English Translation of Approved

NET METERING GUIDELINES – 2018

Submitted to

Sustainable and Renewable Energy Development Authority (SREDA)
Power Division, Ministry of Power, Energy & Mineral Resources
Government of the People's Republic of Bangladesh

Submitted by

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Power Division
Ministry of Power, Energy and Mineral Resources
GOVERNMENT OF PEOPLE'S REPUBLIC OF BANGLADESH

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1 Background

Electricity is essential for the socio-economic growth and enhancement of life standard. According to the Vision 2021, the Government of Bangladesh has pledged to bring all the citizens within the reach of electricity access. In order to ensure universal electricity access and energy security, the Power Division has taken fuel diversification to be one of its major strategies. Under fuel diversification, measures have been taken to generate electricity from environment-friendly renewable sources in parallel to conventional fossil fuels. Increasing the utilization of renewable energy to a considerable extent is one of the targets of the Sustainable Development Goals (SDG-7) declared by the United Nations. According to the Renewable Energy Policy of Bangladesh, a target has been set to generate 10% of the total electricity, i.e. 2000 MWh from renewable sources by the year 2020.

The main sources of renewable energy are – solar energy, wind energy, hydro, biogas, biomass, geothermal, wave and tidal energy. Due to its geographical location, the source with most potential in Bangladesh is the solar energy. A total of 270 MW of electricity has been produced so far by utilizing solar energy, majority of which has come from the Solar Home Systems (SHS) installed as stand-alone systems in remote off-grid areas. Meanwhile, the number of SHS installations has crossed 5 million. But since more than 3 acres of land is required to produce 1 MW of electricity from solar energy, it has been difficult to arrange vast stretches of land to build large scale solar power plants. As a result, the possibility of producing electricity by installing solar systems on the available rooftop of various grid-connected buildings such as, residents, industries etc. is considered with due importance. Installing solar systems on rooftops will increase the share of renewable energy in the production of electricity.

To encourage distributed generation based on renewable energies, steps have been taken to introduce net metering system. Under net metering scheme, the electricity consumer will be able to export the additional electricity generated from the solar system installed in his premise after self-consumption to the distribution grid network. The electricity bill of the consumer for such exported electricity will be adjusted with his/her bill in the following month. As a result, the consumer can cut down his/her electricity expenditure. Until now over 50 countries including our neighboring countries such as, India and Sri Lanka have adopted net metering scheme. A solar system installed on the rooftop of Directorate General of Food in the district of Bogura has been connected to the distribution grid and electricity has been exported and imported under net metering arrangement. Since electricity bills will be reduced, consumer can be motivated to produce electricity from renewable energy systems and to install net meters. In the circumstances discussed above, to avail the net metering facility to the on-grid consumers by installing renewable energy generation systems, the Power Division has taken steps to develop and launch Net Metering Guideline.

This guideline is launched on an experimental basis. In future, it may be subjected to revision and modification based on experience gained from practical implementation.

Objective of the Guideline

This guideline is prepared to promote renewable energy through installation of rooftop solar systems and to utilize the generated electricity on his/her own premise at the consumer level through net metering management.

2 Definitions

2.1 Definitions and Interpretations

Unless otherwise specified, the terms in this regulation shall adopt the meanings provided as follows:

Term	Definition
Area of supply	The geographic area within which the Utility is authorized by its license to supply the electrical energy.
Average cost of power purchase	The weighted average pooled price at which the Utility has purchased the electricity, including the cost of self-generation, if any, plus declared average system loss incurred in the previous year from all the energy suppliers on long-, medium- and short-term basis, but excluding the electricity purchased from renewable energy sources.
Billing cycle or billing period	The period for which electricity bills shall be prepared for the consumer by the Utility.
Capacity / Installed capacity of the distributed RE generation system	The rated output AC capacity (VA) of the distributed RE system. In case of solar PV system the cumulative output AC (VA) capacity of the inverters.
Commencement date	The start of the operation of the renewable energy technology for net energy metering scheme.
Consumer	An eligible consumer who has an installed renewable energy system or who has applied to the Utility to install a renewable energy system under the net energy metering arrangements.
Commercial consumer	A consumer categorized and connected as a commercial consumer by the distribution Utility
Commission	Bangladesh Energy Regulatory Commission established under the Bangladesh Energy Regulatory Act 2003 [Act № 13 of 2003] and any subsequent amendments thereof.
Connection point	The point where the renewable energy system is connected to the consumer's internal network.
Contract	An agreement signed between the Utility and the consumer under the net energy metering scheme as in Annex IV.

Distribution network	An electricity system of electric lines, cables, switchgear and associated equipment at nominal voltage of 33 kV or below for the distribution of electricity.
Domestic/residential consumer	A consumer categorized and connected as domestic/residential consumer by distribution Utility.
Eligible consumer	A consumer of electricity who is in compliance with the requirements of the Utility.
Export of energy	Energy that is injected to the Utility grid generated by the distributed renewable energy generator/s.
Import of energy	Energy that is consumed by the consumer from the Utility grid
Indirect connection	The connection of a renewable energy installation to a supply line indirectly through the internal distribution board of the consumer where the renewable energy installation is connected to an electrical point within the premises of the consumer instead of the point of common connection.
Industrial consumer	A consumer categorized and connected as an industrial consumer by the distribution Utility.
Interconnection point	The point of connection between Utility and the consumer.
Invoice	A monthly or supplementary bill raised/issued by the Utility.
kV	Kilovolt or 1000 volt.
kW	Kilowatt.
kWh	Kilowatt hour.
kWp	Kilowatt peak stands for peak power. Rated kWp in relation to a PV installation means the maximum direct current power such installation can produce under standard test conditions of 1000 watts per square meter of solar irradiation and 25°C ambient temperature.
Licensee	An individual/entity who has received a license under the BERC Act, 2003.
Low voltage	Operation of equipment at a voltage less than 1,000 V or 1 kV.
Maximum demand	The maximum level of the simultaneous power demand of all the electrical equipment and system of a consumer's installation expressed in kW or kVA units.
Medium voltage	Voltage exceeding low-voltage but equal to or less than 33,000 V or 33 kV.
MW	Megawatt or 1000 kilowatts.
MWp	Megawatt peak. 1 MWp = 1,000 kWp.
Net energy metering	A mechanism where an eligible consumer installs a renewable energy system primarily for own use and the excess energy can

	be exported to the grid, for which credit is to be received that may be used to offset part of the electricity bill issued by the Utility for the applicable billing period.
Net export capacity	The maximum level of electrical power which a renewable energy technology can deliver to the distribution system at the point of interconnection.
Net meter	An appropriate energy meter capable of recording both import and export of electricity.
Prosumer	The customer who consumes and produces electric energy
Renewable energy generator	Machine or equipment that converts renewable energy into electrical power.
Rooftop	Any empty space on the roof or facades of buildings, parking lot, garages, boundary wall, factory or industrial buildings or sheds or similar buildings other sheds, Premise of any building / industry or empty space within the boundary of the industry / building which is under the control of the consumer. or at land within own premise of the consumer where Utility meters exist or any other suitable area accepted by Utility.
Rooftop solar PV system	The solar photovoltaic power system installed on the consumer's premise that uses sunlight for direct conversion into electricity through photovoltaic technology.
Sanctioned load/ demand	Maximum demand in kW, kVA or HP, agreed to be supplied by the Utility and indicated in the agreement executed between the Utility and the consumer.
Settlement period	The period of time (months or years) by the end of which the consumer is adjusted or compensated for any accumulated kWh credit.
STC	Standard Test Conditions [Irradiance- 1000W/m^2, Cell Temperature- 25°C, Air Mass (AM)- 1.5]
Tariff structure/ order	In respect of a licensee means the most recent order issued by BERC for that licensee indicating the rates to be charged to the various categories of consumers by the Utility for the supply of electrical energy and services.
Utility	Authorities who are the holder of a license to distribute electricity issued by the Bangladesh Energy Regulatory Commission.

2.2 What is Net Metering and How It Works

Net energy metering (NEM) refers to a policy mechanism that allows prosumers to connect their renewable energy systems to the distribution grid. Thus any excess

electricity after self-consumption that is generated from renewable sources is supplied to the distribution grid, and in exchange the prosumer can either import equal amount of electricity from the grid or receive price of net amount of exported electricity at the end of settlement period as per this guideline.

