Global Gateway

Barriers and Opportunities for Scaling up Rooftop Solar PV in Bangladesh

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Objectives

- Finding international best practices of NEM with examples of success stories
- Survey of existing Net Metering rooftop systems in Bangladesh and the challenges faced
- Review of the NEM Guidelines of Bangladesh and identification of scope for Improvement

Contents

- Background
- Net Metering Policy of Bangladesh
- Potential and Challenges of Rooftop Solar PV expansion in Bangladesh
- Comparison of NEM in Bangladesh and Other Countries
- Performance Analysis of Rooftop systems
- Investor Survey
- Recommendations

Background of the Study

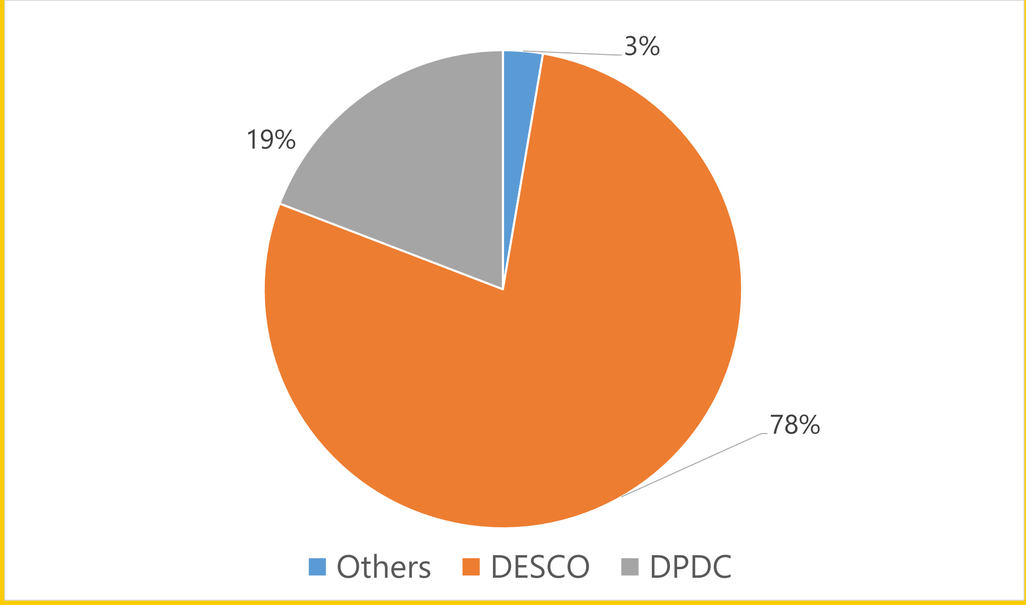
- Bangladesh issued the renewable energy policy in 2008
- 5% of the power demand by renewables by 2015 and 10% by renewables by 2020
- Achievement: by the end of 2023, Bangladesh had only 3%
- Reason was obvious: price of modern renewable electricity (solar and wind) was higher than that of fossil fuel-based electricity, and there was no grid parity.
- The technology has advanced, and economies of scale have brought down the cost of modern renewables,
- The cost of renewable electricity is even lower than that of some types of fossil fuels in the current energy mix
- There is an accompanying increase in investor interest in renewable energy in all over the world and Bangladesh is not out of it.

Background and NEM Guideline

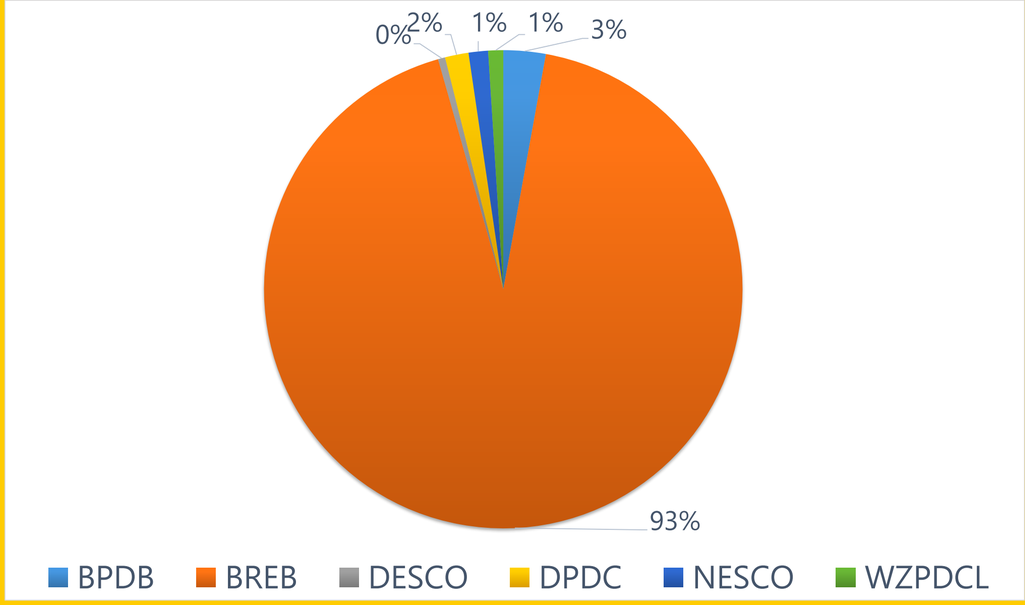
- Bangladesh has adopted the Mujib Climate Prosperity Plan in 2023
- Bangladesh has set a target of 40% of energy from Renewable Sources by 2041
- Solar rooftop systems can play a significant role in achieving this target.
- In July 2018, Bangladesh has issued the Net Metering Guidelines in order to facilitate the grid integration of distributed renewable energy based electricity
- Prosumers (producers and consumers) can include domestic or residential, commercial and industrial consumers.
- To date Bangladesh has installed 2,125 solar PV rooftop systems under the net metering scheme, which comprise 88.20 MW of generation capacity
- There are 232 large rooftop systems of 76.36 MW of installed capacity which are outside the Net Metering scheme

