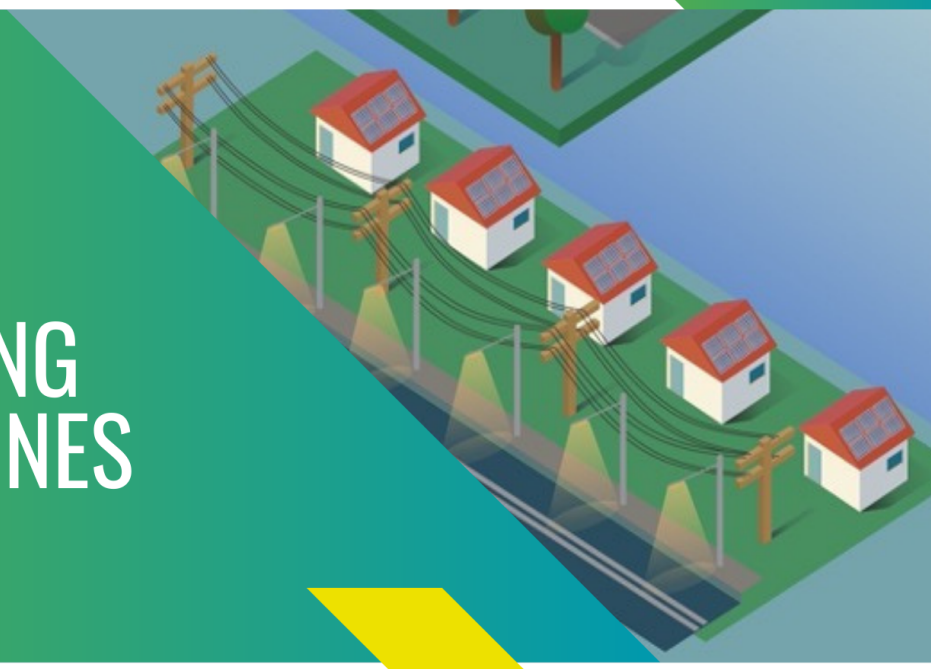
GUIDEBOOK ON NET METERING IN THE PHILIPPINES



DEPARTMENT OF ENERGY · PHILIPPINES ·

C40 CITIES FINANCE FACILITY

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The C40 Cities Finance Facility (CFF) is a collaboration of the C40 Cities Climate Leadership Group and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. The CFF supports cities in developing and emerging economies to develop finance-ready projects to reduce emissions to limit global temperature rise to 1.5°C and strengthen resilience against the impacts of a warming climate. The CFF is funded by the German Federal Ministry for Economic Development and Cooperation (BMZ), the Children's Investment Fund Foundation (CIFF), the Government of the United Kingdom and the United States Agency for International Development (USAID).

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Guidebook on Net-Metering in the Philippines

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List of Abbreviations

AC	-	Alternating current
CCT	-	Condominium Certificate of Title
DAS	-	Distribution Assets Study
DC	-	Direct current
DIS	-	Distribution Impact Study
DOE	-	Department of Energy
DPWH	-	Department of Public Works and Highways
DSOAR	-	Distribution Services and Open Access Rules
DU	-	Distribution utility
ECE	-	Electronics and Communications Engineer
ERC	-	Energy Regulatory Commission
FI	-	Financing institution
IEC	-	International Electrotechnical Commission
ISO	-	Organization for Standardization
kW	-	Kilowatt
kWh	-	Kilowatt-hour
LGU	-	Local government unit
ME	-	Module efficiency
MPP	-	Maximum power point
NBCDO	-	National Building Code Development Office
NEA	-	National Electrification Administration
NGCP	-	National Grid Corporation of the Philippines
NM	-	Net-Metering
NPC	-	National Power Corporation
NREB	-	National Renewable Energy Board
OBO	-	Office of Building Official
pa	-	Per annum
PCAB		Philippine Contractors Accreditation Board
PEE	-	Professional Electrical Engineer
PIOU	-	Privately-owned investor utility
PRC	-	Professional Regulation Commission
PSSEA	-	Philippine Solar and Storage Energy Alliance
PV	-	Photovoltaic
QE	-	Qualified end-user
RA	-	Republic Act
RE	-	Renewable energy
REE	-	Registered Electrical Engineer
RES	-	Renewable energy system
RME	-	Registered Mechanical Engineer
ROI	-	Return on investment
RPS	-	Renewable Portfolio Standard
STC	-	Standard test conditions
TCT	-	Transfer Certificate of Title
UPS	-	Uninterrupted power supply

Glossary and Terms

Certificate of Compliance - refers to a license issued by the Energy Regulatory Commission in favor of a person or entity to operate a power plant or other facilities used in the generation of electricity pursuant to Section 6 of RA 9136 and Section 4 of the Implementing Rules and regulations of RA 9136;

Contestable Customer - refers to an electricity end-user who meets the eligibility requirements for contestability and the threshold level set by the ERC to qualify in the Contestable Market;

Contestable Market - refers to the electricity end-users who have a choice of a supplier of electricity;

Department of Energy or **DOE -** refers to the government agency created pursuant to RA No. 7638 whose functions are expanded in RA No. 9136;

Distribution Asset Study or **DAS -** refers to a study to determine all distribution assets and costs necessary to accommodate the proposed Net-Metering interconnection;

Distributed Energy Resources or **DER -** refers to small-scale power generation sources located close to where electricity and associated facilities used (e.g., a home or business) to provide an alternative to or an enhancement of the traditional electric power grid;

Distribution Impact Study or **DIS -** refers to a set of technical studies which are used to assess the possible effects of a proposed expansion, reinforcement or modification of the Distribution System or a User Development and to evaluate Significant Incidents;

Distribution Services and Open Access Rules or **DSOAR -** refers to the rules promulgated by the Energy Regulatory Commission (ERC) under ERC Resolution No. 2, Series of 2010 including any subsequent amendments thereto, covering, among others, the terms and conditions for the connection of generating facilities to the distribution system;

Distribution Utility or **DU -** refers to any electric cooperative (EC), private corporation, private investor-owned utilities (PIOU), government-owned utility or existing local government unit, which has an exclusive franchise to operate a Distribution System in accordance with its franchise and R.A. No. 9136, as defined in Section 4(l) of RA No. 9513;

Energy Regulatory Commission (ERC) - refers to the independent quasi-judicial regulatory agency created pursuant to RA No. 9136;

Local Government Unit or **LGU -** refers to the political subdivisions established by or in accordance with the Philippine Constitution pursuant to Executive Order (EO) No. 292 or RA No. 7160, which include the province, city, municipality and barangay;

National Renewable Energy Board or **NREB -** refers to the board created under RA 9513 tasked under Section 10 thereof to recommend to ERC the establishment of Net-Metering interconnection standards, pricing methodology and other commercial arrangements necessary to ensure success of the Net-Metering for renewable energy program;

Net-Metering or **NM -** refers to a system, appropriate for distributed generation, in which a distribution grid user has a two-way connection to the grid and is only charged for his net electricity consumption and is credited for any overall contribution to the electricity grid;

Net-Metering Agreement - refers to the agreement between a Qualified End-User (QE) and the DU governing the commercial and interconnection arrangements between the DU and the QE;

Net-Metering Interconnection Standards - refers to the set of requirements and procedures to ensure safe, reliable and efficient connection of QE's RE system, and its operation thereof in parallel to the distribution system;

New Housing Development - refers to a group of individual dwelling or apartment houses that are usually built and sold or leased by management;

"On-Grid System" refers to electrical systems composed of interconnected transmission lines, distribution lines, substations and related facilities for the purpose of conveyance of bulk power on the grid of the Philippines, as defined in *Section 4(kk) of RA No. 9513*;

Philippine Distribution Code or **PDC -** refers to the set of rules, requirements, procedures and standards governing DUs and Users of Distribution System in the operation, maintenance and development of the distribution system. It also defines and establishes the relationship of the Distribution System with the facilities or installations of the parties connected thereto;

Philippine Electrical Code (PEC 2017) - establishes the basic materials quality and electrical works standards for the safe use of electricity for light, heat, power, communications, signaling and for other purposes;

Power Tolerance - refers to the determination of how the power output of a solar panel might differ from its nameplate rating, typically expressed as a plus-or-minus percentage;

Power Rating - refers to the amount of power that the solar panels can produce under industry test conditions;

Qualified End-users or **QE -** refers to entities that generate electric power from an eligible on-site RE generating facility, such as, but not limited to, house or office building with photovoltaic system that can be connected to the grid, for the purpose of entering into a Net-Metering Agreement with the host DU, as defined in *Section 7 of the Implementing Rules and Regulations of R.A. 9513;*

Rapid Shutdown - refers to a system that enables facility personnel and responders to physically flip a switch to disengage the solar PV panel/array to reduce the electrical voltage to 80 volts within 30 seconds of rapid shutdown initiation not more than 1000 mm from point of penetration inside a building in less than a minute (see more 6.90.2.6.(B)(2)(2) *Philippine Electrical Code Part 1 2017);*

Retail Electricity Supplier or **RES -** refers to the entities licensed by the Energy Regulatory Commission to supply electricity to the end-users in contestable market;

Renewable Energy Certificate or **REC -** refers to a certificate issued by the RE Registrar representing all renewable and environmental attributes from one MWh of electricity generation sourced from an eligible RE Generation Facility;

Renewable Energy Resources or RE Resources - refers to energy resources that do not have an upper limit on the total quantity to be used. Such resources are renewable on a regular basis, and whose renewal rate is relatively rapid to consider availability over an indefinite period of time. These include, among others, biomass, solar, wind, geothermal, ocean energy and hydropower confirming with internationally accepted norms and standards on dams, and other emerging renewable energy technologies;

Renewable Energy Technologies - eligible RE technologies under the Net-Metering program include wind, solar, run-of-river hydro, biomass energy systems or such other RE systems capable of being installed with the QEs premises with or without battery;

Renewable Portfolio Standards or **RPS -** refers to a mandatory policy mechanism that requires load serving entities to source a portion of their energy supply from eligible RE Resources, as defined in *Section 4(ss) of R.A. 9513* and *DOE Department Circular No. DC2017-12-0015*; and

Solar Energy - refers to the energy derived from solar radiation that can be converted into useful thermal or electrical energy.