Under the process of net metering electricity can flow in both directions via a bi-directional meter. Thus the consumer gets to adjust the amount of electricity consumed from grid and any excess electricity after self-consumption that is produced by rooftop solar system or any other renewable energy sources, given that all the conditions stated in this guideline are met. The measured data can be stored in the meter or transferred to a centralized aggregator service. The customer's bill is calculated according to the net energy recorded on the meter; i.e. the aggregated energy drawn from the network minus the energy delivered to the network over the specified billing period. If the amount of electricity consumed from the grid is higher than the amount of electricity supplied to the grid from the rooftop solar PV system, the consumer has to pay the bill for net consumption. On the other hand, if the amount of electricity generated and exported from solar PV system or the renewable energy system to the grid is higher than the imported electricity, then the distribution utility shall allow all the credit (in terms of kWh) of the consumer to roll over to the next billing period.

By the end of the specified rolling cycle or settlement period, the consumer is compensated for all kWh credits as a rate prescribed in this guideline by the distribution utility, and on 1 July of every year credit account is set to zero. Figure 1 illustrates the architecture of a typical net metering arrangement using solar PV as an example of distributed renewable energy system.

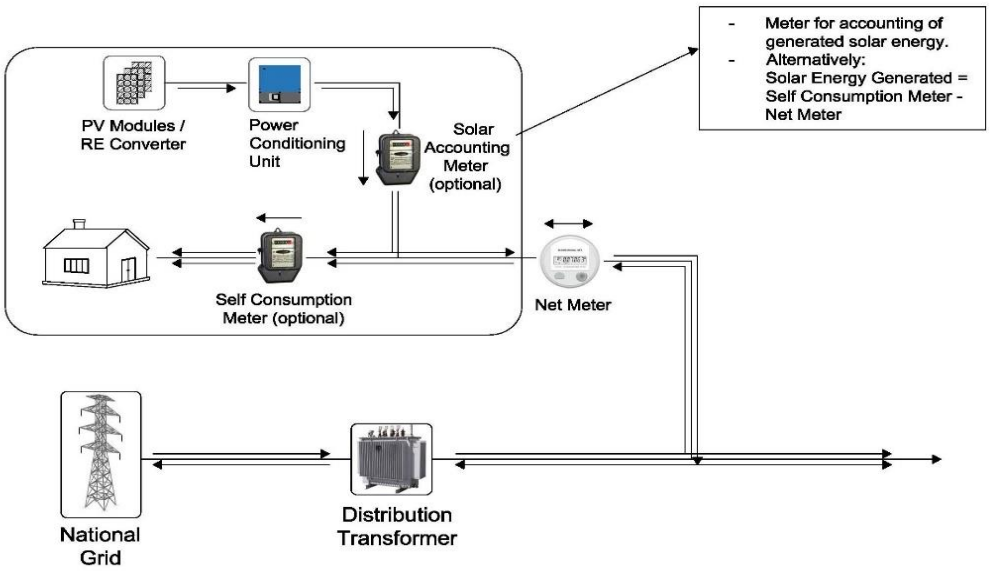

Figure 1: Typical net metering architecture.

The rate at which the customer is billed is determined considering various factors such as the consumer tariff class, type of renewable energy technology, installed capacity and export limitations. While installing such connections, the prosumer must also abide by the interconnection technical requirements and safety regulations set by the concerned authority.

The interconnection process, the mechanism by which net metered distributed energy systems may be legally and safely connected to the electricity grid, is critical to the success of net metering programs. Interconnection standards are typically outlined separately from net metering policy parameters, but are fundamental to the development of the NEM policy.

3 Net Metering Guidelines

3.1 Eligibility Criteria

A consumer shall be considered eligible when the following clauses are complied with:

i. The prosumer should be a current customer of the Utility that is responsible for the supply of electricity in the area;

ii. The applicant should not have any outstanding arrears prior to making the application;

iii. Electricity produced ONLY from renewable energy sources are eligible;

iv. The applicant must either be the legal owner or have the legal permission from the owner(s) or their legal representative(s) for installing the proposed renewable energy system in the premise;

v. Any empty space on the roof or facades of buildings, car parking, garages, factory or industrial buildings or sheds or similar buildings or at land within own premise of the consumer or any other suitable area accepted by Utility where Utility meter exists;

vi. The prosumer shall consume the electricity at the point of RE electricity generation, and only export the excess amount to the grid;

vii. Interconnection standards shall comply with the interconnection rules and standards set by the Utility or other relevant governing authority;

viii. Determination of the renewable energy system capacity shall comply with Section 3.3 of this regulation.

Note: The consumer can be allowed to distribute electricity to another point of use given that s/he is not doing so with the help of the existing distribution network. In other words, the overhead cost associated with such distribution network shall be borne by the consumer. But if the other consumer is customer of any other distribution utility, s/he must secure permission from them.

3.2 Consumer Categories

Eligible consumers (as described in Sec. 3.1) under the framework of this net metering regulation can be broadly classified into three categories.

i. Domestic or residential consumers

ii. Commercial consumers

iii. Industrial consumers

3.3 Capacity and Energy Export Limits

The size of the system and maximum allowable electricity export correspond with consumer type and usage patterns. To reduce the technical challenges, initially following conditions are applied for defining RE system capacity and export of energy. In the future based on the experience of installation of NEM systems Ministry of Power, Energy and Mineral Resources can re-define the system capacity.

i. Any three phase consumer will be considered eligible for the net metering system.

ii. The output AC capacity of the renewable energy converter can be a maximum of 70% with respect to the consumer's sanctioned load. In other word 70% on the customer's sanctioned load is specified as the maximum permissible generator size (installed output AC capacity).

iii. The maximum output AC capacity of the installed RE system for NEM cannot be more than 3 MW.

iv. In case of a medium-voltage (MV) consumer, the installed capacity of the renewable energy system cannot be more than 70% of the rated capacity of the distribution transformer or, cumulative capacity of the distribution transformers. The MV consumer needs to fulfill the first three clauses.

3.4 Energy Accounting and Settlement

The specifics of the energy accounting and settlement are described below:

i. The concerned distribution Utility shall prepare and send the electricity bill to the consumer for each billing period. After adjusting on the basis of the net export or net import (kilowatthour) as per section 3.5 of this guideline, any credited electricity units will be carried over to the next billing period, or the prosumer has to pay for the net consumption. If at the end of the settlement period (in June which is the last month of a fiscal year), any kilowatthour credit is accumulated by the prosumer, the Utility will pay as per this guideline.

ii. For each billing period, the Utility shall prepare an energy statement, which shall separately mention:

   a) The amount of electricity imported by the consumer from the Utility grid;

   b) The amount of electricity exported to the grid by the installed renewable energy systems; and

   c) Net amount of electricity billed to be paid by the prosumer or net credited kWh to roll over to the next billing period.

iii. If the amount of electricity units imported by the eligible prosumer during any billing period exceeds the amount exported, the prosumer will be considered net importer. In that case, utility shall prepare a bill for the net electricity consumption by the prosumer after adjusting the carry over units (if any) from the previous billing cycle of the same settlement period.

iv. If the amount of electricity units exported by the eligible prosumer during a billing period exceeds the amount imported, the prosumer will be consider net exporter. In that case, after adjusting with the carry over units (if any) from the previous billing cycle of the same settlement period, either accumulated kilowatthours will be carried over to the next billing cycle, or utility shall prepare a bill for net peak

consumption (if any). In either cases, the prosumer should pay for the demand, service charge and all other fixed charges.

v. The energy accounting shall be according to the tariff structure as specified in §3.5 of this guideline.

vi. The unadjusted kWh credit shall be allowed to roll over for a maximum period of 12 months, which is otherwise known as the 'settlement period'. The settlement period will be the end of each fiscal year and all the credits should be adjusted or compensated in the last month (June) of the settlement period.

vii. At the end of settlement period, if the prosumer is net exporter of electricity then the Utility shall pay for the net exported amount of electricity to the prosumer at bulk purchase rate (tariff) for the Utility set by BERC.

