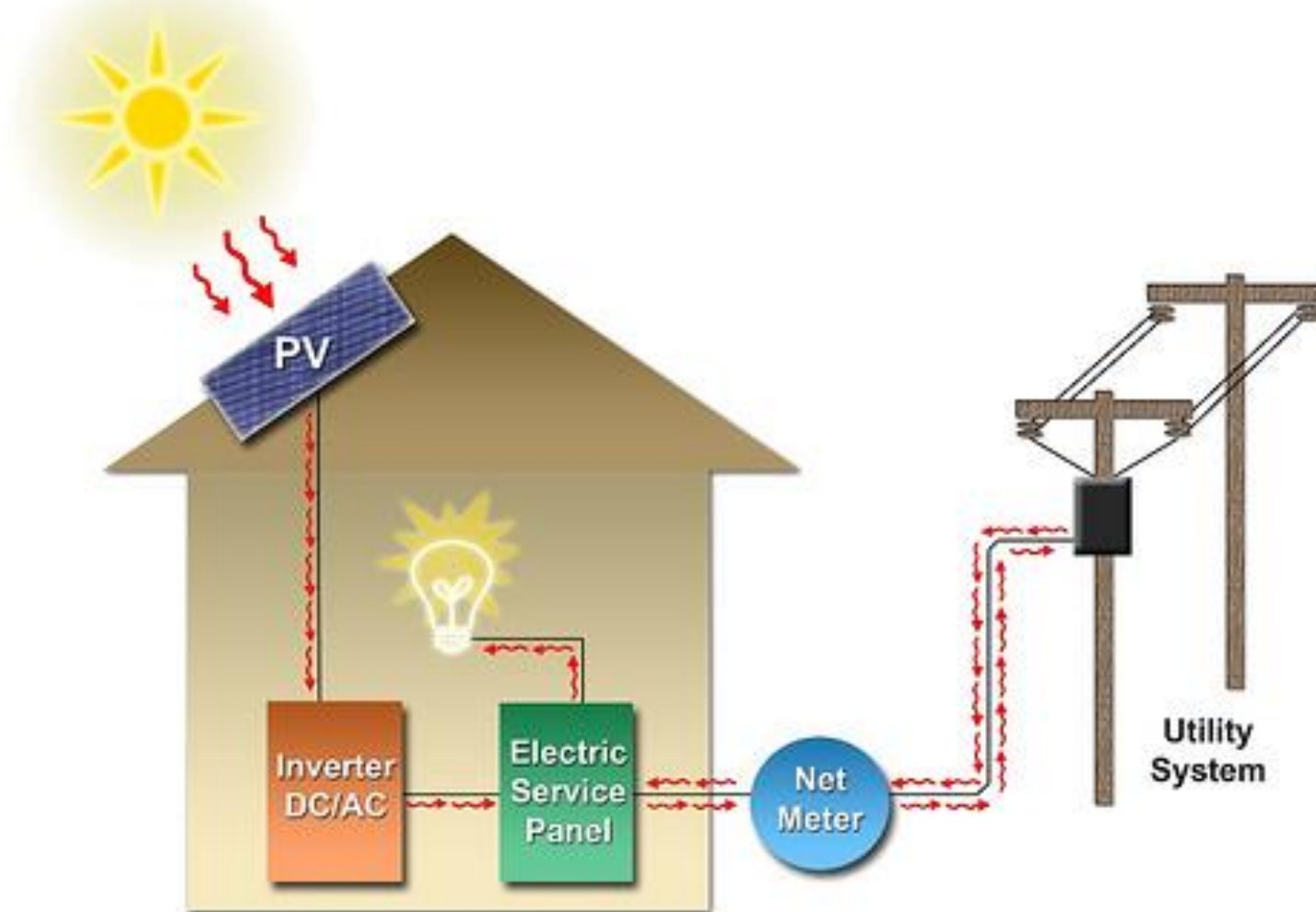
- Solar Panels – convert sunrays into electricity
- Inverter – aggregates generation from each panel and connects, converts to grid electricity (AC – grid voltage)



Types Rooftop Solar PV

- **Grid Connected Solar System:**
 - Without battery backup
 - Excess electricity fed back to grid
 - Cannot be used during power cuts
- **Grid Interactive Solar System:**
 - Connected to the grid, but including battery backup
 - Solar generation first charges battery and excess generation is sent to grid
- **Off-Grid Solar System:**
 - Only charges battery, not connected to grid, can support small appliances.

Net Metering



Source : EQ International Magazine

How Net Metering Works ?