Foreword

The country continues to progress in broadening the utilization of renewable energy resources. The Net-Metering program, one of the non-fiscal mechanisms instituted by the Department of Energy (DOE), is among the most aggressive and promising mechanisms as it allows the consumers to be "prosumers" where households or small companies can generate and utilize its own power through renewable energy systems, particularly solar PV, within its premises.

As of 30 December 2020, around 4,000 qualified end-users, households and small companies, participated in the Net-Metering program, generating a total of 32.1 MW and 85% of the participants are from Metro Manila. With robust promotion of the Net-Metering program through this Guidebook to the rest of the country, exponential growth in the utilization of renewable can be realized.

The "Guidebook on Net Metering in the Philippines" is very timely as it will serve as a reference to electricity consumers, the distribution utilities, local government units, financial institutions and Net-Metering developers/suppliers/installers to better understand the program concepts and "how to" in participating in this initiative. It encapsulates the multiple benefits that Net-Metering offers and DOE is targeting more electricity consumers will participate in this endeavor because recently, the DOE has expanded the coverage of the Net-Metering Program to include off-grid areas.

The Reference Guide on Net-Metering was published in 2013; eight years hence, a lot of developments in the energy sector have taken place. Therefore, Guidebook takes into account the various resolutions, executive orders, and and other rules and regulations issued by the Energy Regulation Commission and the DOE. It also includes the lessons learned through the various experiences and challenges in the past eight years.

We would like to acknowledge the support provided by the GIZ and C40 Cities Climate Leadership Group through the Cities Finance Facility (CFF) project in making this publication possible. More importantly, we thank the electricity end-users for their valuable inputs and in their participation in this environment-friendly alternative as source of power. May we have a more successful Net-Metering program in the years ahead!

Secretary Alfonso G. Cusi
Department of Energy Philippines

This *Guidebook on Net-Metering in the Philippines* is a timely refresh of the first reference guide published in 2013. It coincides with an updated nationally determined contribution from the Philippines, now committed to reducing its greenhouse gas emissions by 75 percent by 2030 compared to 2020 levels.

Globally, there is an ever-stronger recognition of the role cities can play in fighting climate crisis and delivering on the Paris Agreement. Decarbonising the electricity grid is one of the most significant actions cities can take to have the biggest impact in terms of emissions reductions[2]. They can do so by working in partnerships with national government and the private sector through programmes such as Net-Metering. It is therefore vital to empower Local Government Units (LGUs) across the Philippines with the knowledge of how to take advantage of this programme and build the confidence to invest in renewable energy, reducing emissions in line with national commitments.

This is what the Guidebook is looking to achieve. It lays out the policy and regulatory landscape for city officials and highlights best practices with concrete examples from LGUs on how to accelerate renewable energy deployment. One of the examples is Quezon City – a C40 member city working to install solar panels on up to 50 public schools and 3 major hospitals with the assistance of the C40 Cities Finance Facility, a joint initiative of C40 and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH funded by the German, British and U.S. governments and by the Children's Investment Fund Foundation.

As we respond to the COVID-19 pandemic and learn how to move beyond it, cities worldwide have before them a unique opportunity to chart new pathways toward a green and just recovery, leaving behind what was business as usual. The setbacks brought by the pandemic have stretched cities and their resources to the limit. The C40 Global Mayors COVID-19 Recovery Task Force set an agenda and is leading the charge for an economic recovery that puts people, our communities, and our planet first. This agenda includes the need to create good green jobs, support essential workers, and provide training and upskilling to enable a just transition to an inclusive economy.

Fortunately, there is robust evidence that all of these objectives can be met. Our analysis shows that a green and just recovery in C40 cities collectively will halve their emissions by 2030, create 50 million good green jobs which is a third more than business as usual, reduce air pollution by up to 30 percent and prevent 270,000 premature deaths, and deliver in excess of USD 280 billion in public health benefits over the next decade.

It is therefore our sincerest hope at C40 that this Guidebook, developed by the Department of Energy in partnership with the C40 Cities Finance Facility, serves as a key resource for thousands of LGUs across the Philippines, not just in the deployment of renewables but as a cornerstone to their green and just recovery

Mark Watts
Executive Director, C40 Cities

[2] C40 Cities and McKinsey, 2017, Focused Acceleration: A strategic approach to climate action in cities to 2030

The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH is pleased to once again collaborate with the Department of Energy in the production of the Guidebook on Net-Metering in the Philippines. GIZ is pursuing this cooperation in the context of the C40 Cities Finance Facility project, which we are implementing jointly with the C40 Climate Leadership Group.

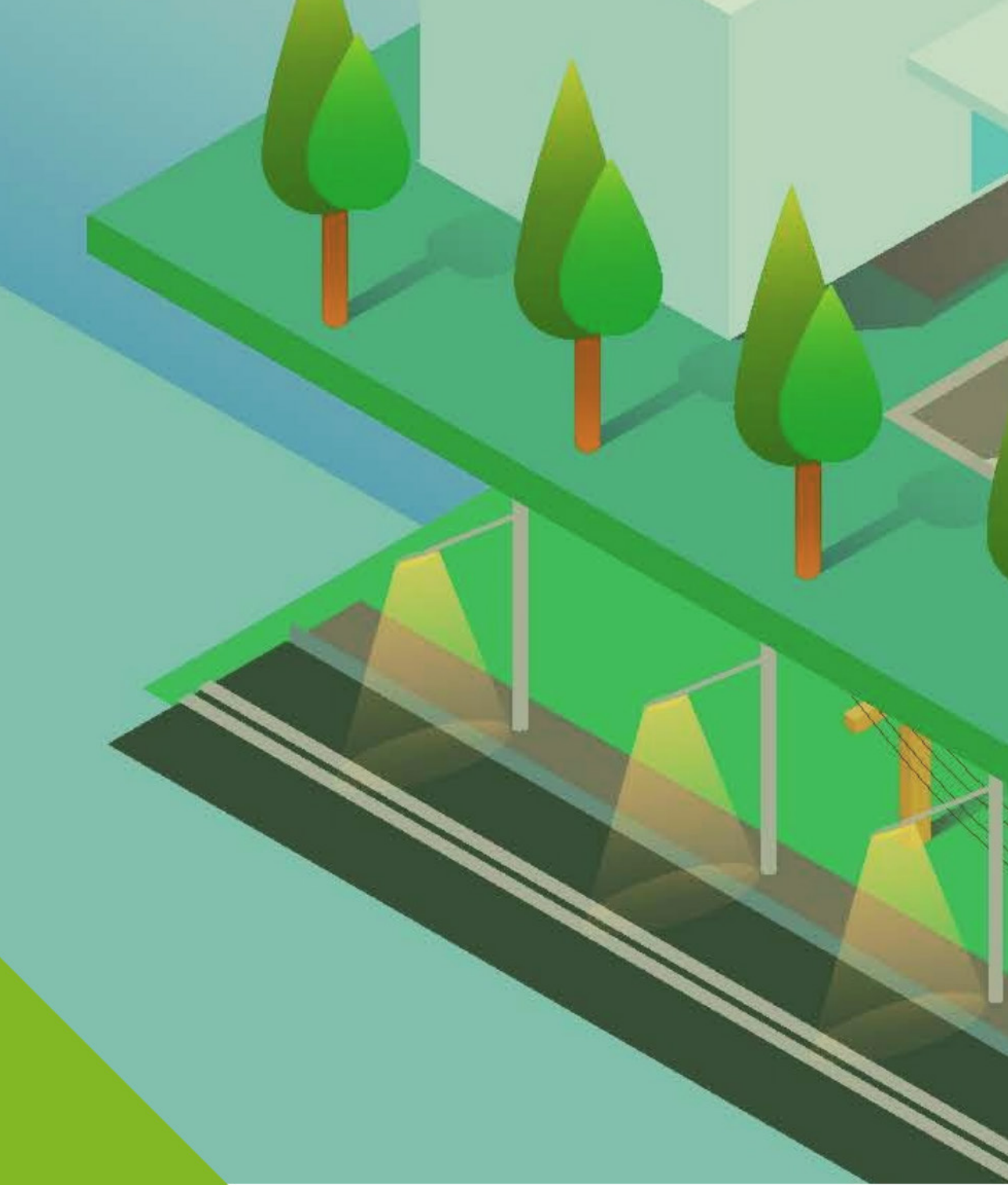
In 2013, GIZ and DOE cooperated in the production of the "Net-Metering Reference Guide," which provided the relevant information to consumers who wish to participate in the Net-Metering program from that year onwards. Since then, there have been several technological developments as well as changes in the policy framework related to the implementation of Net-Metering, which necessitates the updating of the guidebook. GIZ supports the DOE's present campaign to empower and educate consumers of their options for a wiser and more intelligent utilization of energy resources. We also believe on the importance of balancing the interest of the different stakeholders while ensuring that the implementation of Net-Metering program will not be hampered.