3.5 Tariff Structure

The tariff structure, according to which the utility will prepare the bill, settle accounts either via proper adjustment of by collecting dues at the end of every billing period and at the end of the settlement period, are described in this section:

i. For each billing period, the Utility conducts the energy accounting and appropriate adjustment based on the tariff order issued by the Bangladesh Energy Regulatory Commission (BERC).

ii. The electricity bill for prosumers will be calculated based on any of the three possibilities described below:

   a. If the amount of imported and exported electricity is equal, then the prosumer shall pay only the demand charge and other fixed charges.

   b. After adjusting with any carryover credit from the previous billing period (if any), if the prosumer remains a net exporter, then the excess kilowatthours will be carried over to the next billing period. For the current billing period, the prosumer shall pay only the demand charge and other fixed charges.

   c. After adjusting with any carry over credit from the previous billing period (if any), the prosumer becomes a net importer, then prosumer shall pay for the additional consumption along with the demand charges and other fixed charges.

iii. At the end of the settlement period (in June), the Utility shall pay all consumers classes (residential, commercial and industrial) for any accumulated kilowatthour unit of electricity at the bulk rate. In such cases, the bulk tariff rate for 33kV lines determined by the BERC shall be applicable.

iv. For prosumers whose electricity consumption during peak and off-peak hours are separately recorded, the off-peak units will be adjusted first and then the peak hour consumption will be adjust later.

v. The tariff rates are subjected to change according to the tariff structure determined by BERC. If the tariff is changed within a settlement period, then the changed tariff will be considered for energy accounting for the remaining billing cycles.

vi. Examples of energy accounting and sample electricity bills for single billing period and at the end of settlement period for three possible cases as mentioned in the sub-section 3.5 ii, are provided in Annex V of this guideline.

3.6 Metering Arrangement

The metering arrangement shall be done according to the following conditions.

i. A single three phase bidirectional smart meter (capable of recording import, export and net energy consumption) shall be installed at the point of interconnection by the Utility. If by reprogramming, the existing meter can fulfill the requirements, then reprogramming is sufficient and no new meter needs to be installed.

ii. The net meter shall conform to the specifications as mentioned in Annex II of this guideline or approved by relevant authority (Utility or SREDA).

iii. In case of eligible consumers, who fall under the different tariff metering scheme, smart meter capable of recording electricity consumption and generation during peak and off-peak hours separately shall be installed.

iv. The Utility shall be responsible for procuring, testing, installing (and replacing the existing meters), maintaining and reading the net meters. The prosumer can also procure and install the meter but in that case the brand and model should be approved by the Utility or relevant authority (i.e. SREDA)

v. The price of the meters and other relevant costs shall be borne by the consumer.

vi. The reading from the net meters shall be the primary basis of energy accounting and commercial settlement.

vii. In case of the consumer is a prepaid meter consumer, then the prepaid meter should be capable of calculating export, import and net usage of electricity. It should also able (or programmed) to satisfy the above mentioned classes.

3.7 Application Procedure

The eligible consumers, who intend to install and/or connect their renewable energy generation systems with the grid and benefit from net metering shall follow the procedure mentioned in this section.

i. The eligible consumer shall apply in writing for a net metering agreement to the Utility.

ii. The eligible consumer shall use the application template as provided in Annex I of this guideline. Only completed applications with the necessary supporting documents shall be considered acceptable by the Utility.

iii. Upon receiving the completed application package (and proof of payment, if any), the Utility shall officially acknowledge the receipt of the application.

iv. The applicant together with the Utility shall agree on the detailed work plan, which shall include the physical installation of the system (for new installations), the establishment of interconnection, checking and verification, approval and signing of the NEM contract.

v. Upon successful completion of all the necessary steps by the NEM applicant as mentioned above in clause iv, the Utility shall issue the NEM approval. Otherwise the Utility shall notify the applicant of the proper reason and next steps to follow.

vi. After completing all the necessary steps mentioned above, the Utility shall issue the NEM approval as mentioned in clause v within 10 (ten) working days, starting from the submission date of the application as mentioned in clause i.

vii. Within the specified time span, the consumer, with the support of Utility shall carry out the necessary steps to install the renewable energy system (required for new installation) and/or establish the necessary interconnections.

viii. The applicant shall fill the NEM system checklist (Annex III) with assistance from the Utility for the renewable energy system.

ix. The NEM consumer shall complete all the tasks installing the renewable energy system including the NEM system within 08 (eight) months of receiving the NEM approval. The NEM consumer shall submit the filled up NEM checklist to the associated distribution utility requesting verification of the standards set by this guideline and the relevant authority.

x. The Utility shall check and verify the system to ensure that the system components and interconnection parameters comply with the rules and standards of this guideline and Utility. If the standards are found to be in compliance, the Utility shall communicate a contract signing date with the consumer.

xi. The NEM Agreement shall be prepared according to the template provided as specified in Annex IV.

xii. Within a maximum of 15 (fifteen) days of submission of application by the consumer as mentioned in clause ix, the Utility shall settle all necessary formalities and sign the contact as mentioned in clause xi. If the required standards are not met, the Utility shall inform the consumer the proper reasons and steps to follow within this time period.

xiii. If the distribution Utility's system has to undergo any modification in order to install the consumer's the renewable energy system, the NEM applicant shall bear all incurred costs.

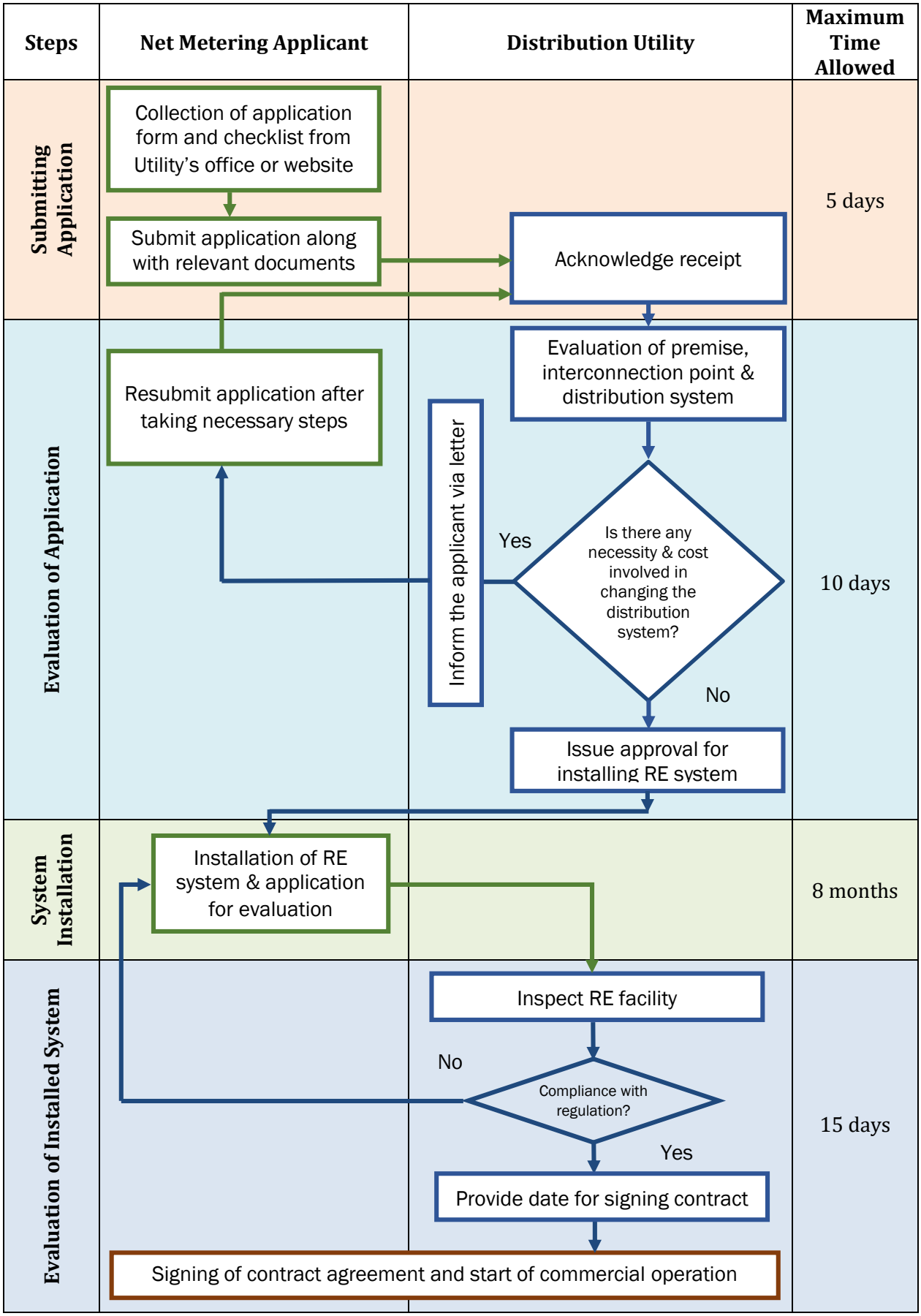

Figure 2: NEM application procedure.

