

Rooftop Solar Net Metering: Regulatory Impact

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The Energy Freedom

- **Every body loves freedom**
- **How nice if I have my own power plant on my roof?**
- **Complete freedom from grid line**
- **Ideal: Solar plant + Battery**
- **But battery has high cost and although solar is cheaper**
- **At present: Solar + Grid best option**
- **Hence grid interactive solar plant**

Gross Metering and Net Metering

- **Example: Rooftop solar**
 - **Pumps 10 units to grid in day time**
 - **You consume 5 units day and night**
- **Gross metering: Two meters**
 - **You pay for 5 units**
 - **You are paid for 10 units**
- **Net metering: Single meter**
 - **Adjusts what you feed and take**
 - **You are paid only for 5 units**

The Term: ROOFTOP

- ❖ “Rooftop solar PV system” means the **grid interactive** solar photo voltaic power system installed on the **rooftops/ground mounted or open land** of consumer premises that uses sunlight for direct conversion into electricity through photo voltaic technology.
- ❖ “Net meter” means the **bi-directional energy meter** for measuring the quanta of electricity flowing in opposite directions and the **net quantum** of electricity consumed by the eligible consumer or injected into the distribution system of the licensee;
- ❖ “Net metering **system**” means a system consisting of a **solar meter** and **net meter** with their associated equipment.

(Source: JERC, KERC)

Billing Sample

BSES

EBILL Customer

Date of Print Out: 24.07.2015

BSES Rajdhani Power Ltd.

Meter Details Annexure

Name : M/s. THE SECRETARY
 Billing NATIONAL PDODUCTIVITY COU LODHI ROAD
 Address :NEW DELHI 110003

Supply Address : NATIONAL
 PDODUCTIVITY COU PLOT 5&
 INSTITUTIONAL AREA NEW DELHI 110003

Mobile / Tel. No. [REDACTED]

District / Division :Nizamuddin

Meter Reading Status :MR

Bill Month :JUL-15

Bill Date :13-07-2015

Sanctioned Load :224.00 (KW)

Contract Demand :353.00 (KVA)

MDI :192.00 (KVA)

Power Factor :.947

Pole No. :NA

Walking Sequence :NZ2KC0027A0AA

Cycle No. :KC

Tariff Category :Non-Domestic [HT]

CA No. [REDACTED]

Energisation Date :17.05.2002

Meter Type :3PSK

Supply Type :HT(11KV)

Bill No. [REDACTED]

Bill Basis :Actual

Customer Care Centre No. 39999707

Net Meter Consumption Details (Date of Reading : 30-06-2015)

B/F Units (If any)	Export Reading			Import Reading			Net Difference			Moderated Units			C/F Units (If any)
	Normal	Peak	Offpeak	Normal	Peak	Offpeak	Normal	Peak	Offpeak	Normal	Peak	Offpeak	
0	156	78	0	16020	8742	1134	15864	8664	1134	15864	10397	851	0

(Consumption in the above table are in KWH/KVAh, as applicable)

Moderated units: Peak units are increased by 20% and off-peak units decreased by 25%