In this edition of the Guidebook, the aim was broadened to help inform not only the consumers but also the other stakeholders including suppliers, distribution utilities, and LGUs to help them effectively deliver their part for the successful implementation of the Net-Metering policy mechanism.

Net-metering is an important policy mechanism as it facilitates the deployment of more distributed renewable energy systems, like solar photovoltaic, in the grid. This is a clear pathway for ordinary citizens to contribute towards the energy transition to decarbonize the power sector. Most of us are also aware of the direct benefit of installing distributed renewable energy such as the reduction in electricity bills, that onsite electricity generation can result in deferment of investment in transmission grid, and the reduction in air and noise pollution. There is also evidence which shows that consumers availing of the net-metering become more conscious about their electricity consumption and try to be efficient in their usage of electricity.

I am confident that the Guidebook will be able to answer most of the questions of those who consider net-metering and finally prompt them to pursue the installation of renewable energy in their property.

Bjoern Surborg,
OIC Country Director
GIZ Regional Office Philippines & Pacific Island Countries



Introduction

1. Introduction

1.1. Background

In the Philippines, the concept of Net-Metering was introduced in the *Renewable Energy Act of 2008 (RA 9513)*. The Net-Metering Program is a non-fiscal strategy to promote the utilization of renewable energy (RE) in the country. It was designed as an incentive scheme to encourage Electricity End-users to participate in the generation of electricity from renewable sources to meet part of its electricity requirements.

Net-Metering is a scheme that allows Electricity End-users to build an RE facility to generate electricity primarily for own-use and when there is unused electricity generated, to sell to the grid.

By virtue of the *Energy Regulatory Commission (ERC) Resolution 09 Series of 2013*, the Rules Enabling the Net-Metering Program for Renewable Energy, the Net-Metering activities were set into motion. A Net-Metering Reference Guide was subsequently published in 2013 by the DOE with support from the GIZ to facilitate the information dissemination of the Net-Metering Program.

The most common RE facility under the Net-Metering program is the rooftop solar photovoltaics, generally referred to as a kind of distributed generation or distributed energy resources (DER).

The Department of Energy (DOE) is the national policy making agency mandated to promote the development of indigenous and RE resources. The recent *DOE Circular No. DC 2020-10-0022* described Net-Metering where the Qualified End-users (QEs), under normal circumstances, will not be a net generator or producer at the end of each calendar year. The DOE Circular moreover expanded the Net-Metering program to include both the on-grid and off-grid areas in the country.

Since the promulgation of the Net-Metering Rules in 2013, there has been a steady increase in Net-Metering participants. Further developments relating to implementation has taken place including the introduction of department circulars from the Department of Energy (DOE) – the national policy making agency mandated to promote the development of indigenous and RE sources – and several ERC rules and resolutions. The COVID-19 pandemic in 2020, however dampened progress on Net-Metering activities. Now that the economy and the industry are starting to embrace the "new normal" and focused on efforts towards recovery, the DOE, National Renewable Energy Board (NREB) and the ERC are in the frontlines of finding solutions to the barriers and challenges in advancing the implementation of the Net-Metering Program in the country.

In *DOE Department Circular No. DC 2020-10-0022* known as "Prescribing the Policies to Enhance the Net-Metering Program for Renewable Energy Systems", described Net-Metering where the Qualified End-users (QEs), under normal circumstances, will not be a net generator or producer at the end of each calendar year. It likewise expanded the Net-Metering program to include both the on-grid and off-grid areas in the country. Among the provisions of the department circular is the development of a Net-Metering Guidebook. The Guidebook aims to prescribe the guidelines and procedures for Net-Metering arrangements from the offer to after-sales services by the Net-Metering installers and practitioners as well as prescribing the minimum standards for all Net-Metering installations, in collaborations with all concerned government agencies. The Guidebook is likewise intended to assist the electricity end-users who are interested to participate in the Net-Metering Program.

1.2. Objectives of the Guidebook on Net-Metering Program

The general objective of this Guidebook is to provide the various Net-Metering Program stakeholders, particularly the Electricity End-users, an easy to read, follow and understand reference in participating in the Net-Metering Program.

The specific objectives in developing this Guidebook are:

- To present the big picture of the objectives and benefits of the Net-Metering Program so that the various participants or stakeholders will appreciate the value of their contributions;

- To discuss in simple language the following
  - Concept of Net-Metering
  - Participants/stakeholders in Net-Metering Program
  - Components of a Net-Metering facility
  - Steps in participating in the Net-Metering
  - Implementation arrangements between stakeholders
  - Procurement of solar PV facility and its components

- To give practical tips to Net-Metering Program participants especially the QEs.

1.3. Walking through this Guidebook

The Guidebook will have the following chapters:

- Chapter 1 – Introduction
- Chapter 2 – Legal framework of the Net-Metering Program
- Chapter 3 – Overview of the Net-Metering Program
- Chapter 4 – Steps in applying for the Net-Metering Program
- Chapter 5 – Procurement of solar PV system and its components
- Chapter 6 – Feedback and Grievance Redress Mechanism

There is a deliberate effort to make the Guidebook reader friendly, that is, easy to read, to understand and to follow. Below are some tips as one reads through the Guidebook:

- Illustrations are provided when appropriate to make discussions interesting.
- Markers with  and boxed information are done for those that are reminders or advice. The reader is advised to remember to go back to them later.

There are instances when technical terms cannot be avoided. Those enclosed in quotation marks are such terms. Descriptions are provided in the Glossary of Terms to clarify them. They are marked with  .

Legal Framework of the Net-Metering Program

2. Legal Framework of the Net-Metering Program

This chapter discusses various legislative and executive instruments that support the implementation of the Net-Metering Program in the country.

The creation of the Department of Energy (DOE) in 1992 through *Republic Act (RA) 7638* declares as a policy of state, among others, to ensure a continuous, adequate and economic supply of energy through the intensive exploration, production, management and development of the country's energy resources. In consonance with this mandate, the *Electric Power Industry Reform Act of 2001* or *EPIRA* privatized and restructured the electric power industry and to make it more efficient and competitive. *Section 37 of the EPIRA* mandates the DOE to encourage private sector investments in the electricity sector and promote the development of indigenous and renewable energy (RE) resources.

The government's intent to accelerate the development, utilization and commercialization of RE got the needed boost with the enactment of *RA 9513* or the *Renewable Energy Act of 2008* or the *RE Act*. The goal of the *RE Act* is to accelerate the exploration and development of RE, promote its efficient and cost-effective commercial application, and encourage its use as tools for balancing the goals of economic growth with protection of health and the environment. To encourage commercial development of RE projects, the *RE Act* enabled several market development policies to enhance competitiveness and wider use of RE. One of this policy mechanisms is the Net- Metering Program for RE.

The Net-Metering Program is anchored on the following resolutions and circulars issued by both DOE and ERC. **Figure 1** shows laws and issuances related to the Net-Metering Program. Those with dotted lines and located at the lower portion are laws/issuances that compliment to the implementation of the Program.

2.1. Resolution No. 09 Series of 2013 Rules Enabling the Net-Metering Program

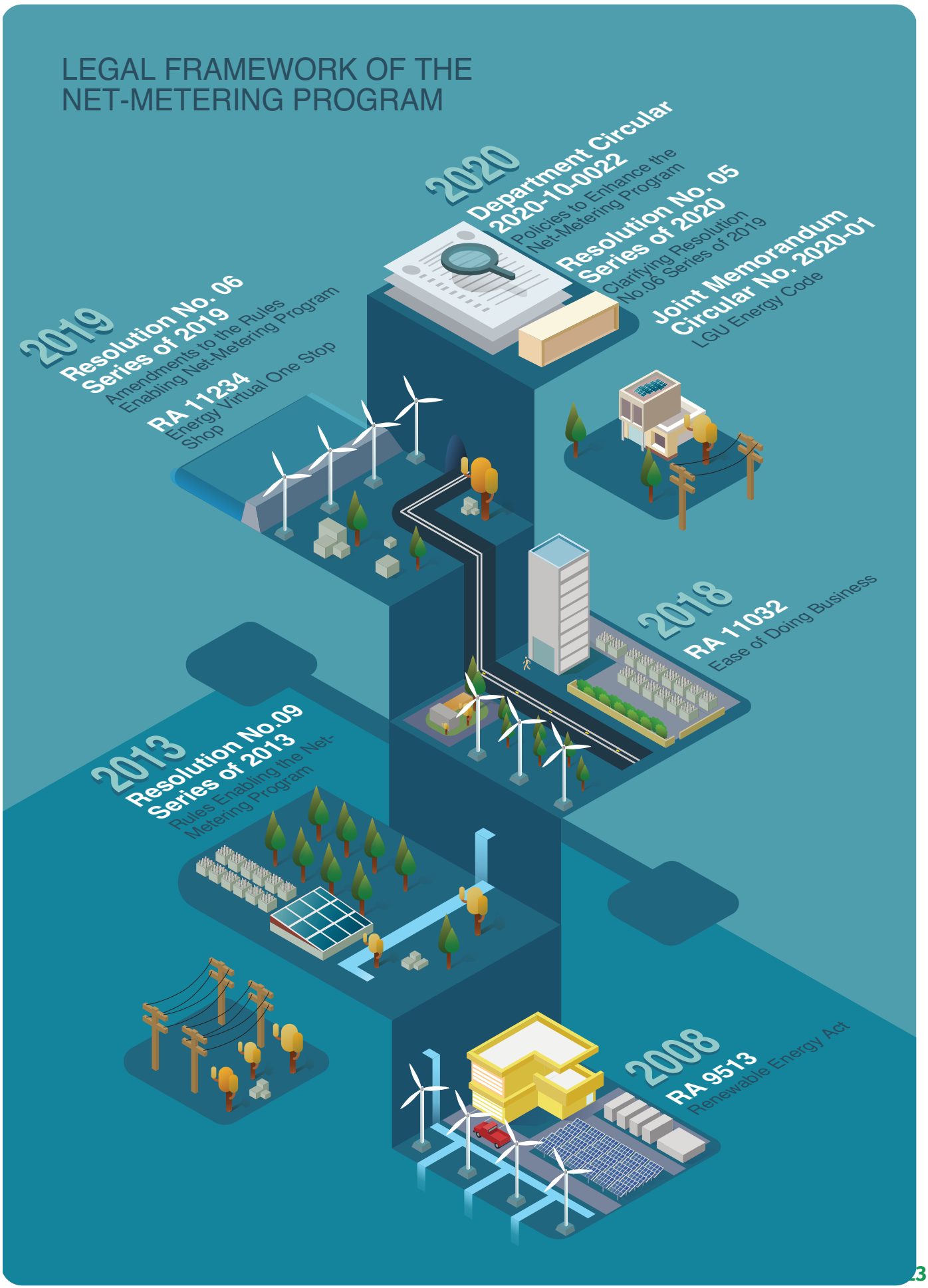
The resolution stipulates that the rules would apply to on-grid system. Qualified end-users (QE) are electricity end-users of good standing and are allowed to participate in the Net-Metering Program utilizing various RE resources such as wind, solar, biomass, biogas energy systems or other RE systems that can be installed within the QE's premises. The Distrubution Utility (DU) shall install two uni-directional meters (one for import and one for export) or a bi-directional meter whichever is economical[3]. A third meter close to the RE system will also be installed to measure the RE generated. Current policy allows the DUs to earn the equivalent Renewable Energy Certificate (REC) derived from the energy generated under the program.