3.8 Approved Equipment

Based on report obtained from any of the listed testing laboratories by SREDA, it will provide certificate for equipment required for the installation of the renewable energy systems such as, inverter, charge controller and net meter. Certificate has to be collected for each model of these equipment separately.

4 Interconnection Requirements

4.1 Description of Indirect Renewable Energy System

4.1.1 Feeding method

The consumer may decide to install indirect Renewable Energy systems to reduce their import from the Utility. A schematic diagram of such indirect connection is provided below:

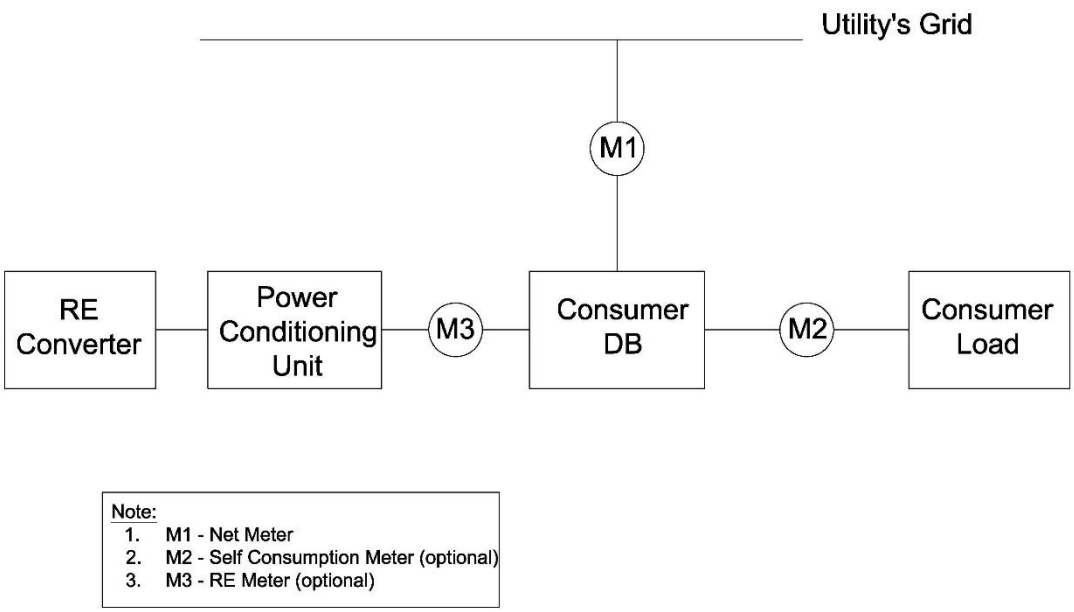

Figure 3: Schematic diagram of indirect connection to the grid

As shown in the figure above, power consumption and export are measured by M1, while energy consumption by the consumer's load is measured by M2 and energy generation by RE technology is measured by M3. For net metering, meter M1 shall have bi-directional capability and facilitate 'Time-of-Use' reading. Meter M2 and M3 are optional.

4.1.2 Equipment standards

Major components of the Rooftop Solar PV System to be installed shall comply with the IEC 61727 (PV systems – characteristics of Utility interface) and other relevant national standards in terms of design, operation, maintenance and environmental testing.

4.1.3 Connection types

Two types of connections can be specified according to the output voltage level of the inverter. The connection types are presented below with corresponding schematics:

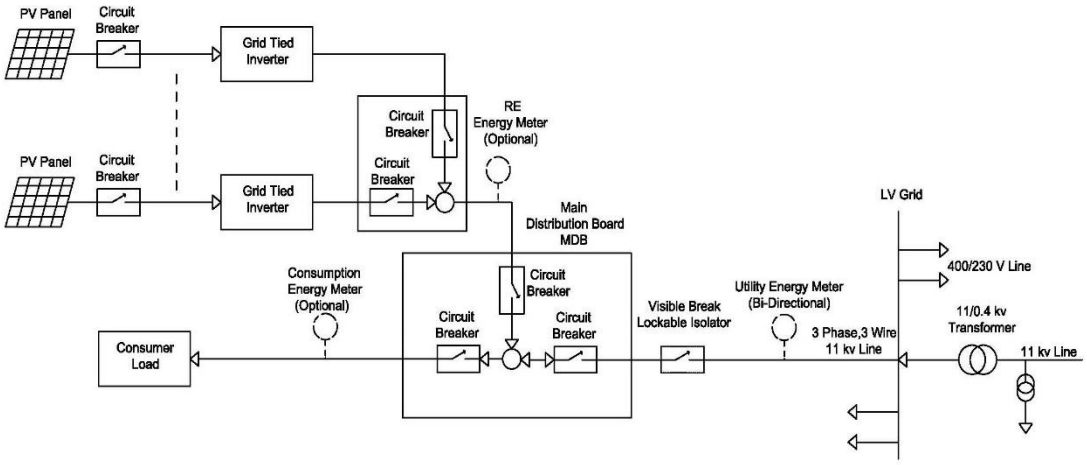

Figure 4: Type A connection [LV Consumer]

Type A is applicable for Utility's consumers with connection to LV network. RE/PV connection point shall be done at the consumer's DB/MSB/SDB. Only three phase inverters are allowed to use in the system.

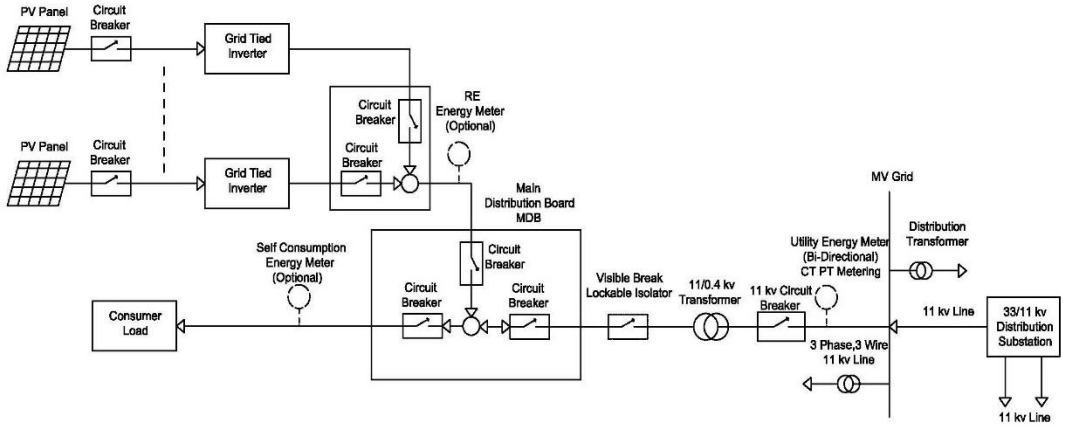

Figure 5: Type B connection [MV Consumer]

Type B connection is applicable for Utility's consumer with connection to MV network. RE/PV connection point shall be done at the consumer MSB/ DB / SDB. Only three phase inverters are allowed to use in the system.

4.2 General Interconnection Requirements

If the interconnection requires any enhancement of the existing Utility supply infrastructure such as cable, fuse, switchgear, and transformer and protection scheme, the consumer has to bear the cost of such modification.

The quality of the power at the point of interconnection shall not be worse than the existing quality of supply. Quality of supply is measured as per the standards on voltage, flicker, frequency, harmonics and power factor, as specified by relevant and concerned authorities. Deviation from these standards represents out-of-bounds conditions and the NEM system shall be able to sense the deviation and disconnect itself from the distribution network accordingly.

To ensure that the interconnection does not adversely impact the quality of supply, the following requirements shall be imposed and adhered to by the NEM consumer:

4.2.1 Normal voltage operating range

Acceptable limit of voltage in case of electricity supplied from renewable energy source under net metering is as follows:

i. Renewable energy systems connected with a low-voltage (LV) interconnection shall operate within the voltage specified in **Table** .