Utilities connecting solar rooftop systems

Utilities connecting non-NEM systems



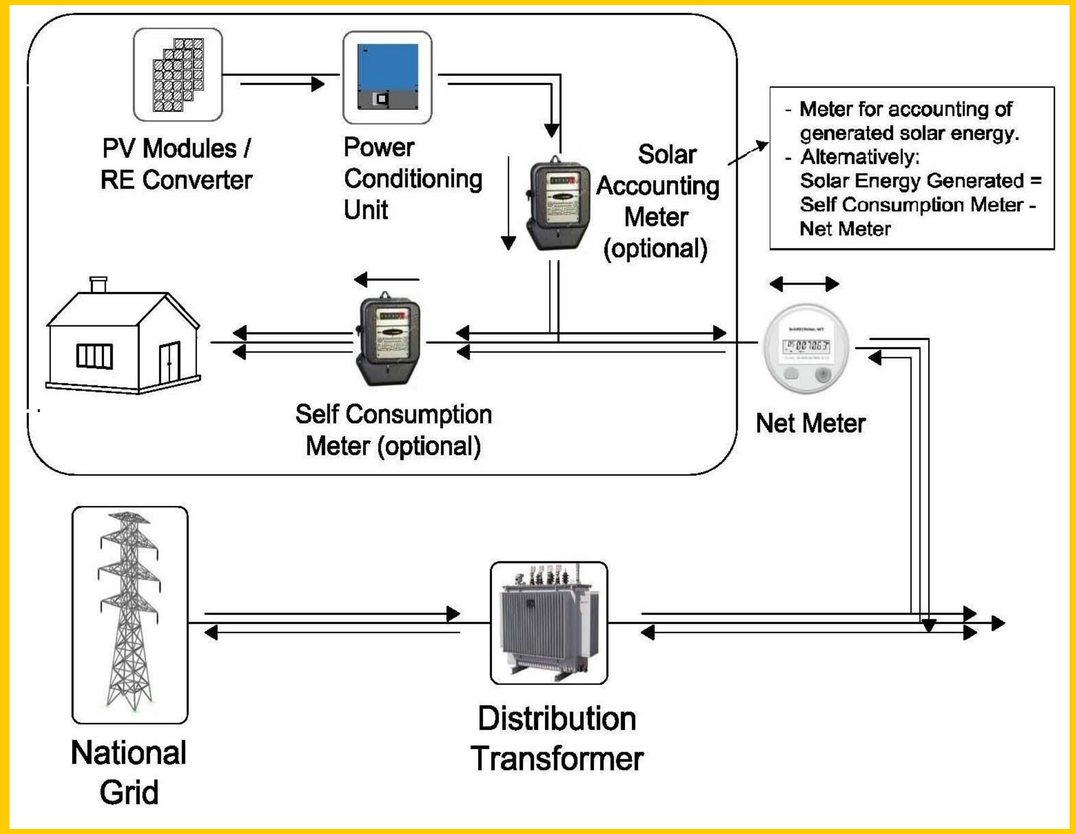
Utilities connecting NEM systems

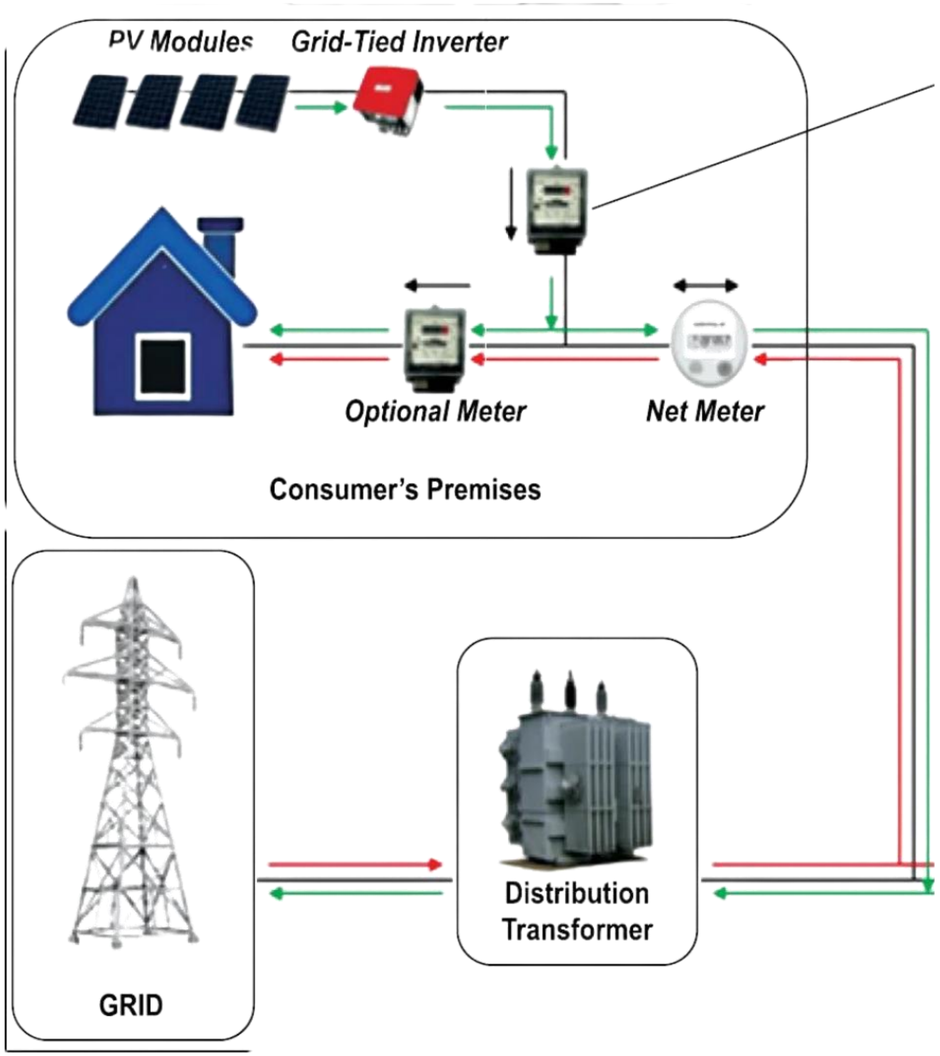


Source: SREDA website

About Net Metering Policy

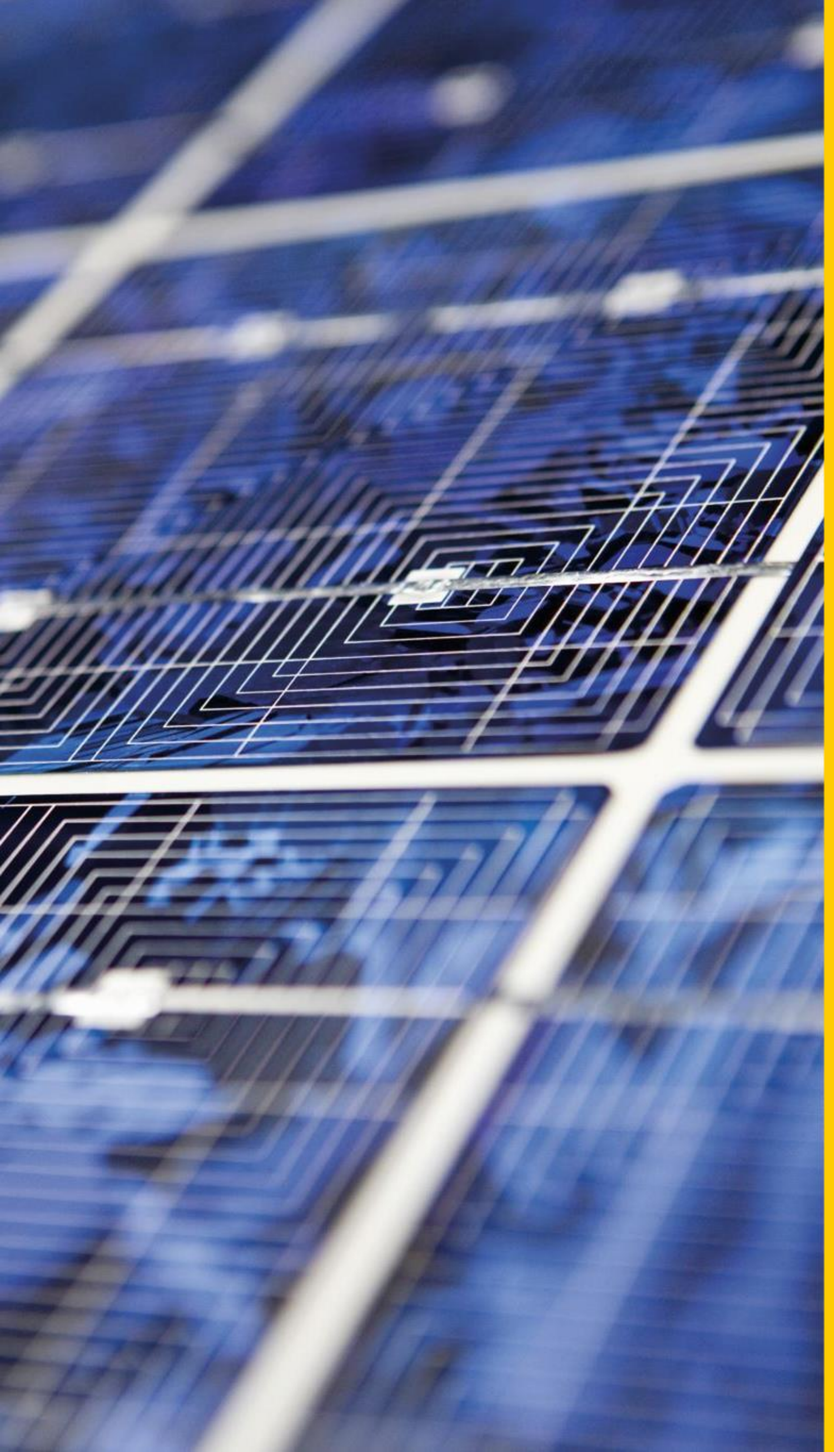
- The prosumer consumes the electricity produced from own Renewable Energy system, and if there is any excess electricity, it will be fed into the grid through the net meter.
- The measured data is stored in the meter.
- The customer's bill is calculated according to the net energy consumed by the prosumers from the grid, i.e. the energy drawn from the network minus the energy delivered to the network over the specified billing period.
- By the end of the specified rolling cycle or settlement period, the consumer is compensated for all kWh credits as a rate equal to the bulk purchase tariff of that distribution utility.