ERC established a pricing methodology for the Net-Metering Program. While primarily the intent of the Net-Metering Program is to manage electricity consumption by installing a small RE facility, the QEs can sell the unused electricity generated by the RE facility based on the blended generation rate of the host DUs.

The resolution also includes in its annexes the Net-Metering Interconnection Standards and Net-Metering Agreement template. The *ERC Resolution No. 09 Series of 2013* is attached as **Annex 1**.

[3] A subsequent resolution prescribed the use of a bi-directional meter; refer to Section 2.3

Figure 1. Laws and Issuances for the Implementation of the Net-Metering Program



2.2. Resolution No. 06 Series of 2019 Amended Net-Metering Rules

The Amended Net-Metering Rules prescribe a maximum 20-working day processing timeline for the DUs to complete the whole interconnection process from receipt of the letter of interest; provided all necessary permits and licenses from various concerned agencies are secured and completed. Eligible "RE technologies" were also modified to include wind, solar, run-of-river hydro, biomass energy systems or such other RE systems capable of being installed within the QEs premises with or without battery. In the amended rules, the ERC has considered that the conduct of "Distribution Impact Study" (DIS) is a regular activity of the DU to ensure the reliability and safety of the interconnection of the RE system and the distribution system, hence DIS fee and net-metering charge were removed to encourage participation from end-users. The pricing methodology under this resolution maintained the DUs' blended generation cost excluding other generation adjustments. Further, the amended Net-Metering rules also rationalized the sharing of lifeline rate subsidy among all consumers.

The *ERC Resolution No. 06 Series of 2019* is attached as **Annex 2**.

2.3. Resolution No. 05 Series of 2020 Amendments to the Rules Enabling Net-Metering Program

The resolution was issued to provide clarifications on some provisions mentioned in Resolution No. 09 Series of 2019. The following amendments were made: (i) the definition of good credit standing now refers to electricity end-users with no unsettled or outstanding obligations with the DU at the time of the application, QEs would also include new customers; (ii) all meters shall be charged to the DU except for existing customers who wish to install RE systems in their premises, of which the difference between the cost of the old meter and the new bi-directional meter shall be borne by the end-user; (iii) the DU shall bear the cost of an REC meter while the QE should pay the wiring cost from the facility to the REC meter; and (iv) the REC meter should be located at the connection point or near the connection point. The resolution also stipulates that in case the existing customers have two (2) uni-directional meters, the same will now be replaced by one (1) bi-directional meter and the cost of such replacement shall be borne by the DU.

The *ERC Resolution No. 05 Series of 2020* is attached as **Annex 3**.

REC METERS INSIGHTS

Older facilities possibly do not have REC meters installed.
If so, the DU shall coordinate with the QE for the installation of a REC meter and execution of the appropriate Net-metering Agreement in accordance with the ERC rules. The DU will shoulder the cost of the REC meter while the QE is responsible for the cost of wiring from the PV system to the REC meter.

The location of the REC meter should be at the connection point or near the connection point (illustration in the annex).

If it is not possible to install the REC meter in the required location, an alternative arrangement may be discussed between the DU and QE. Such an arrangement must be clearly reflected on their net metering agreement.

2.4. Department Circular No. 2020-10-0022 Policies on Net-Metering Program

The amended Net-Metering rules issued by ERC addressed most of the economic and technical barriers of the current Net-Metering Program, however the DOE deems it necessary to further enhance the current policies and commercial arrangements to increase the utilization of RE through the Net-Metering Program. The circular clarified that the QEs under the Net-Metering arrangement shall not be a net generator or producer at the end of each calendar. Thus, any excess or balance Net-Metering credits at the end of each calendar year shall be forfeited. The coverage of the program is also expanded to include off-grid areas or those not connected to the major national electrical transmission grids, namely Luzon, Visayas and Mindanao. The ERC in consultation with DOE, DU, the National Electrification Administration (NEA) and the National Power Corporation (NPC) may issue the necessary amendments to the Net-Metering Interconnections Standards to facilitate effective implementation of the program in off-grid areas. The NEA is stipulated to provide assistance to all Electric Cooperatives (ECs) in promoting the Net-Metering Program, as well as other capacity building program such as technical assistance on Distribution Impact and Asset Studies and determination of the hosting capacity.

The *Department Circular No. 2020-10-0022* is attached as **Annex 4**.

The Net Metering Program is being implemented in complementary with other laws and circulars to fast-track the approval process from other government agencies and local government units. Below are some legal instruments relevant to the program.

2.5. Joint Memorandum Circular No. 2020-01 LGU Energy Code

The DOE and the Department of Interior and Local Government (DILG) issued Joint Memorandum Circular instructing LGUs to monitor and collect the benefits of energy projects and incorporate the same in their comprehensive development plan. The LGUs are also mandated to streamline the processes in issuing the necessary permits on energy related projects in accordance with Section 14 of the Energy Virtual One Stop Shop (EVOSS) Act. The LGUs concerned stakeholders and constituents should be capacitated on energy safety practices, energy efficiency and conservation, energy resiliency, and energy planning.

Joint memorandum Circular No. 2020-01 LGU Energy Code is attached as **Annex 5**.

2.6. RA 11032 Ease of Doing Business

The *Ease of Doing Business (EODB) is an act* which aims to streamline the current systems and procedures of delivering government services. A unified application form will be required for business permits and renewals to cut the red tape involved in business registration and permit renewals. A one-stop-shop will be established to house agencies involved in starting a business. All government agencies must comply with standard turnaround time for various transactions. All forms will be moved online, and digital copies of documents will be submitted electronically to reduce the risk of graft and corruption. Likewise, licenses and permits can now be printed at home, and this copy shall have the same authority as a hard copy. The *EODB Law* prescribes administrative and criminal liability to the officials and employees who may act inappropriately.

2.7. RA 11234 Energy Virtual One Stop Shop

The law establishing the EVOSS system aims to streamline and ensure timely action on the permitting of power generation, transmission, and distribution projects in the Philippines. The *EVOSS Act* intends to eliminate the bureaucratic red tape, which often discourages foreign firms from entering the power generation industry. EVOSS is an online platform where prospective energy developers can apply, monitor, and receive all the needed permits and applications, submit all documentary requirements, and even pay for fees. It will allow the single submission and synchronous processing of all required data and information and will provide a single decision-making portal for the approval of new energy generation projects. All government agencies involved will be required to follow a strict timeframe to act on pending applications. The failure of an agency to act within the prescribed timeframe will result in the automatic approval of an application while potential administrative sanctions may be imposed against inefficient public officers to penalize the delay.

The Philippines Net-Metering Program

3. The Philippines Net-Metering Program

3.1. Overview of the Net-Metering Program

The Net-Metering Program is a non-fiscal strategy prescribed under *RA 9513 of 2008* to promote the utilization of RE in the country. It is designed as an incentive scheme that aims to encourage electricity customers to participate in the generation of RE to meet part of its load demand, thereby reducing its purchased electricity from the DU.