- Consumers install solar PV and generate electricity
- Generated electricity is fed back in to the MSEDCL grid
- Electricity use of the consumer continue as usual
- At the end of the month MSEDCL bills consumer only for 'Net' electricity drawn by the consumer
- Example of net metering
 - Total Electricity consumption – 300 units
 - Solar Electricity generated / sent to the grid - 200 units
 - MSEDCL bill - $300 - 200 = 100$ units

Advantages of Net Metering

- No need for battery— saves cost (MSEDCL acts as battery !)
- Solar generation on holidays etc. is not wasted, as it is fed back in to the grid and credit is given when it is used (MSEDCL acts as energy bank !)
- Since electricity is generated and used locally it helps reduce distribution losses
- Small system size and investment allows even small consumers to take benefit of and participate in renewable energy generation

Economics and Operation

Area Required (shadow free – south facing) : 100 Sq. ft / kW

Generation : ~ 1350- 1450 kWh / kW / Year

| System Size | kW _p | 1 | 5 | 50 |
|--|-----------------|---------------|---------------|-----------------|
| Generation | (kWh pa) | 1,350 – 1,450 | 6,750 – 7,250 | 67,500 – 72,500 |
| Area required | (sq. ft.) | 100 | 500 | 5000 |
| Approximate Cost per kW (Without Subsidy) | Rs. Lakhs | 0.9 - 1.2 | 0.85 - 1 | 0.70 - 0.85 |

Cost Benefit

- Cost of electricity generation using a Rooftop Solar PV system is ***Rs. 6.50 - 8.00 /kWh***
- Solar Costs fixed over lifetime, while Utility Tariffs rising

| Energy Charges including Electricity Duty at 16% (does not incl. fixed costs) | Rs/kWh |
|--|---------------|
| LT Residential consumers above 100 units/ months | > 8.3 |
| LT Commercial consumers above 500 units/month | > 11.5 |
| LT Industrial consumer above 20 kW | > 8.1 |

Why should I install a Rooftop Solar System?

- Contribute to saving environment while saving money - **“Go Green and Save Money”**.
- Cost of power drawn from grid will keep increasing and solar will prevent your electricity bill from increasing.
- You can become partially or fully self sufficient with regard to your electricity requirement
- Low and easy operation and maintenance limited to cleaning of panels.
- Additional incentives
 - 30% subsidy from MNRE on capital cost of system (for residential and social sectors). MEDA Nodal Agency.
 - Commercial and Industrial Users can avail an accelerated depreciation on Solar Plants

Financing / Ownership Options

- Fully Self-Financed and Owned
- Partly self-financed & partly from bank loan
 - RBI provision to include Solar Rooftop PV systems as a part of their home loan by public sector banks
 - Priority Sector Lending status as well.
- Third Party Ownership with no upfront capital investment from consumer.
 - System leased to consumer
 - Third Party responsible for O&M, performance.

Maharashtra Electricity Regulatory Commission (MERC)

Net Metering Regulations - 2015

MERC, Net Metering Regulations, 2015

Eligibility

- Any consumer who wants to setup a Solar Rooftop Power Plant up to a maximum capacity of 1 MW is eligible
- Maximum limit for Solar Rooftop System Size: Limited to sanctioned load
- Additionally, voltage wise inter-connection limits as follows
 - Single phase : < 8 kW; Three phase : <150 kW ; 11kV : > 150 kW

MSEDCL approval

- The total capacity of solar plants connected to a distribution transformer (DT) should not exceed 40% of the DT Capacity.
- All approvals for connection to be provided on first come first serve basis
- On approval for installation of system the consumer and MSEDCL will sign net metering agreement for 20 years.

MERC Net Metering Regulations 2015

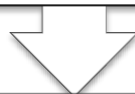
System Installation Details

- System can be installed on Roof or any Mounting Structure (Ground, Shed, Superstructures etc.) in consumer premises.
- System maybe owned by consumer directly or by Third Party leasing such system.
- Excess generation in a month carried over to next month. Excess generation at the end of the year will be purchased by MSEDCL at the average power purchase price as approved by the commission.
- If a consumer is within the ambit of time of day tariff, the peak and off- peak generation is adjusted against respective consumption and excess generation in any time slot is adjusted in off peak slot

Procedure

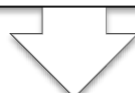
Application Letter : Receipt To be received within 3 days

Fill application form available on MSEDCL website , along with technical details of system with registration fees



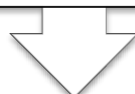
Technical feasibility assessment : To be conducted within 15days

Distribution Company to conduct Technical Feasibility Study ,eligibility of consumer and DT capacity availability



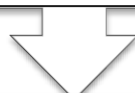
Approval from DISCOM : To be received within 7 days

DISCOM to provide approval letter to consumer for installation of Grid connected Solar PV rooftop Plant



Install solar system : Within 6 months of receipt of approval letter

Install solar system and send request to SE (O& M) DISCOM for testing and commissioning of plant



DISCOM testing, commissioning of plant and Install Net meter : Within 10 days

Install net meter and synchronise system and sign net metering agreement with DISCOM

Common Questions

- What happens if my electrical demand is more than solar generation at a particular point in time?
- What is the performance of solar PV in monsoon?
- What is the life of solar system?
- Is maintenance of the system cumbersome and costly?
- How much time does it take to install a rooftop system?
- Can I combine a battery system with net metering?

THANK YOU

shweta@prayaspune.org

ashwin@prayaspune.org

Disclaimer – The information in this presentation is only for creating awareness about rooftop solar systems, net metering and the existing policies, regulations etc. w.r.t rooftop solar in Maharashtra. PSCDCL, PMC, MEDA, MSEDCL, Prayas, Energy Group or PIC do not endorse any particular solar product or developer, neither any information or reference in this presentation should be construed as professional advice. Before taking any commercial decision independent professional advice should be sought.