Features of Net Metering Policy of Bangladesh

- Any three-phase consumer can be considered eligible for the NEM system;
- Maximum capacity of the installed RE system is 70% of the sanctioned load;
- For a medium voltage (MV) consumer, the installed capacity of the RE system can be a maximum of 70% of the rated capacity of the distribution transformers.
- The maximum output AC capacity of the installed RE system can be up to 10 MW;



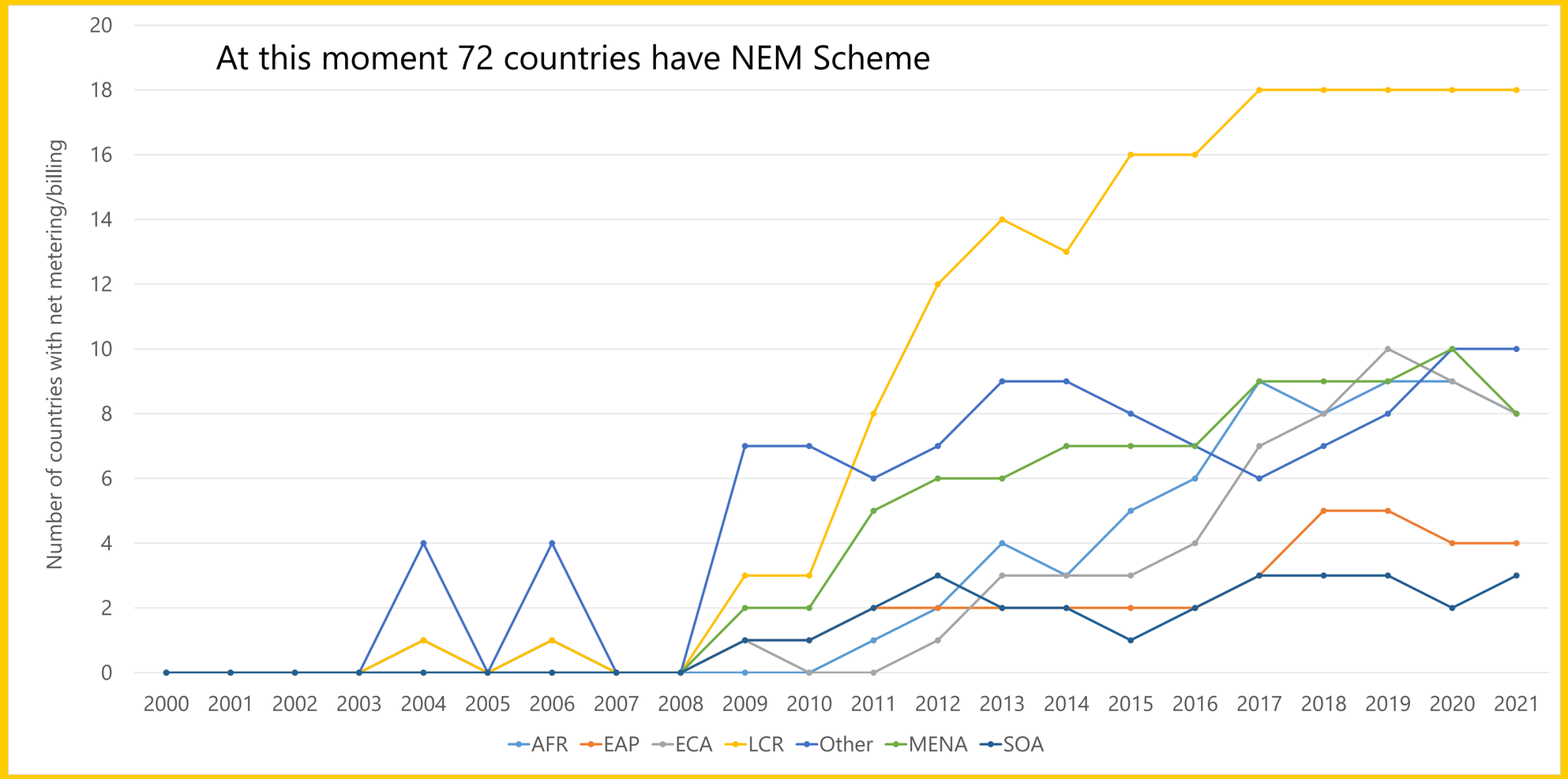
Potential for solar rooftop in Bangladesh

