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ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
(A Statutory Body of the Govt. of India)
(Ministry of Education, Govt. of India)
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CIRCULAR

To

All Vice Chancellors of Technical Universities and
All Directors/ Principals of AICTE Approved Institutions,

Subject: Installation of Roof Top Solar (RTS) plants to harness Solar Energy.

Sir/Madam,

As you are aware that during COP26 at Glasgow, Hon'ble Prime Minister announced five nectar elements (Panchamrit) of India's climate action. The announcements, inter-alia, include achieving 500 GW non-fossil energy capacity by 2030 and achieving net-zero emissions by 2070 Achieving this ambitious target requires Renewable Energy (RE) capacity addition of 30-40 GW annually for which cohesive efforts of all stakeholders is needed.

Installation of Rooftop Solar (RTS) plants in buildings is one of the simplest ways to contribute in achieving the energy independence. It has multiple benefits such as no requirement of additional land, no requirement of new transmission and distribution lines, no major grid balancing issues, etc. Further, the installation of RTS is financially viable even without any subsidy/support from the Government. A detailed note on installation of RTS on buildings is attached for your reference.

All AICTE approved institutions/technical universities are requested to explore the possibility of installing RTS plants, which apart from saving electricity, contribute towards achieving clean energy targets of the country. For any assistance in this regards, Shri J. K Jethani Sr. Director, MNRE has been designated as the Nodal Officer and may be contacted at jethani.jk@nic.in.

with regards,

Yours Sincerely,

01 May, 23

(Dr. Mamta Rani Agarwal)

Grid Connected Solar Rooftop plant

Solar photovoltaic (PV) panels can be placed on the top of building roofs to generate electricity. Such a system is called a rooftop solar system. Electricity generated from the rooftop solar system can be used to meet the buildings' energy demand, charge batteries for later use, or can be exported to the electricity grid.

Apart from the solar PV panels, a rooftop solar system also has other components such as an inverter, module mounting structure, wires and cables, monitoring and safety equipment, and meters, among others. The diagram below shows the key components of a typical grid-connected rooftop solar system.

