

सां/No. : 5-1(17)/2008-PD

Dated 17.04.2023

प्रेषक / From : संयुक्त सचिव (प्रशासन)
Joint Secretary (Admn.)

सेवा में / To : सी.एस.आई.आर. की सभी राष्ट्रीय प्रयोगशालाओं/संस्थानों/मुख्यालय/एककों के निदेशक/प्रधान
The Directors/Heads of all CSIR National Labs./Instts./Hqrs./Units

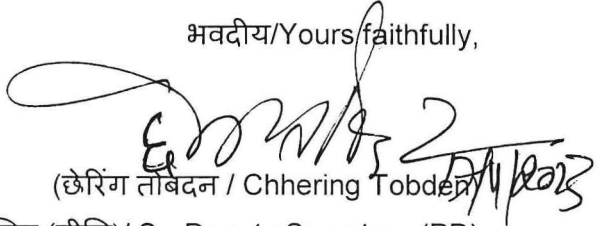
विषय/ Sub : Installation of Rooftop Solar (RTS) on buildings to contribute in achieving the energy Independence- reg.

महोदया/Madam / महोदय/Sir,

मुझे, उपरोक्त विषय पर, विद्युत मंत्री एवं नवीन और नवीकरणीय ऊर्जा मंत्री, भारत सरकार के दिनांक 09.02.2023 के अर्धशासकीय पत्र सं 318/25/2022-GCRT को आपकी जानकारी, मार्गदर्शन और आवश्यक कार्यवाही के लिए अग्रेषित करने का निदेश हुआ है।

I am directed to forward herewith Minister of Power and Minister of New & Renewable Energy, Government of India, D.O letter No. 318/25/2022-GCRT dated 09.02.2023 on the above mentioned subject for your information, guidance and necessary action.

भवदीय/Yours faithfully,


(छेरिंग तोबदेन / Chhering Tobden)

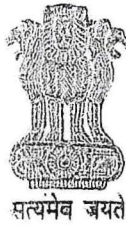
वरिष्ठ उप सचिव (नीति)/ Sr. Deputy Secretary (PD)

संलग्न/Encl. : यथोपरि/As above

प्रतिलिपि/Copy to:

- 1) सी.एस.आई.आर. वेबसाइट/ CSIR Website
- 2) कार्यालय प्रतिलिपि/Office copy.

आर. के. सिंह
R. K. SINGH



विद्युत मंत्री एवं
नवीन और नवीकरणीय ऊर्जा मंत्री
भारत सरकार
Minister of Power and
Minister of New & Renewable Energy
Government of India

D.O. No.318/25/2022-GCRT

09 FEB 2023

Dear Dr. Singh,

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 States; and Ministries and its organisations is needed.

2. Installation of Rooftop Solar (RTS) on 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. The RTS in Government buildings can be installed under CAPEX/ RESCO mode. In the CAPEX mode, the initial investment can be recovered from the savings in the electricity bill within 4 - 5 years depending upon the tariff applicable and thereafter the electricity generated from the plant is almost free for the next 19-20 years. In the RESCO mode, the building owner can get cheaper solar power without any investment. A detailed Note on installation of RTS on Government buildings is attached for your ready reference.

3. It is requested that all the Government Departments/Organisations/CPSEs under your Administration be encouraged to install RTS plants, which apart from saving electricity, contributes towards achieving clean energy targets of the country. For any assistance in this regard, Shri J K Jethani, Sr. Director, MNRE has been designated as the Nodal Officer and may be contacted at jethani.jk@nic.in and Cell No. +91-9810314003.

4. I am hopeful that with our joint efforts we will be able to achieve the targets well before the timelines.

With regards,

Encl: As above.

Yours sincerely,

(R. K. Singh)

Dr. Jitendra Singh
Minister of State (IC) of Earth Sciences and
Science and Technology
South Block, Raisina Hill
New Delhi-110011

S621140

Rooftop Solarization of Government and Institutional Buildings

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.