- Solar rooftop systems can produce electricity at the cost of within 5 US cents per unit whereas the ground mounted solar systems have a tariff of 9.85 US cents.
- The electricity rate from solar rooftop is much lower than the grid electricity rate for industrial or commercial consumers, which is approximately 10 US cents per unit.
- The weighted average grid electricity generation cost in 2022-23 was BDT 11.02 per unit (Electricity supply cost BDT 11.51 per unit).
- Therefore, the generation cost for rooftop solar is much lower than the average grid power generation cost of Bangladesh.

Challenges to the expansion of solar rooftop systems in Bangladesh

- The policy excludes the largest market segment of grid-connected consumers, which are single-phase consumers (which have loads less than 7 kW), as the policy allows only three-phase electricity consumers to be connected.
- The output AC capacity of the RE converter can be a maximum of 70% of the consumer's sanctioned load, which restricts the size of the system installed.
- The maximum output AC capacity of the installed RE system for NEM is 10 MW.
- Grid upgrade costs must be borne by the prosumer if applicable.
- OPEX system owners cannot sell their electricity to anyone other than the specific consumer.
- All small scale rooftop systems (within and outside Net Metering) are self-financed by the prosumers, but majority of the larger systems are backed by financial institutes and IDCOL is leading this financing.

Region wise trend of NEM adoption



Comparison of NEM policy of Bangladesh with other countries

- A few countries in Asia allow agricultural consumers to be NEM prosumers, But not Bangladesh.
- Bangladesh sets a capacity limit of upto 10 MW AC capacity.
- Although Bangladesh states that the NEM capacity should not exceed 70% of sanctioned load, most countries do not impose this type of restriction.
- Bangladesh specifies that only three phase consumers are eligible, but this limitation is not applicable in most other countries.

Comparison of NEM policy of Bangladesh with other countries

- In Bangladesh, the tariff structure is set at the bulk rate (only for the net exported amount). In comparison, some countries specify the tariff rate at a known fixed amount, either to remain fixed for the entire life of the system, or to vary according to the age of the system.
- In some countries, the tariff rate can vary according to the type of prosumer, whereas in other cases, the retail rate instead of the bulk rate is applied.

  In Palestine, tariff rates can vary seasonally.
- In Bangladesh, one year is considered the settlement period, but in some countries it is set up to two years.

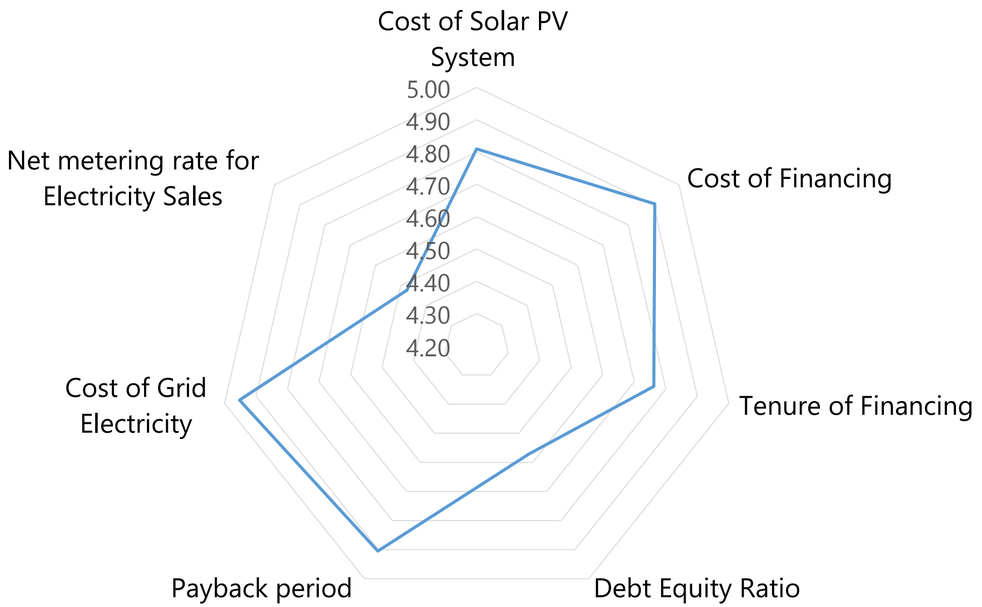
Comparison of power generation and solar irradiation