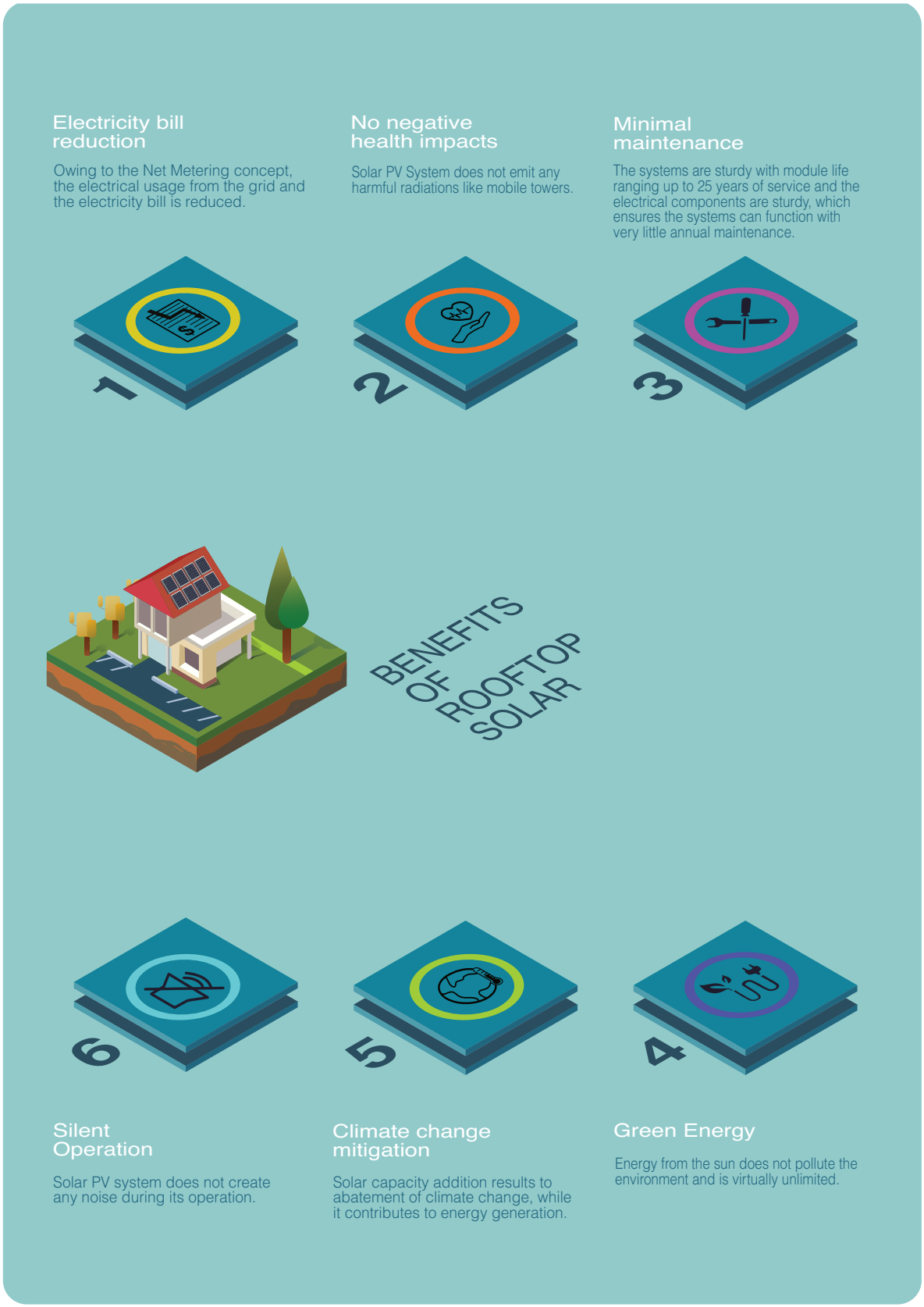
Under the Net-Metering Program, which commenced implementation in 2013, the electricity End-users are allowed to install an on-site (within the premises of the Electricity End-users), RE system not exceeding 100 kilowatts (kW) in capacity to generate electricity for their own use. The RE systems include wind, biomass, biogas energy systems, run-of-river micro-hydro or such other RE systems. The rooftop solar photovoltaic (PV) is currently the popular RE Net-Metering technology.

Specifically for the electricity customers with rooftop solar systems, during 10AM to 3PM, there may be excess electricity for its load, thus they are able to export power to the distribution system. The net amount creditable to the QE shall be obtained by subtracting from the subtotal amount for export energy the following: (i) the subtotal peso amount for the export energy, and (ii) the peso amount credited in the previous month, if any. If the resulting peso amount is positive, the QE shall pay this positive peso amount to the DU. If the resulting peso amount is negative, the DU shall credit the negative peso amount to the QE's electric bill in the immediate succeeding billing period. It must be emphasized, however, that a QE would still need power from the DU whenever the electricity generated from his RE facility is not sufficient to meet his energy requirements, thus, resulting to a positive peso amount during times when its import energy from the grid is higher than its export energy.

While the Electricity End-users are allowed to generate electricity, it must be clear that electricity consumers will be net consumers and cannot be a net power generator. This means that their consumption is higher than their electricity generation. With this clarification, electricity consumers should not see their Net-Metering participation as a possible business venture by oversizing their RE or solar PV system to export more power to the grid. Further, the credit to the QE cannot be withdrawn in cash and will remain virtual credit that can be used to offset the whole or a portion of the electricity bill.

The Net-Metering Program, particularly the rooftop solar PV systems, has many benefits which are shown in **Figure 2** on next page.

Figure 2. Benefits of Net-Metering



FACT OR FICTION?

"Net-metering can give you a monthly paycheck"

Fiction. With net-metering, you can receive utility bill credits for the electricity that your solar panels produce. However, you won't receive a cash payment from your utility for your excess solar electricity. Any excess credits at the end of each calendar year shall be forfeited as per **DOE Department Circular No. 2020-10-0022**.

Note 1. Fact or Fiction: Net-Metering Monthly Paycheck

3.2. The Net-Metering Facility

3.2.1. Components of an RE/Solar PV System

An RE system Net-Metering facility, for example a solar PV system that is connected to the utility power grid, can be described also as grid-tied, on-grid, utility-interactive, grid intertie or grid back-feeding.

The major components of a solar PV Net-Metering facility, shown in **Figure 3**, are the following:

- Solar photovoltaic (PV) panels— the solar energy from the sun is the main fuel for producing electricity. When sunlight hits the solar PV panels, PV cells produce DC electricity.
- Inverter— converts the electricity produced from the solar PV panels from DC electricity to an AC electricity, the type of current flow used both on the grid and in your home. Some solar panel system configurations have a single inverter (often called a string inverter) for the entire system. Some have a micro-inverter connected behind each solar panel.
- Bi-directional meter— measures the inflow and outflow of electricity to and from your home; electricity produced by the rooftop solar PV system is first used to power your home, and then is sent to the distribution grid in times of surplus.
- REC meter— measures the gross electricity produced by the solar PV/RE system
- Distribution electric grid— provides electricity to your home in times of under-generation and carries out excess electricity in times of over-generation. The distribution system acts as the virtual battery for the solar PV system.

Recent developments introduced the hybrid solar PV system, a combination of a grid-connected and storage-ready apparatus that provides consistent energy supply during day and night. The hybrid system stores energy for later use in one or multiple batteries but then can also pull from the grid in high energy use periods like hot summer months.

Any solar PV plus storage system that is not meant to be entirely off-grid will be a hybrid system. The hybrid solar PV system includes additional components, particularly the battery, which dramatically increases the cost. The hybrid solar PV system may be considered if there is a special need or requirement for steady and uninterrupted power supply. This may be considered for areas which are experiencing frequent brown-outs or unsteady power supply from its DU.

3.2.2. How Net-Metering Works

- The home, school or office/commercial buildings have two sources of electricity, i.e., (i)from the solar PV or an on-site RE system and (ii) from the distribution grid;
- The electricity produced from the RE systems are direct current (DC). An inverter is a component of the solar PV system to convert DC to alternating current (AC) which will run the various loads at home or in school or office/commercial buildings;
- The flow of electricity is shown as color coded; (i) electricity from the RE system is "yellow" going to the home (for example) and during period of oversupply, it is exported to the distribution grid; (ii) electricity from the distribution grid is "blue", goes to the home when there is not enough electricity supply from the on-site RE system;
- The flows of electricity are measured through a bi-directional meter;

A second meter, the Renewable Energy Certificate (REC) meter, will be installed. The REC meter is a kilowatt-hour meter that measures the gross electricity generation from eligible RE system with type approval from ERC. Moreover, the REC meter measures the total RE generated for compliance to the Renewable Portfolio Standard (RPS) and to measure the actual energy consumption for the determination of the following: (i) non-exemption from payment of the lifeline subsidy rate; (ii) payment of senior citizen subsidy rate; and (iii) other relevant subsidies mandated by law.

Solar energy systems generally hit high electricity production in the afternoon; this is when many people are not home using electricity. In contrast, solar energy systems' electricity production is low in the mornings and evenings, when home electricity use is typically higher. This is shown in Figure 4. Net metering helps the electricity consumers to account for these ups and downs in the day-to-day electricity production and usage.