Table 1: Normal operating condition at LV interconnection

Nominal voltage [V]	Steady state voltage limit
400	± 10%
230	±10%

ii. Renewable energy systems connected with a medium-voltage (MV) interconnection shall operate within the voltage specified in **Table** .

Table 2: Normal operating condition at MV interconnection

Nominal voltage [kV]	Steady state voltage limits
11	± 10%
33	± 10%

4.2.2 Voltage fluctuation

Power generation from renewable energy systems varies due to the changing renewable energy sources throughout the day. The varying power generation injected into the distribution network creates voltage fluctuation at the interconnection point and other buses within the grid.

The maximum voltage fluctuation range allowed for LV and MV due to varying renewable energy sources is 6%. Beyond this, there is a danger of Utility and consumer equipment heating up. An appropriate voltage control is to be undertaken to mitigate the voltage fluctuation when necessary.

4.2.3 RE generator power factor

The power factor is defined as the ratio between the applied active power and the apparent power.

i. The renewable energy systems shall have a leading or lagging power factor greater than 0.9 when load is 20% greater than the rated inverter output power. The smart inverters used shall automatically make necessary adjustments to ensure that the power factor does not cause a voltage rise beyond the permissible limit.

ii. The requirement of plant power factor shall be identified during the technical assessment.

4.2.4 Reactive power compensation

If the installed indirect renewable energy system is set to operate at unity power factor (pf = 1), reactive power for the consumer's load will be totally imported from the Utility and the real power will be a mix of on-site generation and imported electricity from the Utility. This will result in a low power factor reading at the Utility tariff meter as the ratio of reactive power is higher for own generation.

4.2.5 Injection of direct current

The PV system shall not inject DC current greater than 1% of the rated inverter output current into the Utility interface under any operating condition.

4.2.6 Harmonic

The harmonic of a wave is a component frequency of a wave that is an integer multiple of the fundamental frequency. In the presence of non-linear loads such as computer power supplies and other appliances, alternating current (AC) can be distorted by the introduction of various harmonic frequencies. Harmonics can be measured by the percentage of the fundamental frequency or by calculating total harmonic distortion (THD). When present at high levels, harmonics are detrimental to the electrical system and its loads. The following shall be maintained.

i. The PV system output should have low current-distortion levels so that other equipment connected to the Utility system is not adversely affected.

ii. Total harmonic current distortion shall be less than 3% of the rated inverter output at the cable connected to the interconnection point.

4.2.7 Voltage unbalance

Voltage unbalance is defined as the ratio of the negative sequence voltage component to the positive sequence voltage component.

i. Infrequent short duration peaks with a maximum value of 2% over 1-minute duration are permitted for voltage unbalance.

ii. When multiple single-phase PV units are installed the unbalance should be distributed evenly among the three phases of the power system.

iii. The unbalanced voltage shall not exceed 1% on 5 occasions within any 30-minute period at the terminals of the consumer's installation.

4.2.8 Short circuit level

The Utility shall ensure that short circuit level of the network is within the equipment ratings. The regulation specifies that network maximum sub-transient 3-phase symmetrical short circuit shall be within 90% of the equipment designed short-time make & break capacity. **Table** highlights the typical equipment ratings in Utility's network.

Table 3: Typical equipment rating in distribution network

Nominal voltage [kV]	Rated voltage [kV]	Fault current [kA]
33	36	25
11	12	20
0.4	1.0	31.5

4.3 Protection Guidelines

Protection systems for indirect renewable energy generators shall be designed to isolate the faulty part of the system from the remaining properly functioning portion. NEM consumer shall design a protection system, which shall suit her/his target degree of system security. Nevertheless, the NEM consumer shall comply with the Utility's protection requirements to ensure that the fault will not spread beyond the RE generator system.

4.3.1 Smart inverter

Connection of power generation to distribution network could cause voltage rise during low load conditions. Also, sudden loss or generation from distributed generation could cause instability of the network, especially for system with high distributed generation penetration.

Advanced inverters or known as smart inverters are capable of providing additional features in addition to the power conversion. Smart inverters are capable of assisting the grid during its time of need. Such features include:

- Reactive power control
- Active power control
- Grid management

Inverters used by the consumer's system shall comply with the requirement of the smart inverter as described in §4.3.2 to §4.3.10.

4.3.2 Frequency

Utility shall maintain the system frequency and the PV system shall operate in synchronization with the Utility's frequency. Utility shall operate with nominal 50 Hz system with ±1% range band. The inverter should be capable of producing power at the frequency band of at least ±6%.

4.3.3 Synchronization

Synchronization is an act of matching within allowable limits. The RE generator should be equipped with automatic synchronization system. For solar PV system the synchronization is to be done at the inverter.

4.3.4 Anti-islanding inverter

i. Anti- or non-islanding inverters are unable to supply the load without the presence of the Utility's system. For personnel safety, the PV plant is not allowed to be energized during the outage of Utility grid (loss of mains). The NEM

consumer shall disconnect from the Utility's system for loss of main within one second.

ii. Inverters used by the NEM consumer shall provide the following anti-islanding detection techniques:

a. Under voltage

b. Over voltage

c. Under frequency

d. Over frequency

It should also include at least one of the following active anti islanding techniques:

a. Negative-sequence current injection,

b. Impedance measurement,

c. Slip mode frequency shift,

d. Frequency bias, etc.

iii. NEM consumer is to prove the anti-islanding capability of the plant during commissioning tests.

4.3.5 Inverter fault current contribution:

The fault current contribution by the inverter will be limited usually by the inverter control. Based on IEC 61727 or, IEEE 1547, the typical range of short circuit current is between 100% and 200% of the rated inverter current. NEM consumer shall ensure that inverters used comply with the IEEE 1547 requirements.

4.3.6 Protection schemes:

The basic requirements for the design of the protection schemes shall be as follows:

i. For any internal fault in the indirect RE System must not cause problems to the Utility's system and its customers.

ii. For any distribution network fault outside the indirect RE System, the PV system must be protected from any damaging effect.

iii. NEM consumer shall be required to provide other protection devices to complement existing special features.

4.3.7 Failure of system protection or control equipment:

The indirect RE System must be disconnected from the distribution system during any of the system failure. Failure condition of the indirect RE System shall include:

i. Failure of protection equipment

ii. Failure of control equipment

iii. Loss of control power

4.3.8 Frequency disturbance

The under frequency and over frequency levels and the corresponding inverter trip time shall be as follows:

i. When the Utility frequency is outside the nominal 50 Hz value by ±2%.

ii. Trip time shall be within 0.20s.

iii. Applicable for both LV and MV interconnection.

4.3.9 Voltage Disturbance

i. The inverter should sense abnormal voltage and respond according to the conditions in **Table** . Consideration shall be given to monitoring voltage in this clause in order to avoid problems due to voltage drop in various transformer, wiring or feeder circuit. When the inverter senses that the voltage lies outside its operating limits, the actions recommended in Table 4 shall be taken.

Table 4: Voltage disturbance

Voltage at interconnection	Maximum trip time (s)
V < 50%	0.10
50% ≠ V < 90%	2.00
90% ≠ V ≠ 110%	Continuous operation
110% < V < 135%	2.00

ii. Inverters are expected to continuously operate which during distribution network voltage fluctuation ±10% of its nominal.

iii. During the time of voltage disturbance, which could be the result of transmission network switching and distribution switching on nearby feeder, the voltage would be affected. Therefore, inverters must be able to ride thru the voltage disturbance bands of 50% to 90% and 110% to 135%. This is to help stabilize the Utility's system.

iv. Loss-of-mains is indicated by voltage drop less than 50%.

v. Over voltage and under voltage detection shall be provided for all 3 phases.

4.3.10 Utility interface disconnect switch

The RE System interconnection must incorporate Utility interface disconnect switch to allow disconnection of the system output from interconnecting with the Utility for safe Utility line works. The requirement of such switch could be referred to standard switch. The switch shall be manual and lockable. It should also have other feature such as:

- Provide clear indication of switch position;
- Visible and accessible to maintenance and operational personnel; and
- Provide visual verification of the switch contact position when the switch is in open position.