Causes of low electricity generation

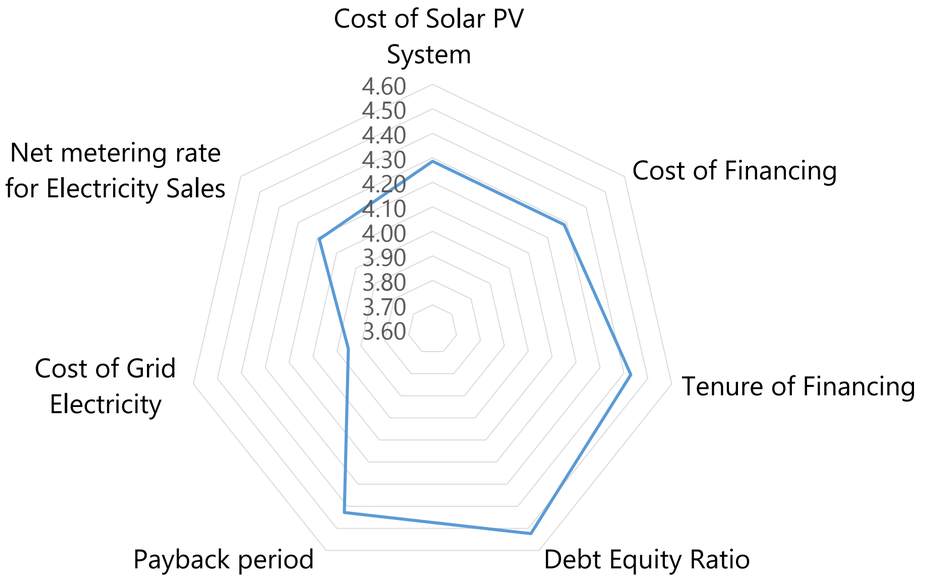
- Lack of cleaning and maintenance.
- System failure.
- Load scheduling.
- Deliberate shutdown of inverter.
- System maintenance.
- Holiday shutdown.