Figure 3. How Net-Metering Works

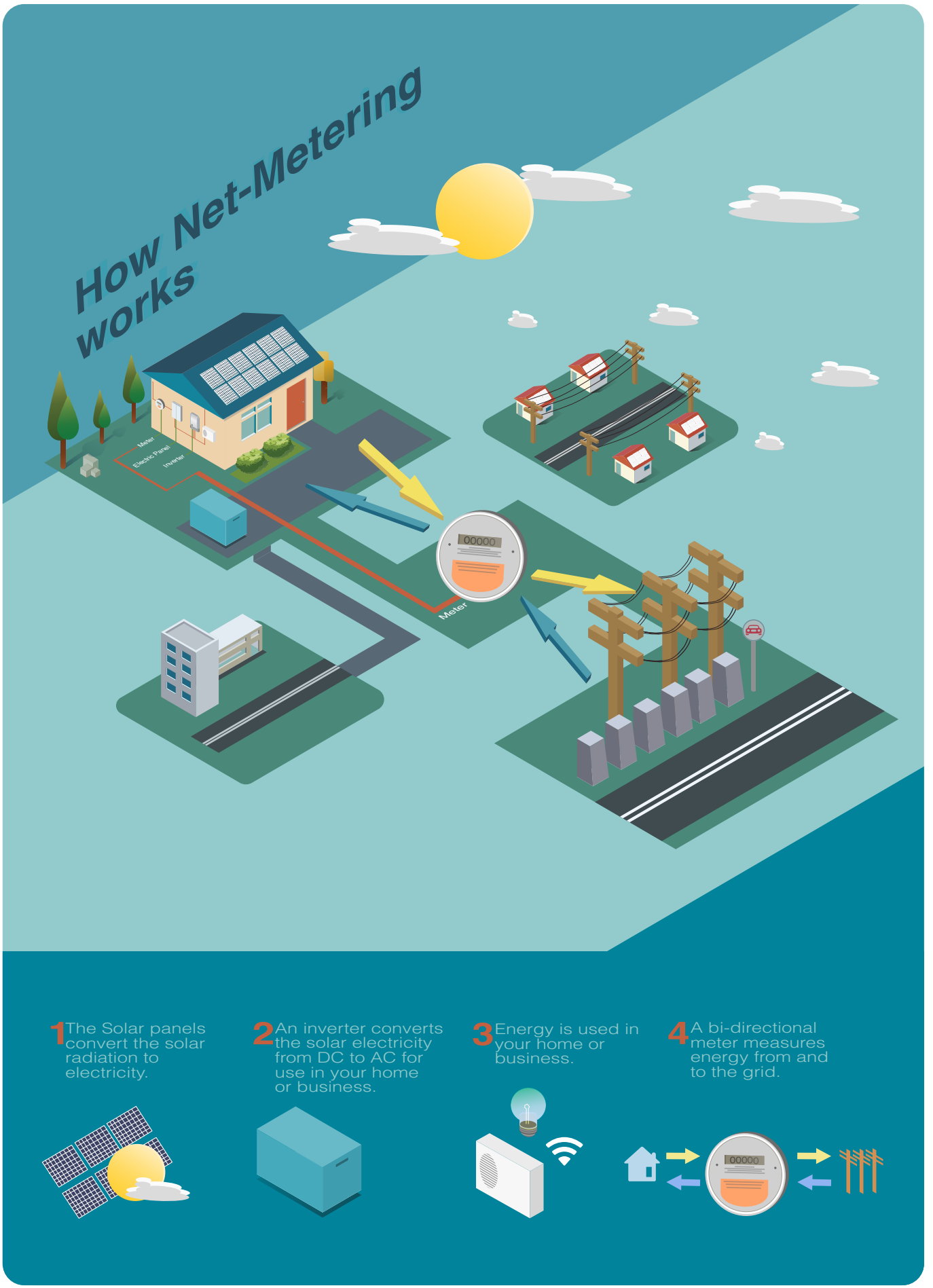
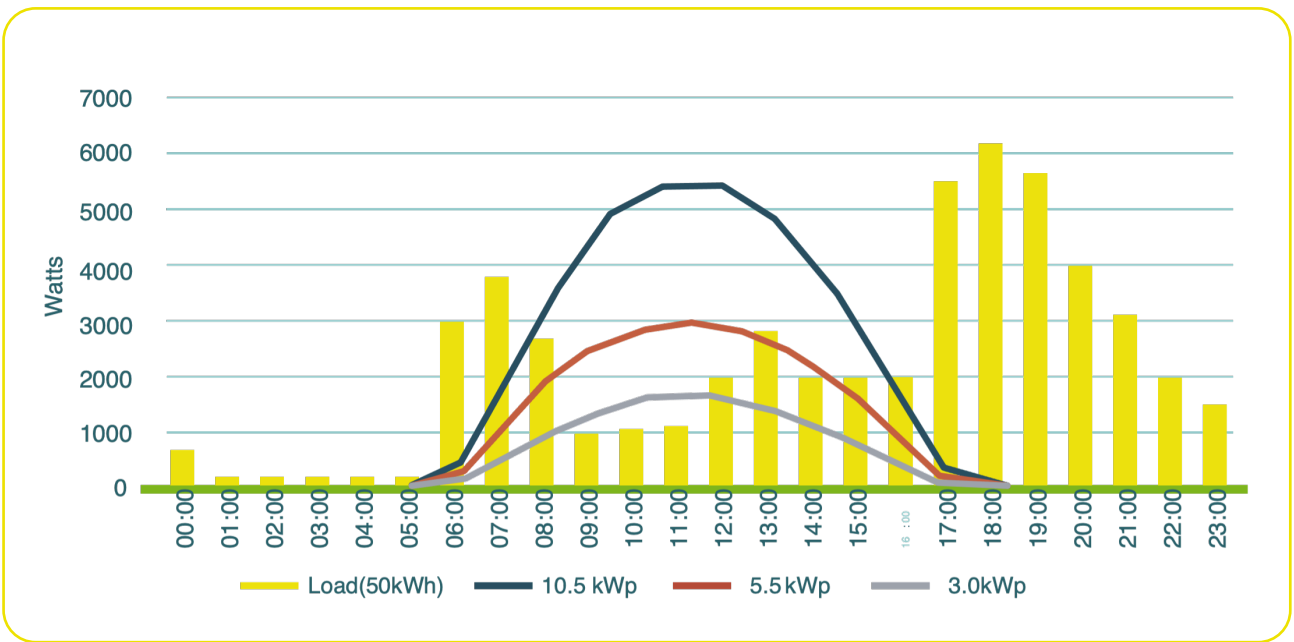


Figure 4. Typical Daily Household Energy Consumption and Solar PV Production Profile



3.3. Stakeholders in the Net-Metering Program

3.3.1. Prosumers/Qualified End-users

The Electricity End-users that are participants to the Net-Metering Program have been referred to as prosumers and Qualified End-users (QEs). Prosumers means that the QEs are both producers and consumers of electricity.

The Net-Metering Rules[4] on the other hand defined QEs as referring to entities that generate electric power from an eligible on-site RE generating facility, such as but not limited to house or office building with photovoltaic system that can be connected to the grid for the purpose of entering into a Net-Metering Agreement. The Rules also provided that all end-users who are in good credit standing in the payment of their electric bills to the DU are qualified to participate in the Net-Metering Program for Renewable Energy. The "good credit standing" was further clarified in *ERC Resolution No. 05 Series of 2020* as end-user with no unsettled or outstanding obligations with the DU at the time of the application.

The *ERC Resolution No. 06 Series of 2019* included "new customers" of the DU as qualified to participate in the Net-Metering Program for RE.

The 2013 Reference Guide on Net-Metering further provided the following clarifications on who are not qualified to participate in the Net-Metering Program:

- A contestable electricity customer getting power supply from a competitive Retail Electricity Supplier (RES) is not qualified to participate;
- Only distribution end-users (or captive customers) or contestable customers who opted to remain with their DU are qualified to participate in the Net-Metering Program;

Electricity End-users directly connected to the transmission grid are not qualified to participate. These electricity customers are not DU customers but rather are customers that are directly supplied by a generating company utilizing the transmission line of the National Grid Corporation of the Philippines (NGCP).

The success of the Net-Metering Program relies on the pro-active participation of the QEs, among other factors. However, QEs are often not fully informed during the solar PV system procurement process[5]. During the past years of implementation of the Net-Metering Program, there have been incidents where QEs were dissatisfied with their purchase, with the services of their contractor and some were exploited. As these malpractices may not be totally removed, grievance and complaints mechanisms must be in placed to address and resolve cases. This will be discussed further in Chapter 6.

Ensuring solar consumer protection is therefore important. Solar consumer protection refers to laws, policies and practices with the goal of safeguarding consumers interest and protecting them from unfair and unsafe goods, services and business practices (footnote 4).

Apart from laws and policies, informal approaches to help consumers to make fair, balanced and safe solar PV purchase and adoption decisions may include but not limited to consumer

[4] ERC Resolution No. 09, Series of 2013
[5] NREL/USAID/HNEI, Technical Input for the Philippines (Net-Metering Standards and Guidelines for PV practitioners)

education and guidelines. Examples of these are project checklist, standardized contracts and guidebooks, and accredited installer databases. The government, through the DOE, NREB, ERC and LGUs, has made progress in some of these approaches and these will be discussed in Chapter 4. Particularly on standardized contracts, the ERC provided a template on the Net-Metering Agreement which most, if not all, DUs are adopting. There are plans and on-going initiatives to address emerging concerns in the Net-Metering program.

Consumer protection through consumer education will be successful only if the consumer recognizes and is willing to know and understand the basic concepts of Net-Metering and their roles and responsibilities. It was gathered from representatives of DUs and LGUs consulted that some consumers/owners of the RE facility completely leave to their supplier/service provider the whole process of the application including the purchase of the system and at the end just sign the contracts with the DU and the service provider.

For QEs protection, it is therefore prudent for them to know and understand their roles and responsibilities as well as practical tips when deciding to install rooftop solar PV and entering into agreement with their DU and their service provider. These are also discussed in Chapters 4 and 5.