4.4 Safety Requirements

The installation of grid-connected RE system shall comply with the relevant national and international safety standards. The provisions of this section are aimed at ensuring that system topologies and earthing arrangements are taken into account for the safe operation of the connected system.

4.4.1 Operation

i. It is important that for the safety of operating staff and public, both the Utility and the NEM consumer must coordinate, establish and maintain the necessary isolation and earthing when work and/or tests are to be carried out at the interface/ connection point.

ii. The safety coordination applies to when work and/or test that are to be carried out involving the interface between the distribution network and the indirect Rooftop Solar PV System and it is the responsibility of the Utility and NEM consumer to comply with the requirements of the statutory acts, regulations, sub-regulations, individual license conditions, Standardized Utility's Safety Rules and the National Grid and Distribution Code.

4.4.2 Labeling

Labels shall be clearly and visibly placed to remind the operator that the device should be accessed with caution as there could be an energized part that comes from the indirect RE generation system.

Annex I: Application Template

i Applicant Information

Please select your consumer category:

☐ Domestics/ Residential ☐ Commercial ☐ Industrial

For Individual Applicants (If Applicable):

Name:																			
Address:																			
Nationality:																			
National ID:																			
Passport no. (If non Bangladeshi):																			
Telephone:									Mobile:										
Email:																			
Utility Account No.																			
Meter No.																			
Sanctioned load																			

Alternate Contact Person:

Name:																			
Address:																			
Relationship:																			
Nationality:																			
National ID:																			
Passport no. (If non Bangladeshi):																			
Telephone:									Mobile:										
Email:																			

For Non-Individual Applicants (If Applicable):

Name of the Organization/Company:	
Registration no.:	
Trade License no.	
Address:	
Mailing Address (if different):	
Utility Account No.	

Meter No.	
Sanctioned load	

Contact Person:

Name:			
Position:			
Address:			
Nationality:			
National ID:			
Passport no.(If non Bangladeshi):			
Telephone:		Mobile:	
Email:			

ii Project Information

2.1 Installation Site Address

Site Address:			
Post code:		District:	
Site Ownership:	☐ Fully Owned	☐ Owned (Charged to Bank)	☐ Leased
GPS Location of Site Installation:			
Latitude*:		Longitude:	

* Latitude and longitude shall be specified up to 6 (six) digits after the decimal point (eg: 23.039612, 90.401387) or up to 1 (one) digit after decimal point in writing the second (eg. 23°15'30.6'', 90°.13'48.6''), as shown in the examples.

2.2 Information of Installation

Utility:	
Billing Account no.	
Tariff Category:	
Contract no.	
Installed Capacity:	

2.3 Information of Installation Premise

Voltage Level at the Connection Point:	☐ Low Voltage (Single Phase)	☐ Low Voltage (Three Phase)	☐ Medium Voltage (Three Phase-11 kV)	☐ Medium Voltage (Three Phase-33 kV)
Voltage at Point of Common Coupling (RE):	*Not Applicable*			
For Commercial and Industrial Category ONLY:				
Low Voltage:	*Whole Current <= 100A, Fuse Rating:*			
or,	*LV CT Rating:*			
Medium Voltage:	*MV CT Rating:*			

Project Status:	☐ New Project		☐ Existing Project
Types of Building:			(House/ Shop/ Office/ Others etc.)
Types of Installation:	☐ Rooftop, facedes of Building	☐ Car park or Garage	☐ Others:
Use of Battery Storage:	☐ Yes		☐ No
If yes, please provide detail design:			
Battery Capacity:		Technology	
Brand and Model:		Country of Origin	

2.4 Technical Self-Assessment [*For Commercial and Industrial Category ONLY*]

Daytime Peak Demand (09 am to 05 pm)	kWac
Daytime Lowest Demand (09 am to 05 pm)	kWac
Weekends / Holidays Peak Demand (09 am to 05 pm)	
Weekends / Holidays Lowest Demand (09 am to 05 pm)	
Sanctioned Load	kW/ kVA
Proposed RE capacity	kW / kVA

iii Proposed Work Plan

No.	Steps	Estimated Due Date
1	NEM application submission date	
2	Proposed date for signing of NEM contract	
3	NEM Commencement Date	

iv Applicant Declaration

**To be filled by the Applicant (Individual)*

I, ……,
National ID No./ Passport No.: …… and address:
……
……
……
……sincerely declare the following:

i. I hereby authorize…….. (name of the Competent Person) with National ID No./Passport No.: ..... as the Competent Person to act on my behalf to manage my NEM application;
OR
I hereby declare myself with National ID No./Passport No.: ..... as a Competent Person to manage my own NEM application;

ii. I hereby attest that the Competent Person appointed here is a Competent Person within the definition of a Competent Person under this guideline and any other relevant regulations thereunder;

iii. I hereby attest that the renewable energy system under net metering shall be installed using equipment as approved in this guideline and all the specifications shall comply with the international and national standard as mentioned in this guideline.

iv. I hereby confirm that I have not committed any offences under the Electricity Act 2018 and/or any other relevant laws and regulations pertaining to the supply and licensing of electricity;

v. I hereby certify that all information given is true and correct to my knowledge and belief;

vi. I understand and agree that …….. will have the right to take any action including to forfeit all initial fees paid, if any of the information given is false;

vii. I hereby agree, understand and will comply with all the relevant laws and guidelines applicable to this application; and

……

Signature

Annex II: Description of the Net Meter

I. Existing three phase unidirectional meters should be either reprogrammed to be a bi-directional meter or replaced by an entirely new one.

II. The existing meter board and its wiring shall be (if required) re-located or replaced by the registered technician appointed by the consumer. The location of the meter shall be accessible to Utility personnel.

III. The consumer shall bear all costs associated with the interconnection including the costs of meter replacement, supply upgrading, and system connection/ modification (if applicable).

IV. The installed NEM system should have remote online monitoring system. The NEM consumer should provide the online monitoring access to the Utility.

(a) Meter for Net Metering Measurement:

No.	Technical Parameters	Connectivity at 415V & below voltage level	
		Whole current meters	CT operated
1	Applicability	7 kW to below 50 kW sanctioned load	Above50kW and below100 kVA sanctioned demand
2	Number of phases and wires	3 phase, 4 wire	3 phase, 4 wire
3	Measurand (s)	kWh, kVAh, kVA, PF	kWh, kVAh, kVA, PF
4	Standard voltage and frequency	3*240V(P-N), 415V(P-P), 50 ± 5%	3*240V(P-N), 415V(P-P), 50 ± 5%
5	Current rating	10 – 60 / 10 - 100	5 Amp
6	Accuracy class	0.5	0.2
7	Export-import feature	Import & export	Import & export
8	Communication port/ protocol	Optical / RS-232 / DLMS / MODBUS / Wireless	Optical, RS-232 / DLMS / MODBUS, Wireless

For 100 kW/kWp or above system the net meter should be connected in 11 kV or in 33 kV system. In that case the NEM consumer should follow the Utility standard.

(b) Pre-paid Meter for Net Renewable Energy Generation Measurement:

Consumers of pre-paid meters should have the metering system that can keep record of the import and export of energy and also should be able to show the net consumption. The meter should also be able to calculate the value of the exported energy according to

the flat rate or the minimum rate for that consumer. The prepaid meter should be programmed to set the carry over energy credit to zero at the end of the settlement period.