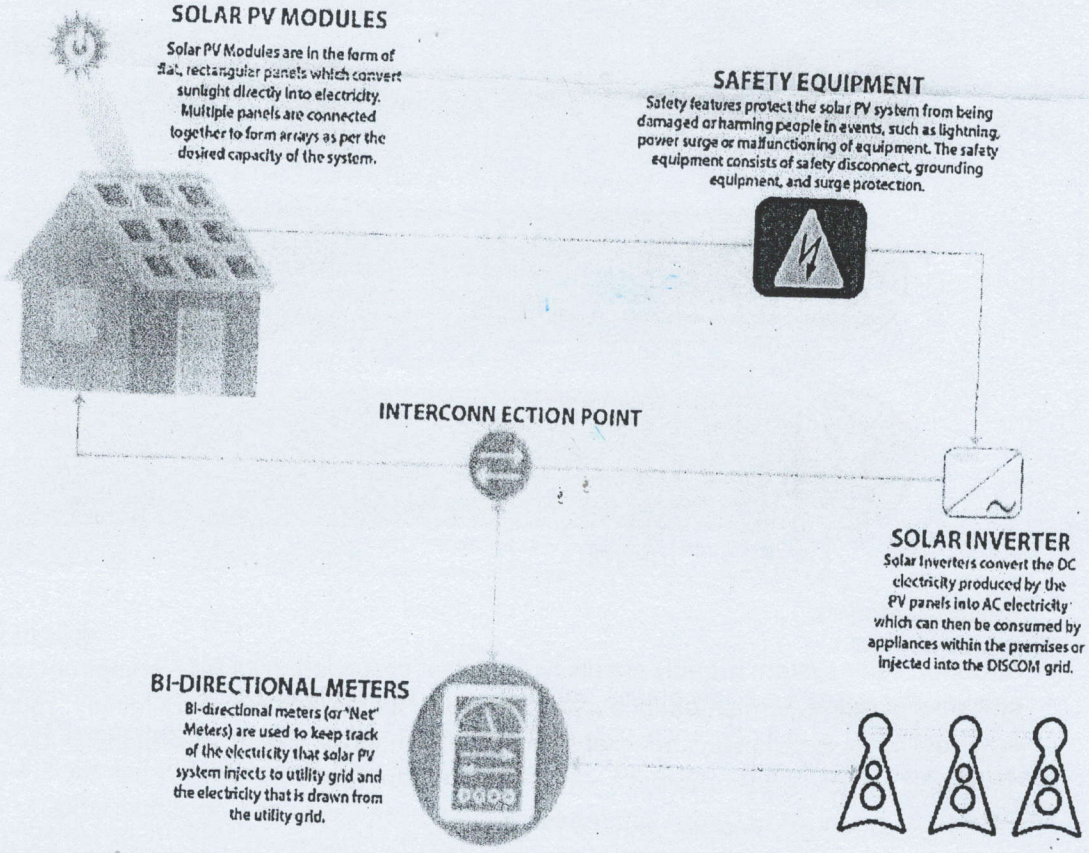


Figure 1 - Rooftop solar system components[1]

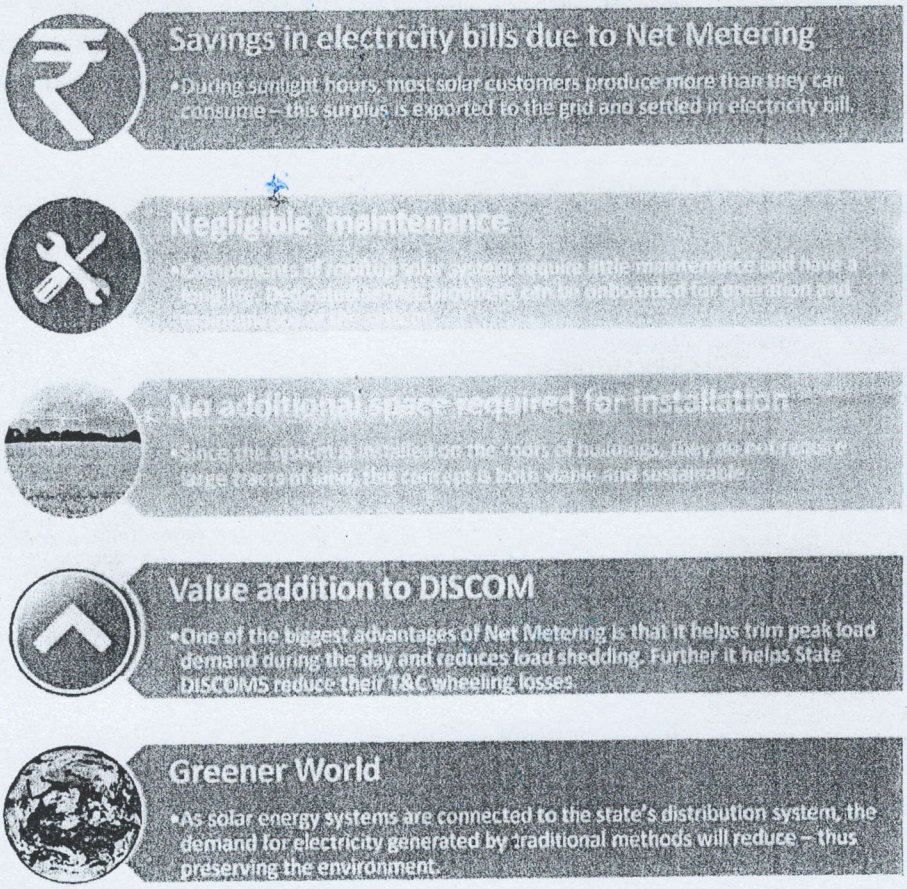
Net metering

In the case of grid-connected electricity consumers using rooftop solar systems, "net metering" is a mechanism that allows them to export surplus energy into the grid. At the time of electricity bill generation, the consumers are billed only for the net electricity they have consumed i.e.,

1 http://solarbses.com/about-grid-connected-rooftop-solar.aspx

the difference between the electricity they have consumed from the grid and the electricity they have exported to the grid (from the rooftop solar system).

Benefits of solarization



Business Models

A rooftop solar system broadly entails two types of costs during its life – an upfront capital cost and an operation & maintenance cost during its operational life. Accordingly, rooftop solar systems have traditionally been set up mainly under two business models: CAPEX and RESCO.