- QEs who are planning to participate must have a good understanding of how the Net-Metering works before engaging service providers/contractors/installers;
- The DU is the best entity to provide basic information as well as the requirements and procedures to follow;
- Engage reputable service providers/contractors/installers with very good performance and track records. Their past projects and customers must be verifiable to attest or certify the performance of the service providers/contractors/installers;
- Comply with all requirements of the DU and the LGU's Office of Business Official (OBO). These requirements are prescribed to ensure the QE's best interest and safety;
- Apply for a Certificate of Compliance (COC) with the ERC in accordance with *ERC Resolution No. 16, Series of 2014*;
- Provide the required space and associated civil works for the location of the metering facilities; Provide DU access to QE's premises to inspect, test and maintain and operate the protective devices and read or test the meters and other facilities; as much as possible meters should be located in areas that are accessible to DU.
- Shoulder the expenses related to the bi-directional meter (cost will be the difference of the new bi-directional meter and the old meter) and its installation. However, for new customers and QEs with existing separate meters required to replace with a bi-directional meter, the cost will be to the account of the DU;

- Provide adequate protection for the installed facility under any operating conditions whether or not the interconnected generation is in operation;

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- Apply for a Certificate of Compliance (COC) with the ERC in accordance with *ERC Resolution No. 16, Series of 2014*[6];

- Provide the required space and associated civil works for the location of the metering facilities;

- Provide DU access to QE's premises to inspect, test and maintain and operate the protective devices and read or test the meters and other facilities; as much as possible meters should be located in areas that are accessible to DU.

- Shoulder the expenses related to the bi-directional meter (cost will be the difference of the new bi-directional meter and the old meter) and its installation. However, for new customers and QEs with existing separate meters required to replace with a bi-directional meter, the cost will be to the account of the DU;

- Provide adequate protection for the installed facility under any operating conditions whether or not the interconnected generation is in operation;

[6] ERC Resolution No. 16 Series of 2014 is the "Resolution Adopting the 2014 Revised Rules for the Issuance of Certificates of Compliance (COCs) for Generation Companies, Qualified End-Users and Entities with Self-generation Facilities"

- Reference to the REC meter, QEs will bear the cost of the wiring from the REC meter to the renewable energy facility;

- Provide the DU the contact number of the person who is knowledgeable in the operation of the RE system;

- In the event that a QE modifies his RE facility (e.g. customer added solar panels for his additional load), the QE would have to undergo the same process as that of a new customer applying for Net-Metering Agreement and COC from ERC. Additional certification may be required by the LGU. Failure to undergo the same process for the modifications made on the RE facility, the QE will be liable for any costs and/or damages incurred by the DU as a result thereof;

- Grant free access to DOE, ERC and the NREB to all data generated by Net-Metering to enable the creation of a knowledge-based resource on Net-Metering. This knowledge-based resource is vital to enhance and accelerate the viability of the Program and successful integration to the grid.

3.3.2. Distribution Utilities

The DUs have been mandated to enter into a Net-Metering Agreement with the QEs subject to technical considerations and without discrimination and upon request by the Electricity End-users,

Their roles and responsibilities[7] in the implementation of the Net-Metering Program are further discussed below:

- Provide mechanisms for the necessary physical connection of the RE facility of the QE with a maximum capacity of 100 kW (100 kWAC except for solar which is 100 kWpeak or 100 kWDC as provided in the amended net-metering rules) and ensure compliance with Grid and Distribution Codes;

- Process within 20-working days from the receipt of LOI the interconnection of the Net-Metering facility, provided that the QE has submitted all necessary permits and licenses from various concerned agencies;

- Conduct inspections and witness calibration and testing of the QE's lines, wires, and switches;

- Install bi-directional meter. For new customers and QEs with existing separate meters, they are required to replace them with a bi-directional meter. The cost will be to the account of the DU;

[7] References to the DUs' roles and responsibilities are the various DOE Department Circulars and ERC Resolutions discussed in Chapter 2 of this Guidebook.

- Furnish and install REC meter in the proximity of the RE system;
- File the QE's COC application with the ERC. The COC application includes, among, others the signed Net-Metering Agreement between the QE and the DU as well as the COC application fee in the form of cashier's or manager's check payable to the ERC;
- Furnish the executed Net-Metering Agreement to DOE and NREB within five (5) days from its execution;
- Hosting capacity should be updated when consumed or upgraded;
- Remove the QE's generation from the distribution system at any time due to maintenance, test, repair and emergency condition or safety concerns related to the DU;
- Grant free access to DOE, ERC and NREB to all data generated by Net-Metering to enable the creation of a knowledge-based resource on Net-Metering. This knowledge-based resource is vital to enhance and accelerate the viability of the Net-Metering program and successful integration to the grid;
- Entitled to any REC resulting from Net-Metering arrangements with the QE.
- Publish in DUs website (or on any official social media platform) their respective Net-Metering Programs, processes and procedures including hosting capacities on a per feeder or sector basis;
- DU will include the Net-Metering Program in their orientation/briefing to new applicants/member-consumers.

3.3.3. Local Government Units

The LGUs are enjoined to strictly comply with the provisions of *RA No. 11234 (EVOSS)* and *RA No. 11032 (EODB)* in processing permits and licenses related to applications for Net-Metering Agreements such as, but not limited to, Building Permit applications and, Certification of Final Electrical Inspections (CFEI). The CFEI is an important permit as it certifies the completeness of the installation of all electrical wirings and that all electrical wirings are compliant to existing standards. The CFEI is needed prior to the interconnection of the utility to the Net-Metering facility. This is a requirement that ensures the safety of the RE facility owner and those who will be operating and maintaining the RE facility.

The OBO of the LGU is in-charge of the processing and issuing of the permits and licenses required. In some cases, the Engineering Unit of the LGU performs the tasks.

In processing and issuing the electrical permits and other requirements, the Electrical Division of the OBO or the Engineering Unit sees to it that the applicant complies with the standards and requirements of the electrical safety in the *Philippine Electrical Code (PEC)*, the *Electrical Engineering Law* and the concerned LGU.

Chapter 4.2 discusses the processes and requirements in securing the permits and licenses required from the LGU.

3.3.4. National Government Agencies

The DOE, ERC, NREB, NEA are national government agencies (NGAs) that collectively perform their functions to achieve the overall goal of broadening the adoption of RE in the country. The DOE is the energy policy making body that develops/amends policies on Net-Metering, and monitors/reviews/evaluates the implementation of the Net-Metering Program.

The ERC issues rules, resolutions and other instruments to support the policies of the DOE on Net-Metering.

The NREB is the policy advisory board to the DOE for energy and in this case, also for Net-Metering.

The NEA, being the lead overseer on the businesses and operations of the ECs, provides assistance to the ECs to implement their roles and responsibilities in the Net-Metering program.

3.3.5. Service Providers/Contractors/Installers

Service providers or contractors or installers are private individuals or entities who are:

- suppliers of the RE systems;
- technical consultants;
- installers of the RE system for Net-Metering;
- acting as representative of QEs in dealing with the DU and the LGU; or
- combination of the above or all of the above

The qualification of these service providers/contractors/installers is broad from professionals to self-taught. Their role and responsibilities in the successful implementation of Net-Metering is very critical, thus the following would be the minimum requirement:

- in-depth knowledge of how Net-Metering works and can explain in simple terms to the QEs;
- up to date with safety considerations (compliance to the different codes) in installing and operating a Net-Metering facility;
- knowledgeable on the prescribed processes and requirements of DU and LGU and will follow them; and
- offer after-sales services and warranty for workmanship.

In the absence of a certification or accreditation of service providers/contractors/installers, QEs are reminded to do own-qualification and performance check of candidate service providers/contractors/installers before engaging with any of them. Additional discussions on this can be found in Chapter 5.

3.3.6. Financing Institutions

The development of successful business and deployment models for RE facility under the Net-Metering Program are contingent on solar-financing solutions.

The large Philippine bank lenders limit their focus to 1 MW to 50 MW projects at the moment. This means that it is difficult to find financing for smaller, distributed rooftop solar PV systems, such as residential rooftop solar PV systems[8].

With heightened awareness of the potential benefits of installing RE facility under the Net-Metering Program, demand is high already and will continue to grow as the QEs are now starting to embrace and thrive in the new normal, i.e. co-existing with Covid 19.

3.3.6.1. Development Bank of the Philippines

The Development Bank of the Philippines (DBP) has a facility that can be availed of by prospective QEs. DBP has established a facility called "Energy Efficiency Savings Financing Program" (E2SAVE) to provide credit assistance to RE and energy efficiency projects to reduce greenhouse gas emissions. E2SAVE caters to both public (national government agencies, government-owned and controlled corporation, state universities and colleges, LGUs, etc.) and private sectors [private companies and Energy Service Companies (ESCO) accredited by the DOE. Among the eligible projects is the installation of solar rooftop/ground mounted and other renewable energy technologies for own-use or Net-Metering.

For public institutions, the maximum loan amount shall be up to 100% of the acceptable total project cost or winning bid price, whichever is lower, provided DBP will be the depository bank and cash capture mechanism is in place. For private companies, the maximum loan amount shall be up to 80% of validated total project cost. For ESCO project, the maximum loan amount shall be up to 80% of Contract or Purchase Order amount, net of margin. The interest rate is based on prevailing rates of DBP, fixed or variable depending on the source of fund.

More information about E2SAVE is provided in the following link:

https://www.dbp.ph/developmental-banking/environment-initiatives/energy-efficiency-savings-e2save-financing-program/

3.3.6.2. Pag-IBIG Fund

The Pag-IBIG Fund issued a memorandum in May 2015 with subject "Availment of Pag-IBIG Housing Loan for the Acquisition/Installation of Solar Panels.

[8] IEEFA, Unlocking Rooftop Solar in the Philippines, August 2018

The Pag-IBIG memorandum provided the following policies:

- A qualified Pag-IBIG Fund member may be allowed to avail of a housing loan for the acquisition/installation of solar panels as part of home improvement or as a component of the housing unit to be purchased subject to the prevailing Pag-IBIG Fund retail housing loan programs;

- The loan shall be secured by a collateral that shall consist of the same residential property to which the loan proceeds are applied.