Annex III: NEM System Checklist

1. Applicant information

Name (*Individual/ Organization*):	
Address:	
Utility account no.	
Meter no.	
Sanctioned load	

a. Contact person:

Name:																			
Position:																			
Address:																			
Nationality:																			
National ID:																			
Passport no. (If non Bangladeshi):																			
Telephone:									Mobile:										
Email:																			

2. Components used

a. Solar PV panels

Manufacturer (*Company name, origin*)	
Brand	
Model no.	
Rated capacity	
Compliance	

(*IEC 61215, IEC 61701, IEC 61730, PID test certificate -IEC 62804 or similar*)	
Details of national specification compliance certificate issued by BSTI	
Number of Panels	
Installed capacity (*Total*)	

b. Inverters

Manufacturer (*company name, origin*)	
Brand	
Model no.	
Rated capacity	
Compliance (*IEC 61727*)	
Number of inverters	
Installed capacity (*Total*)	
No and date of approval under NEM	

c. Mounting system

General Information	
Manufacturer (company, origin)	
Type & description if applicable	
Type of fastening system	
Mounting location	☐ flat roof ☐ sloped roof (>5° slope) ☐ facade ☐ open space
Design	☐ integrated ☐ parallel ☐ elevated (non-parallel) ☐ tracking
Fastening system	☐ weight-loading ☐ fastening provided ☐ other
Estimated static friction coefficient	
Calculated static friction coefficient	
☐ **I/we hereby certify that all relevant requirements pertaining to building authority regulations, building rules lists and technical building specifications, including BNBC have been met.**	

d. Cables/ power lines

General description	
PV string cable / power line	
Manufacturer	
Type	
Cross-section	
PV main cable / power line (DC)	
Manufacturer	
Type	
Cross-section	
Inverter supply cable / power line (AC)	
Manufacturer	
Type	
Cross-section	

e. Feed-in Management/ communication

General information	
Features	☐ Effective power reduction ☐ 70% provision ☐ Other provision: _____%
Implementation with	☐ Permanent inverter settings ☐ Feed-in management system ☐ Other measures: _____
Manufacturer (company, origin)	
Type & description if applicable	
Does the system communicate effective feed-in levels to network operator? ☐ Yes ☐ No	

3. Information regarding planning and installation

General
☐ The installation of the PV system was carried out in accordance with recognized technical rules and standards. ☐ The PV system was built with minimal shadowing effect. ☐ A shading analysis was incorporated into the yield forecast (required given a notable degree of shading).
Structural information

☐ For roof-mounted systems, the load bearing capacity of the substructure has been assessed by (name of person or firm with contact details):

☐ For roof-mounted system, the aging condition of the rooftop surface has been assessed by (name of person or firm with contact details):

☐ The anchoring and load application was carried out in accordance with the manufacturer's calculated proofs or the type structural calculations for the mounting structure as well as relevant mounting instructions.

☐ The fastening of the modules was carried out in accordance with the manufacturer's guidelines.

☐ Using alternative means, please describe the reasons:	

☐ Roof perforations were carried out in accordance with technical rules and standards.

Building details:

Building height		m
Wind load zone		m
Cable		m
Edge distances		m
Roof ridge		m

Fire safety measures

☐ Smoke and heat exhaustion systems are fully functional.

☐ Firewalls and fire compartments have been taken into consideration in accordance with fire protection regulations.

☐ Other measures:	

Electrical safety, choice and installation of electrical equipment

The system and the choice and installation of equipment was installed according to the general provisions of DIN VDE0100 and the specific provisions of VDE 0100-712 and VDE-AR-N 4105, and inspected according to the provisions of IEC 62446 (VDE 0126-23). Among others, the following specifications were met:

☐ The RE system's cables and power lines were selected and installed in a way that makes them "earth fault and short circuit safe" in accordance with VDE 0100-520.

☐ The cables are attached to the frame, have no contact to the surface of the roof and are not routed over sharp edges. The necessary strain relief has been ensured at all connection points. All outdoor cables are drawn through covered cable trays.

☐ The circuit breakers used in the direct-current circuit are sufficient according to the manufacturer's guidelines with regard to the suitability and switching capacity.

Lightning and voltage surge protection

Note: It is mandatory for *a PV system to be a lightning protection system installed.*		
1. Lightening protection system is mandatory for buildings. Is there any lightning protection system in the building?	☐ Yes	☐ No
2. Does a test report exist for the lightning protection system?	☐ Yes	☐ No
3. Was the outside lightning protection system adjusted accordingly?	☐ Yes	☐ No
4. Have separation distances been calculated?	☐ Yes	☐ No
5. Have separation distances been observed?	☐ Yes	☐ No
6. Is the PV generator directly connected to the lightning protection system?	☐ Yes	☐ No
7. Has lightning protection equipotential bonding been carried out?	☐ Yes	☐ No
8. Are type 1 DC lightning arresters installed in proximity to the entry point to the building's string cable?	☐ Yes	☐ No
9. Is a type 1 lightning arrester installed on the AC-side of the inverter?	☐ Yes	☐ No
10. Is a type 1 lightning arrester installed at the feed conduit's building entry point?	☐ Yes	☐ No
11. Is there a type 2 DC surge arrester installed in front of the inverter on the DC side?	☐ Yes	☐ No
12. Is there a type 2 surge arrester installed in front of the inverter on the AC side?	☐ Yes	☐ No
13. Has a type 1-2-3 combination arrester been installed at the feed conduit's building entry point?	☐ Yes	☐ No
14. Has equipotential bonding been carried out for the mounting structure? **Note***: Separate lightning protection = min. 4 mm² (unprotected cable channels). Combined lightning protection = min. 16 mm²*	☐ Yes	☐ No

Annex IV: Net Metering Agreement Template

This Agreement is made and entered into at (location) _____ on this (date) _____ day of (month)_____ year ____ between the Consumer, by the name of _____ having premises at (address) _____ as first party

AND

_____ (Name of the Utility), Company registered under the Companies Act 1994 (Act XVIII of 1994) and functioning as the "Utility" under the BERC Act 2003 having its Head Office at, _____ (hereinafter referred to as _____ or Utility which expression shall include its permitted assigns and successors) as second party.

AND, WHEREAS _____ (name of the consumer) desires to set-up such renewable energy System of _____ kW (or kWp) at _____ connected with (Name of the Utility)'s grid at _____ Voltage level for his/her/its own use within the same premises.

WHEREAS, the _____ (name of authority) through letter dated _____ has registered for developing and setting up _____ kW (or kWp) own renewable energy system for his/her/its own use under _____ (name of the policy) at his/her/its premises in legal possession including rooftop or terrace.

And whereas, the Utility agrees to provide grid connectivity to the Eligible Consumer for injection of the electricity generated from his Rooftop Solar PV System of capacity _____ kilowatts Peak (kWp) into the power system of Utility and as per conditions of this agreement and in compliance with the applicable Policy/ rules/ Regulations/ Codes (as amended from time to time) by the Consumer which includes-

[List of relevant documents: Utility should determine]

Both the parties hereby agree as follows:

1. Eligibility

i. The consumer should be eligible as per conditions that are specified in the Section 3.1 of 'Net Metering Guidelines-2018'.
ii. The Eligible Consumer must abide by the generation and electricity export limits regulated in the Section 3.3 of the same document as above.
iii. The Eligible Consumer should agree to abide by the Government regulated rules and eligibility conditions as amended from time to time.

2. Technical and Interconnection Requirement

i. Consumer agrees that his renewable energy and net metering system will conform to the standards and requirements specified in this Net Metering Guidelines-2018, existing national regulations, the Grid and Distribution Code as amended from time to time.

ii. Consumer agrees that he has installed or will install, prior to connection of Rooftop Solar Photovoltaic System to Utility's distribution system, an "Utility interface disconnect switch" (both automatic and inbuilt within inverter and external manual relays) and agrees for the Utility to have access to and operation of this, if required and for repair & maintenance of the distribution system.

iii. Consumer agrees that in case of non-availability of grid, renewable energy system will disconnect/isolate automatically and his plant will not inject power into the Utility's distribution system.

iv. All the equipment connected to the distribution system shall be compliant with the relevant regulations mentioned in this guideline.

v. Consumer agrees that Utility will specify the interface/inter connection point and metering point.

vi. Consumer and Utility agree to comply with the relevant regulations in respect of operation and maintenance of the plant, drawing and diagrams, site responsibility schedule, harmonics, synchronization, voltage, frequency, flicker etc.

vii. In order to fulfill Utility's obligation to maintain a safe and reliable distribution system, consumer agrees that if it is determined by the Utility that Consumer's renewable energy system either causes damage to and/or produces adverse effects affecting other consumers or Utility's assets, Consumer will have to disconnect RE System immediately from the distribution system upon direction from the Utility and correct the problem to the satisfaction of Utility at his own expense prior to reconnection.

viii. The consumer shall be solely responsible for any accident to human being/animals whatsoever (fatal/non-fatal/departmental/non-departmental) that may occur due to back feeding from the Rooftop Solar plant when the grid supply is off. The Utility reserves the right to disconnect the consumer's installation at any time in the event of such exigencies to prevent accident or damage to man and material.

3. Clearance and Approvals

The consumer shall obtain all the necessary approvals and clearances (if any other than the Utility) before connecting the photovoltaic system to the distribution system.