To understand these models, consider the following scenario: two electricity consumers have a daily consumption of 550 kWh and 200 KWh at a tariff of ₹7/kWh. Given the availability of sufficient space for the installation of a rooftop solar system, they are considering a 100 kW and 50 KW rooftop solar system, respectively. A comparison between the CAPEX and RESCO models for implementing the same is presented below.

Assumption:

1. *Considering a flat grid tariff of ₹7/kWh and 365 days of operation*

Before Solar		
	Building A	Building B
Daily electricity consumption (kWh)	550	200
Annual consumption (kWh)	2,00,750	73000
Grid tariff (₹/kWh)	7	7
Annual electricity bill (₹)	**14,05,250**	**5,11,000**

Two buildings have been considered for illustration. Building A is larger than Building B. Building A may be a bigger KV School and building B may be a smaller School.

CAPEX model

CAPEX stands for Capital Expenditure. In this model, the upfront capital investment comes from the consumer who also owns the roof rights. The consumer hires a solar project developer, which provides turnkey installation of the entire solar power system and hands over the assets to the consumer. The company may also take care of the annual operation and maintenance (O&M) of the plant at a mutually agreed cost. The annual savings under the CAPEX model in the scenario considered above is explained below.

Assumption:

1. *Electricity generation from the rooftop solar system is assumed to be 4 kWh/day for 300 days in a year.*
2. *Considering 100% inhouse consumption of solar power.*
3. *Cost of RTS plants is being assumed to be Rs 5 Cr/MW.*

Savings from rooftop solar in the CAPEX model		
	Building A	Building B
Daily electricity consumption(kWh)	550	200
Annual consumption (kWh) - A	2,00,750	73,000
Proposed Solar capacity(kWp)	100	50
Estimated Cost for Proposed RTS Solar	50,00,000	25,00,000
Daily Solar generation(kWh)	400	200
Annual Solar generation (kWh) - B	1,20,000	60,000
New electricity import from grid (kWh) - (A-B)	80,750	13,000
New annual electricity bill (₹)	5,65,250	91,000
Annual savings due to rooftop solar (₹)	8,40,000	4,20,000

RESCO model

RESCO stands for Renewable Energy Service Company and is the equivalent of an OPEX (Operating Expenditure) model. Under the RESCO model, the consumer does not have to bear the initial capital cost of installing the rooftop solar system. A solar project developer invests in capital cost and the consumer pays for the energy supplied by the rooftop solar system. Both the consumer and developer sign a long-term power purchase agreement (PPA) for an agreed tenure and electricity tariff. The responsibility for the operation and maintenance of the rooftop solar system lies with the solar project developer during the tenure of PPA. The annual savings under the RESCO model in the scenario considered above is explained below.

Assumption:

1. *Electricity generation from the rooftop solar system is assumed to be 4 kWh/day for 300 days in a year.*
2. *Assuming solar PPA tariff between consumer and RESCO as ₹4/kWh*
3. *Considering 100% inhouse consumption of solar power.*
4. *Cost of RTS plants is being assumed to be Rs 5 Cr/MW.*

Savings from rooftop solar in the RESCO model		
	Building A	Building B
Daily electricity consumption(kWh)	550	200
Annual consumption (kWh) - A	2,00,750	73,000
Proposed Solar capacity(kWp)	100	50
Est. cost of proposed RTS	50,00,000	25,00,000
Daily Solar generation(kWh)	400	200
Annual Solar generation (kWh) - B	1,20,000	60,000
RESCO PPA Tariff	4	4
Payment to RESCO - C	4,80,000	2,40,000
New electricity import from grid (kWh) - (A-B)	80,750	13,000
Existing electricity tariff	7	7
Payment to DISCOM - D	5,65,250	91,000
Annual electricity cost (C+D)	8,88,250	3,31,000
Annual savings due to rooftop solar (₹)	5,17,000	1,80,000

Conclusion

Government and institutional buildings can act as a critical resource for solar energy adoption due to the availability of flat roofs and vacant space. Rooftop solar adoption by Government and institutional buildings, most importantly, will be a great demonstration point and will inculcate environmental sustainability values for citizens who frequent these public offices. It will help raise awareness about electricity use in general and spark interest amongst the public officers and visiting citizens to become energy efficient.