Rooftop Relevance Today

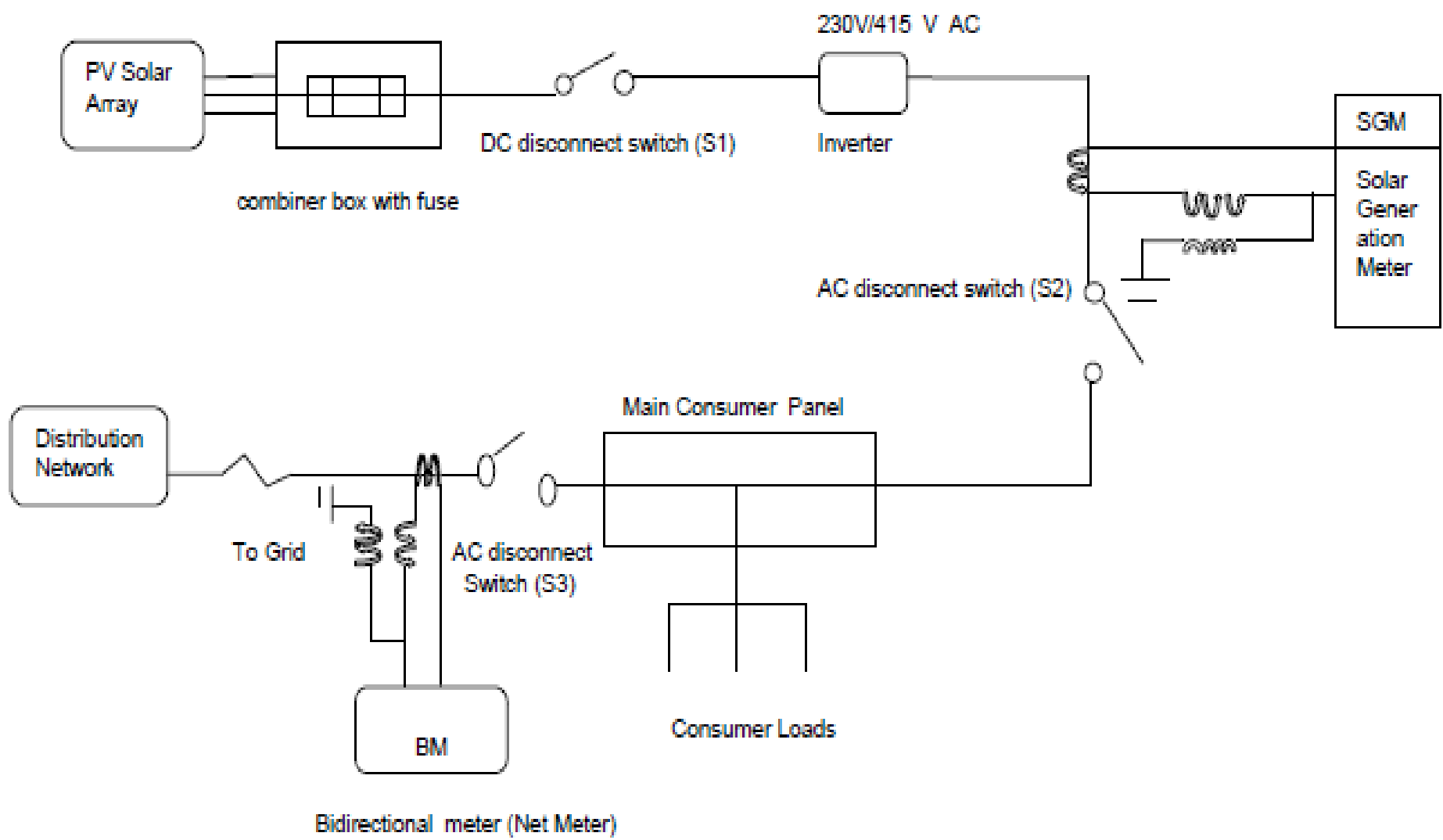
Evolution Period	Affordable to
1980 - 1989	Research laboratories, Space centers
1990-1999	Off-grid, Govt. Schemes, Remote area, high subsidy
2000-2009	Grid scale, Govt. supported, Institutes
2010-2019	Grid Private, Commercial, Individual roofs ✓

Rooftop Concepts

CAPEX	OPEX*
Project owned by roof owner/consumer	Project owned by project developer/supplier
Roof owner/consumer responsible for O&M of system after initial 1-2 year period	Roof owner/consumer not responsible for O&M; O&M is responsibility of project developer
Can't be converted to OPEX model at a later date	Can be converted into CAPEX at a pre-decided date (option to buy back)
Power to be used for captive consumption; surplus power can be sold to distribution utility	Power can be sold to roof owner; Power can be sold to distribution utility; Power can be sold to third party**

- **CAPEX – Prosumers** unlike consumers
- * **OPEX – Mostly RESCOs**
- ** **Some states do not allow 3rd party sale**

Net Metering Configuration (Source: TERC)



Benefits

Quick installation	Zero emission
No noise	Low maintenance
Reliable	Long life
On site production	Affordable
Extra income	No extra land
No T&D loss	Local employment

- ❖ **MNRE rooftop target: 40,000MW (2022)**
- ❖ **2016-18: 2000, 4000, 4000 MW**
- ❖ **Fiscal and financial incentives**

New Concept: Many Issues

- **Legal enforcement provision**
- **Rate of net electricity per unit**
- **Metering, billing and banking procedure**
- **Application and approval procedure**
- **Approved draft of PPA**
- **Sudden load on local transformer**
- **New technical specification**
- **Grid interconnection safety guidelines**
- **Loss of customer base of utilities**
- **Extra burden to remaining consumers**
- **Capacity cap on solar plant**
- **Quantity of solar electricity to be sold**
- **State/Central fiscal/ financial incentives**
- **REC trading eligibility**
- **RPO offsetting eligibility**

Who will solve the problems?