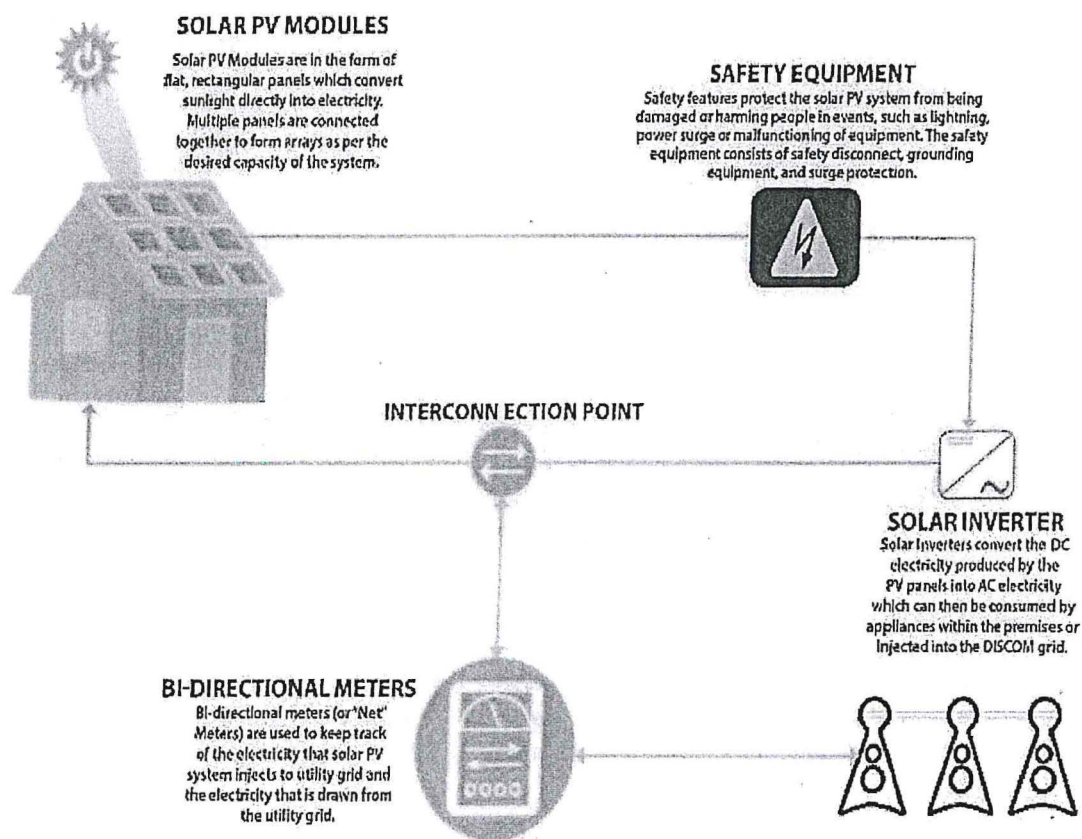


Figure 1 - Rooftop solar system components¹

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://solarbsees.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



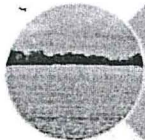
Savings in electricity bills due to Net Metering

- During sunlight hours, most solar customers produce more than they can consume – this surplus is exported to the grid and settled in electricity bill.



Negligible maintenance

- Components of rooftop solar system require little maintenance and have a long life. Dedicated service providers can be onboarded for operation and maintenance of the system.



No additional space required for Installation

- Since the system is installed on the roofs of buildings, they do not require large tracts of land, this concept is both viable and sustainable.



Value addition to DISCOM

- One of the biggest advantages of Net Metering is that it helps trim peak load demand during the day and reduces load shedding. Further it helps State DISCOMS reduce their T&C wheeling losses.



Greener World

- As solar energy systems are connected to the state's distribution system, the demand for electricity generated by traditional methods will reduce – thus preserving the environment.

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.