Investor survey:
Cost features of solar rooftop systems

Importance of cost features

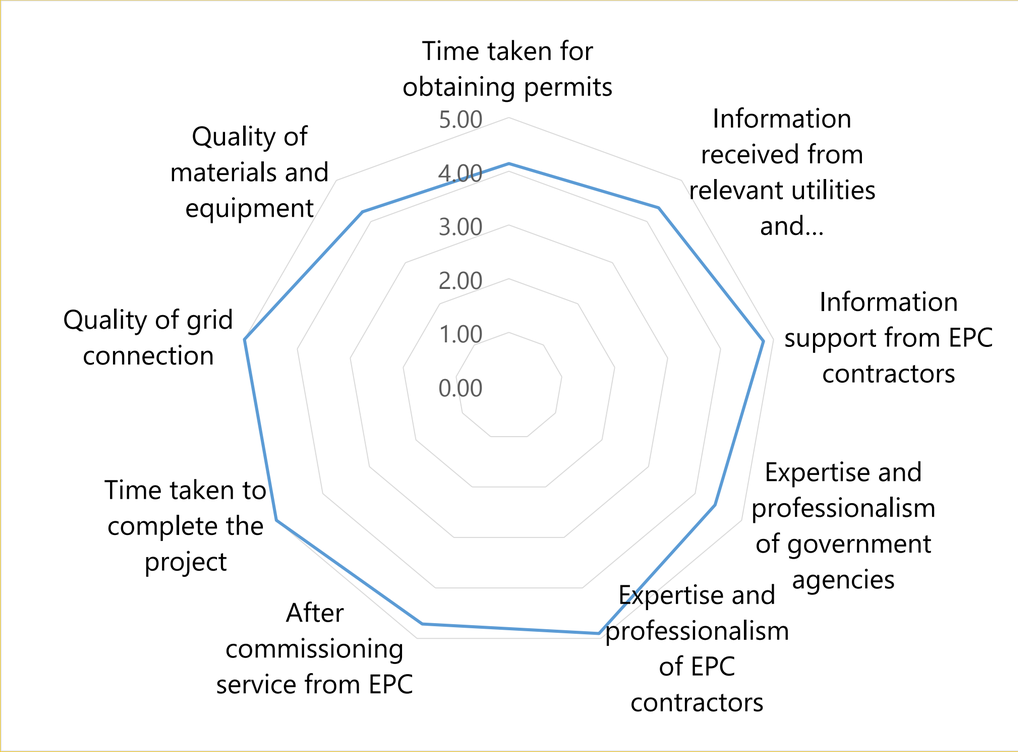


Satisfaction with cost features



Investor survey: Service features of solar rooftop systems

Importance of Service Features



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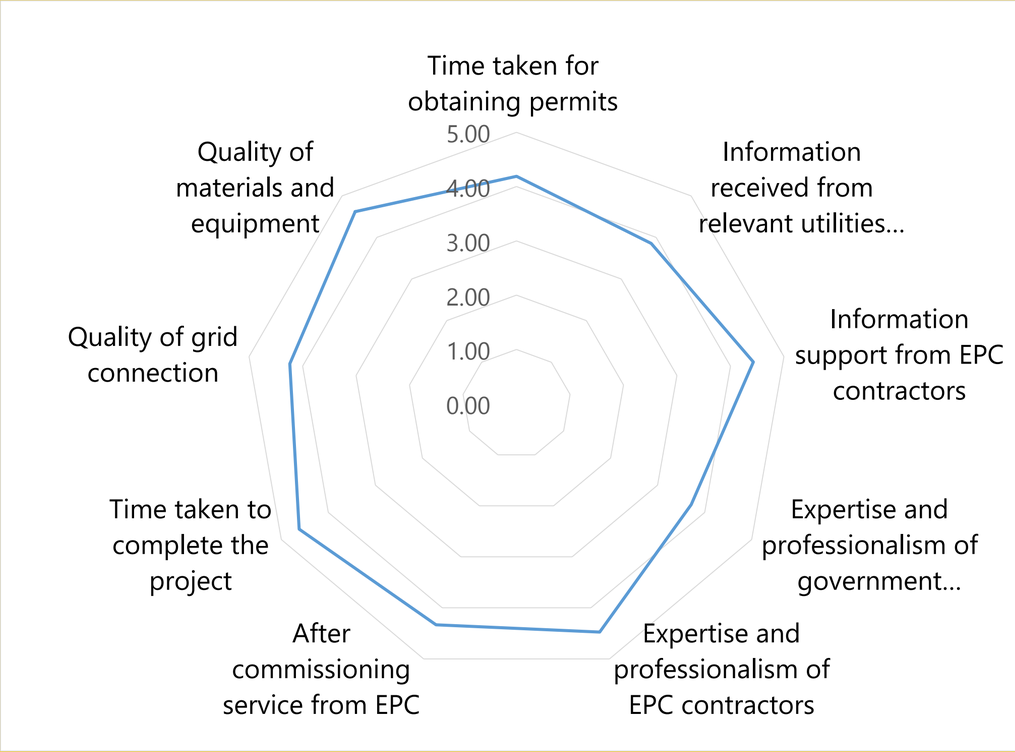
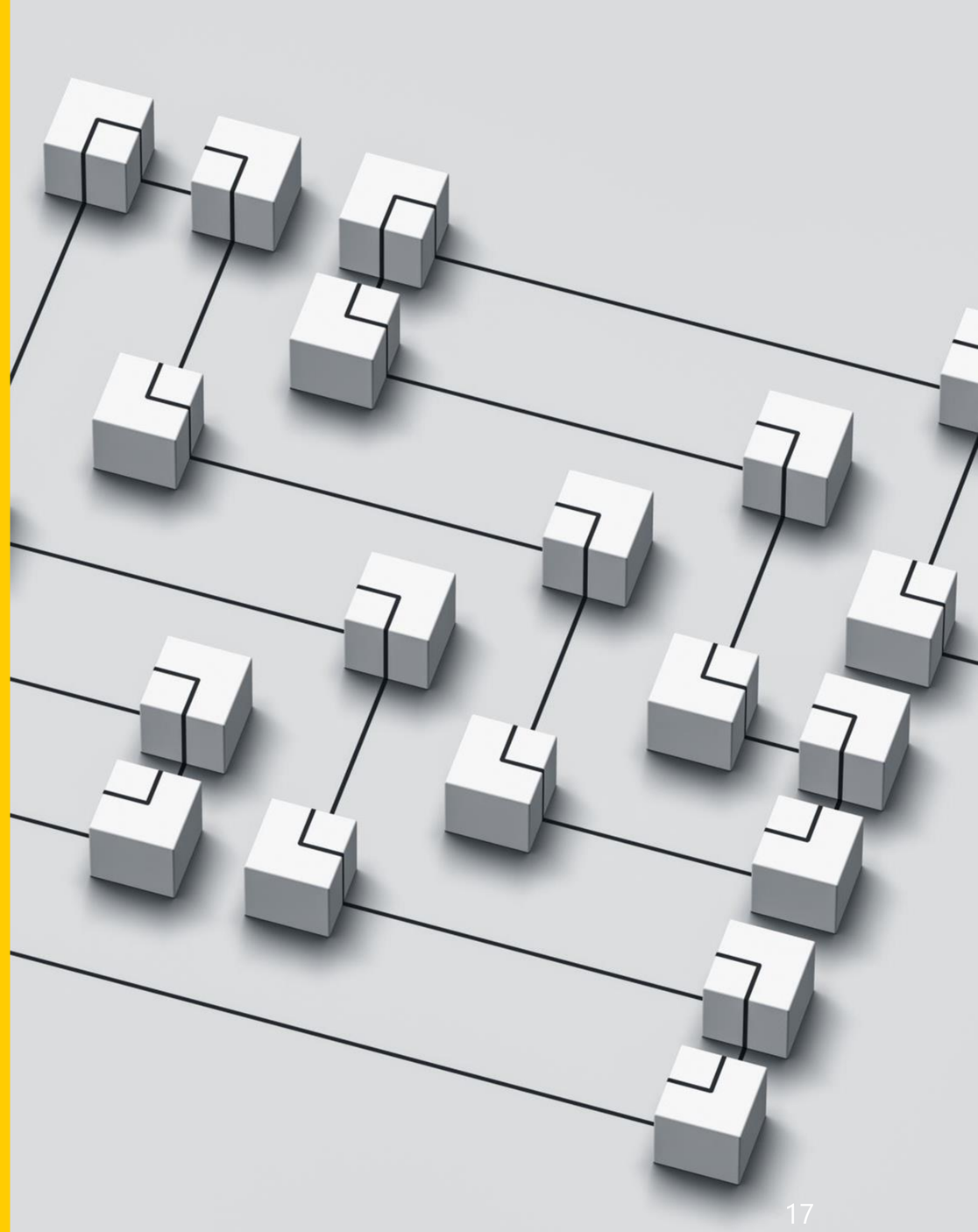