- **Central Government?**
 - No. Electricity – State subject
- **State Government?**
 - No. Stake holder – Vote bank
- **DISCOMs/ Utilities?**
 - No. Vested Business interest
- **Independent authority needed**
- **CERC?**
 - Yes. But can only guide SERCs
- **SERCs?**
 - Yes. Fully authorized

State Electricity Regulatory Commissions': Orders

- **Positive Developments**
- **23 states and 6 UTs passed orders**
- **Points common to all:**
 - **DISCOMs to permit on a nondiscriminatory and 'first come, first serve' basis**
 - **All residential, commercial and industrial consumers are eligible**
 - **MNRE/State subsidy if available may be availed**
 - **SPV plant as per MNRE tech spec**
 - **Interconnection as per CEA Tech Spec**
 - **No banking, wheeling and cross subsidy charges**
 - **Tariff as per SERC in a given year**
 - **Interconnection agreement for 20-25 yrs**
 - **RPO to be claimed by utility**

State Electricity Regulatory Commissions': Orders

State	System Size	Capacity Cap	Transformer Cap	Banking Cap	REC Trading
Andhra Pradesh	1kW-1MW	100% of SL	Case to Case	No cap	Silent
Bihar	1kW-1MW	100% of SL	15%	90%	Allowed
Chhattisgarh	50 kW-1MW	No cap	Silent	49%	Silent
Delhi	1kW-1MW	No cap	20%	No cap	Allowed
Gujarat	1kW – 100kW	50%	Silent	Silent	No

State Electricity Regulatory Commissions': Orders

State	System Size	Capacity Cap	Transformer Cap	Banking Cap	REC Trading
Haryana	1kW-1MW	100% of SL	15%	90%	Silent
Himachl Pradesh	1kW-1MW	80% of SL	Case to case	Silent	Allowed
Jharkha nd	1kW-1MW	100% of SL	15%	Silent	Allowed
Karnata ka	1kW-1MW	No cap	80%	Silent	Silent
Kerala (Wheel)*	1kW – 100kW	No cap	80%	No cap	Silent

State Electricity Regulatory Commissions': Orders

State	System Size	Capacity Cap	Transformer Cap	Banking Cap	REC Trading
Manipur	1kW-500kW	80% of SL	30%	80%	Not Allowed
Maharashtra	1kW-1MW	100% of SL	40%	No cap	Not Allowed
Madhya Pradesh	1kW-112kW	No cap	15%	No cap	Silent
Odisha	1kW-1MW	100% of SL	30%	90%	Not Allowed
Punjab	1kW-1MW	80% of SL	30%	90%	Allowed

State Electricity Regulatory Commissions': Orders

State	System Size	Capacity Cap	Transformer Cap	Banking Cap	REC Trading
Rajasthan	1kW-1MW	80% of SL	30%	No cap	Silent
Tamil Nadu	1kW-1MW	100% of SL	30%	90%	Silent
Telangana	1kW-1MW	No cap	50%	No cap	Silent
Uttar Pradesh	1kW-1MW	100% of SL	15%	No cap	Allowed
Uttarakhand	3kW-500kW	No cap	Silent	95%	Silent

State Electricity Regulatory Commissions': Orders

State	System Size	Capacity Cap	Transformer Cap	Banking Cap	REC Trading
West Bengal	5kW-100kW	90%	Silent	90%	Silent
Goa and 6 UTs	1kW-500kW	No cap	30%	No cap	Allowed

Observations:

1. SL means sanctioned load
2. REC silent means as per CERC if allowed
3. Practically whole country ready for Net Metering
4. No uniformity, large variation in regulations
5. Banking cap to protect interest of DISCOMs
6. Transformer cap silent implies case to case basis
7. Banking cap 'silent' is inherent in capacity cap

Achievement

Source: MNRE (as on Feb 2016)

- ❖ **Sanctioned and approved: 2500 MW**
- ❖ **Installed:**
 - ❖ **Through schemes: 116 MW**
 - ❖ **Through SECI: 39 MW**
 - ❖ **Through channel partners: 11 MW**
 - ❖ **Total achievements: 166 MW**
- ❖ **Slow progress against target of 40,000 MW**
- ❖ **Needs to speed up through:**
 - ❖ **Innovative financing**
 - ❖ **Infrastructure improvement**
 - ❖ **Enabling policy instruments**
 - ❖ **Simplified procedures**

The Future Ahead

- ❖ **Bright Future – Catalyzed by Efficient & Cheap Battery e.g. Lithium Ion, NiMH**
- ❖ **Solar grid power @Rs 3.00 per unit (2019)**
- ❖ **PV + Wind + Storage – Grid power cheaper**
- ❖ **Every house – Own power plant with storage
– 100% free from grid**
- ❖ **100% cars/ Two wheelers – Battery operated
– Charged by rooftop solar – No traffic
pollution**

The Future Ahead

- ❖ **No need of green corridor of grid – saving in infrastructure cost**
- ❖ **100% lighting – LED only – Great saving**
- ❖ **Solar passive architecture – Energy efficient buildings – Mandatory**
- ❖ **Solar supported Digital India – A reality – Even in rural/ remote areas**
- ❖ **Coal/Oil/Gas power project – only for industries/large commercial entities**

Complete Information Available on MNRE Website

<http://mnre.gov.in/schemes/decentralized-systems/solar-rooftop-grid-connected/>

THANK YOU

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