4. Access and Disconnection

i. Utility shall have access to metering equipment and disconnecting means of the RE generation System, both automatic and manual, at all times.

ii. In emergency or outage situation, where there is no access to the disconnecting means, both automatic and manual, such as a switch or breaker, Utility may disconnect service to the premises of the Consumer

5. Liabilities

i. Consumer shall indemnify Utility for damages or adverse effects from his negligence or intentional misconduct in the connection and operation of RE System.

ii. Utility shall not be liable for delivery or realization by the Consumer of any fiscal or other incentive provided by the Government.

6. Metering

Metering arrangement and specification should comply with Section 3.6 and ANNEX II of Net Metering Guidelines-2018 as amended from time to time.

7. Commercial Settlement

Commercial Settlement shall follow the regulations as specified in Section 3.4 and Section 3.5 of Net Metering Guidelines-2018 as amended from time to time.

8. Connection Cost

The Eligible Consumer shall bear all the cost related to setting up of Rooftop Solar Photovoltaic System including metering and inter-connection. The Consumer agrees to pay the actual cost of modifications and upgrades to the service line (if needed).

9. Inspection, Test, Calibration and Maintenance Prior to Connection

Before connecting, Utility shall complete all inspections and tests finalized in consultation with the consumer. Consumer shall make available to the Utility all drawings, specifications and test records of the project or generating station as the case may be.

10. Records

Each Party shall keep complete and accurate records and all other data required by each of them for the purposes of proper administration of this Agreement and the operation of the Rooftop Solar PV System.

11. Dispute Resolution

i. All disputes or differences between the Parties arising out of or in connection with this Agreement shall be first tried to be settled through mutual negotiation, promptly, equitably and in good faith.

ii. In the event that such differences or disputes between the Parties are not settled through mutual negotiations within sixty (60) days or mutually extended period, after such dispute arises, then for

   a) any dispute in billing pertaining to energy injection and billing amount, it would be settled by the Utility .

   b) any other issues pertaining to the Regulations and its interpretation; it shall be decided by the Ministry of Power, Energy and Mineral Resources following appropriate prescribed procedure or any other entity authorized by Power Division.

12. Termination

i. The Consumer can terminate agreement at any time by giving Utility 30 (thirty) days prior notice.

ii. Utility has the right to terminate Agreement with 30 days prior written notice, if Consumer commits breach of any of the terms and conditions of this Agreement and does not remedy the breach within 30 days of receiving written notice from Utility of the breach.

iii. Consumer shall upon termination of this Agreement, disconnect the renewable energy generation system from Utility's distribution system within one week to the satisfaction of Utility.

Communication:

The names of the officials and their addresses, for the purpose of any communication in relation to the matters covered under this Agreement shall be as under:

In respect of the (Name of Utility):	In respect of the Consumer:

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be executed by their authorized officers, and copies delivered to each Party, as of the day and year herein above stated.

FOR AND ON BEHALF OF The Utility	FOR AND ON BEHALF OF The Project Owner
Authorized Signatory Witness 1.	Authorized Signatory Witness 1.
2.	2.

Annex V: Examples of Energy Accounting and Bill

a. If the amounts of exported and imported electricity are equal:

Let us assume that Mr. Abdul Karim is a residential prosumer of DPDC. His sanctioned load is 10 kilowatt. To benefit from net metering scheme he has installed a 7 kilowatt rooftop system. In the month of October, Mr. Abdul Karim has consumed 500 units of electricity form the grid. In the same month, after self-consumption he has exported the same amount i.e., 500 units of electricity to the grid. In this case, for Mr. Abdul Karim the amount of exported and imported electricity is equal, or in other words the amount of net exported/imported electricity is (500-500 =) 0 units.

Therefore, he will only pay for the demand charge and associated VAT. For the month of October, he will not pay for any energy consumption. Mr. Abdul Karim's bill for the month of October, 2018 is shown below:

Description of electricity export/ import	**Amount**	**Rate (in BDT)**	**Total bill (in BDT)**
Demand charge	10 kW	25 BDT/kW	250.00
Electricity imported from grid	500 units		
Electricity exported to the grid	500 units		
Net electricity consumption	0 units		0.00
Carryover units	0 units		
Electricity bill	-	-	250.00
VAT on bill	-	5%	12.50
Total bill (except late fee and meter charge)	-	-	262.50

So, even if the electricity exported and imported by Mr. Abdul Karim is equal, in October 2018, he will have to pay 262.50 BDT.

b. If the amount of exported electricity is higher than total import (prosumer is net exporter):

Let us assume that Mr. Abdul Karim is a residential prosumer of DPDC. His sanctioned load is 10 kilowatt. To benefit from net metering scheme he has installed a 7 kilowatt rooftop system. In the month of October, Mr. Abdul Karim has consumed 500 units of electricity form the grid.

In the same month, after self-consumption he has exported 600 units of electricity to the grid. In this case, for Mr. Abdul Karim the amount of exported electricity is higher than the amount of imported electricity. In other words, the amount of net exported energy is (500-600 =) -100 units.

Mr. Abdul Karim's bill for the month of October, 2018 is shown below:

Description of electricity export/ import	Amount	Rate (in BDT)	Total bill (in BDT)
Demand charge	10 kW	25 BDT/kW	250.00
Electricity imported from grid	500 units		
Electricity exported to the grid	600 units		
Carryover units to the next month	100 units		
Net electricity consumption	0 units		0.00
Electricity bill	-	-	250.00
VAT on bill	-	5%	12.50
Total bill (except late fee and meter charge)	-	-	262.50

So, even if in October 2018 Mr. Abdul Karim has exported extra 100 units to the grid compared to his import from the grid, he will have to pay an electricity bill of 262.50 BDT. In this case, his 100 units will be transferred to the next billing cycle as carryover and will be adjusted with the imported electricity. This will continue until the month of June.

c. If the amount of exported electricity is lower than total import (prosumer is net importer):

Let us assume that Mr. Abdul Karim is a residential prosumer of DPDC. His sanctioned load is 10 kilowatt. To benefit from net metering scheme he has installed a 7 kilowatt rooftop system. In the month of October, Mr. Abdul Karim has consumed 500 units of electricity form the grid. In the same month, after self-consumption he has exported 350 units of electricity to the grid. In this case, for Mr. Abdul Karim the amount of imported electricity is higher than the amount of exported electricity. In other words, the amount of net imported energy is (500-350 =) 150 units.

Mr. Abdul Karim's bill for the month of October, 2018 is shown below:

Description of electricity export/ import	Amount	Rate (in BDT)	Total bill (in BDT)

Demand charge	10 kW	25 BDT/kW	250.00
Electricity imported from grid	500 units		
Electricity exported to the grid	350 units		
Carryover units to the next month	0 units		
Net electricity consumption	150 units	*	708.75
Electricity bill	-	-	958.75
VAT on bill	-	5%	47.95
Total bill (except late fee and meter charge)	-	-	1006.70

* For 0-75 units the rate is 4 BDT/unit and for 76-200 units the rate is 5.45 BDT/unit.

So, as Mr. Abdul Karim has imported additional 150 units from the grid compared to the amount he has exported to the grid, he will have to pay an electricity bill of 1006.70 BDT in the month of October 2018.

d. If the prosumer remains a net exporter at the end of the settlement period (June), then the calculation of electricity bill is shown below:

Description of electricity export/ import	**Amount**	**Rate (in BDT)**	**Total bill (in BDT)**
Demand charge	10 kW	25 BDT/kW	250.00
Electricity imported from grid in June	500 units		
Electricity exported to the grid in June	450 units		
Carryover units from previous month (May)	250 units		
Adjusted exported (net export) unit	200 unit		
Amount of settled unit	200 unit	6.615 BDT/unit*	- 1323.00
Electricity bill	-	-	- 1073.00
VAT on bill	-	5%	53.65

Total bill (except late fee and meter charge)	-	-	- 1019.35

* Bulk rate of DPDC: 6.615 BDT/unit

At the end of settlement period (in June), the distribution Utility shall pay the prosumers an amount of -1019.35 BDT for the 200 units of net export at the bulk rate (6.615 BDT/unit), after adjusting with other charges.

P. S.: At the end of settlement period (on 30 June), if any prosumer (residential/ commercial/ industrial) remains to be a net importer, the prosumer will have to pay the Utility as per bulk rate determined by the BERC.