Recommendations: Eligibility criteria (1)

- Installed capacity should be equal to or above the sanctioned load (in case of approving above sanctioned load, care should be taken, so that the distribution grid can accommodate dispatch the excess energy),
- Single phase consumers should also be allowed to apply for connection under net metering.
- Large consumers who are connected by very high voltage lines (132kV and 230 kV) should also be allowed to avail NEM facilities



Recommendations: Eligibility criteria (2)

- NEM consumer should be allowed to install the system in other premises they own and use his excess electricity to any place within the country by providing wheeling charge to the utility/s or the grid operator. Many factories do not have enough rooftop area to install the solar PV system which is equal to their maximum allowable capacity under NEM, but the company may have other lands or building rooftops in other locations of the country (which may not be their point of consumption of electricity), which can be used for this purpose. This will utilize unused land or rooftops, reduce the land shortage problem, and increase self-sufficiency.
- It is recommended that the prosumer should be given the option to sell its excess energy to any other consumer or consumers within the Utility or any other part of the country by giving wheeling charge to the utility/utilities or to the grid operator. This will allow prosumers who want to use specifically renewable electricity from another prosumer.

Recommendations: Financial support

- Ensure timely payment of net exporting prosumers by Utility, at the end of the annual settlement period.
- Initiate a carbon credit system to compensate utilities to source electricity from NEM prosumers.
- NEM owners, EPC contractors and operators should be allowed to import NEM equipment and spare parts with a tax waiver like the IPPs.

Recommendations: infrastructure support

- EPC contractors should shorten the completion time of projects to improve returns to investors and also the financing institute should take less time to complete the due diligence.
- In order to better secure the financial investment of the RESCO, a tri-party agreement could be signed between the prosumer, utility and the RESCOs for the OPEX model. The utilities could then enforce the industry to pay the bill to the RESCO thus reducing the OPEX model risk. For this services the Utilities should encouraged with some incentives in terms of service charges per unit.
- NEM consumers should be allowed to use excess electricity generated at one location in any place within the country by providing wheeling charge to the utility/Utilities or the grid operator.
- Economic Zones (EZs) or Export Processing Zones (EPZs) should support NEM.

Recommendations: Technological upgrades for operation and maintenance monitoring and safety

- In order for proper quality monitoring, it is recommended by equipment suppliers that an I-V Curve diagnosis for 100% PV strings and quarterly diagnosis report for the PV plant are provided.
- This way, the supplier shall have online I-V Curves diagnosis reference if the system is more than 1MWp.
- The software or function should be certified by renowned testing laboratory, and the test report should be provided.

- **Some improved safety requirements could be recommended, as follows:**
  - The PV system should have an Arc-fault circuit interrupter (AFCI) function. Inverters should comply with the IEC 63027 requirements.
  - TUV or Bureau Veritas or Inter Tek or similar certification (BSTI could be empowered) for AFCI function should be provided with NEM application.
  - The PV system should have Rapid Shutdown function, which can save the system from any fault at the DC side within 30 seconds of rapid shutdown initiation. This can protect the installed PV system from accidental fire hazards.

Recommendations: Technological upgrades for operation and maintenance monitoring and safety

Recommendations: Awareness raising

- It is recommended to also work on increased awareness on the NEM policy among potential prosumers.
- It could be considered to have promotional campaigns, targeting the general public and targeting specifically industrial prosumers with large premises.
- It is recommended for the utilities to have a prosumer service department or officer, to support the incorporation of the NEM into new and existing systems

Scope for the expansion of solar rooftop systems in Bangladesh

- Roofs of government offices with large buildings.
- The tops of buildings and structures in all Export Processing Zones and Economic Zones.
- The rooftops of railway stations, platforms and adjacent land.
- Roof of metro rail stations
- Roofs of metro rail deport and workshops
- The rooftops of cold storages and storage silos
- Rooftops of garment factories, jute mills, paper mills and possibly roofs of all other industries.
- Roofs of rerolling mills and warehouses
- Rooftops of cyclone shelter centers.
- Rooftops of civil aviation centers and land available near the airports with sufficient glare protection.
- Rooftops of public educational institutions, especially schools, colleges and universities.
- The jetties of river and sea ports.
- Tops of stadiums, sports complexes.

Thank You