The memo is attached as Annex 6.

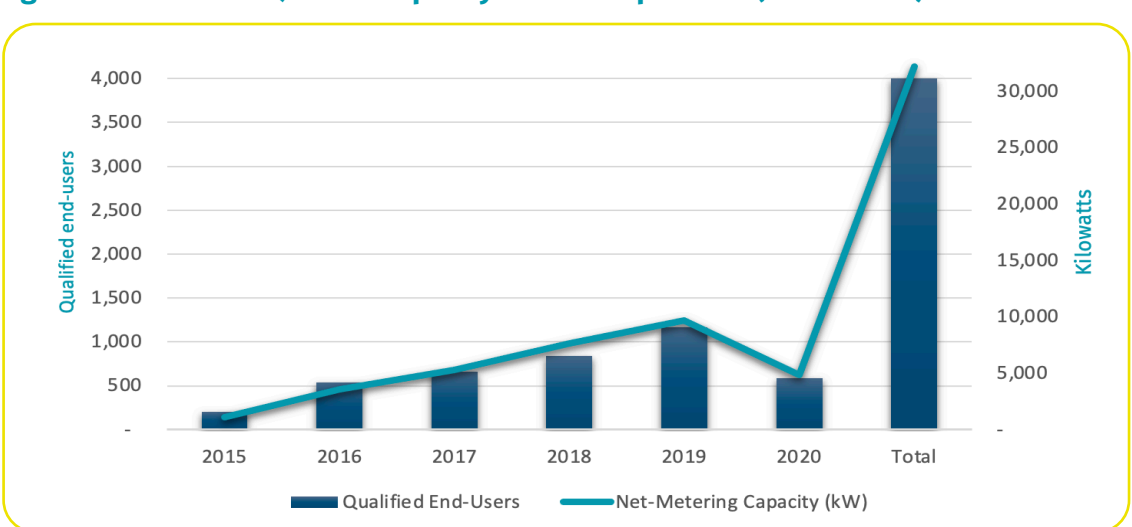
3.3.6.3. Solar Providers Financing Solutions

Some solar companies have tie up with major credit card companies that offer installment packages for the installation of rooftop solar PV. Some may even offer 0% interest rate for installment of up to 12 months.

3.4. Status of the Net-Metering Program

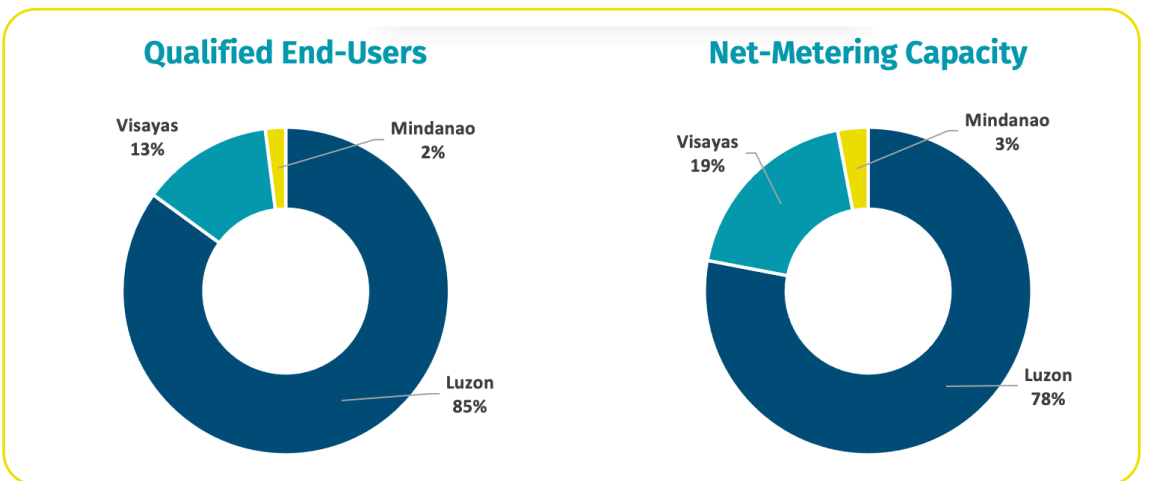
A snapshot of the progress and status of the Net-Metering Program is shown **Figures 5 to 8** below. The ERC is the source of the data presented in the charts shown and its was clarified that data reported started in 2015 based on the Certificate of Compliance (COC) issued to the Net-Metering participants or Qualified End-users. There was a consistent increase in the number of QEs from 2015 to 2019 and a dramatic drop in uptake in 2020 which can be attributed to the COVID-19 pandemic. Moreover, the average Net-Metering installed capacity increased from 5.5 kWp in 2015 to almost 9 kWp recorded in 2018. For 2020, the average recorded installed capacity of Net-Metering installation is 8.19 kWp.

Figure 5. Number of QEs and Capacity Additions per Year (2015 - 2020)‹



A closer look at the country's Net-Metering Program, see figure below, Luzon has the biggest share in the number of QEs and total Net-Metering capacity as of December 31, 2020.

Figure 6. Number of Qualified End Users and Total Net-Metering Capacity by Major Island Group, December 2020



In Luzon, twenty-six (26) DUs entered into a Net-Metering Agreement (NMA) with their QEs; these 26 DUs represent 37% of all the DUs (71) in Luzon. For Visayas, seventeen (17) DUs out of the 38 DUs (45%) have signed a NMA with their QEs while for Mindanao, seven (7) DUs out of the 39 DUs (18%).

As expected, MERALCO is leading the DUs with great margin in the implementation on Net-Metering Program.

Figure 7. No of Qualified End-users MERALCO and other DUs, 2020

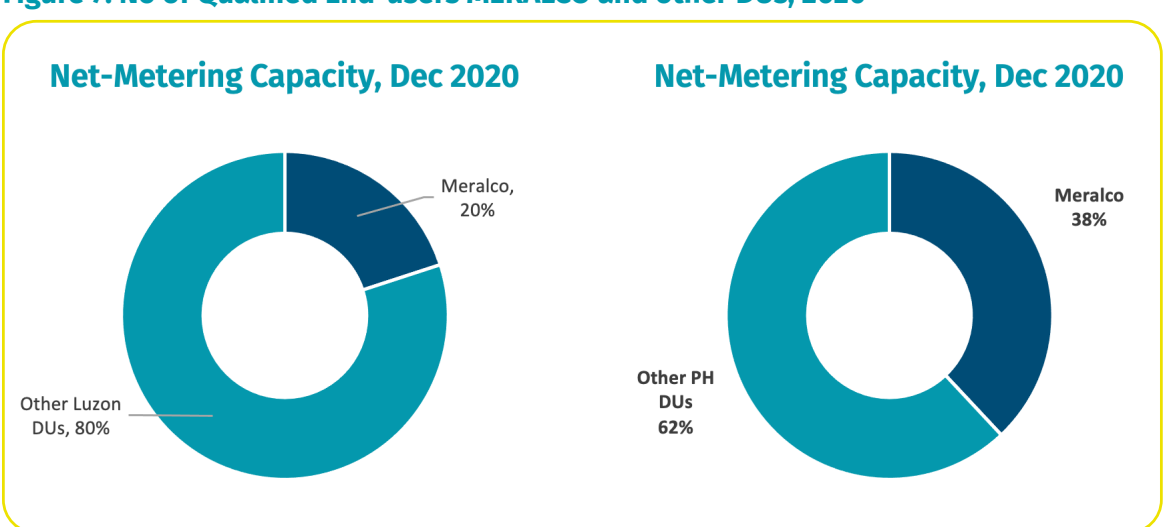
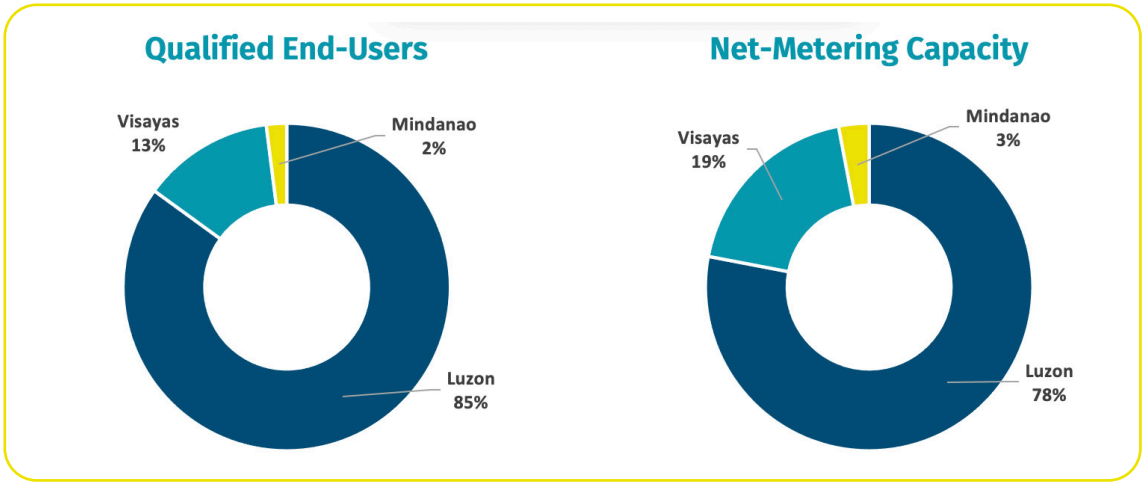
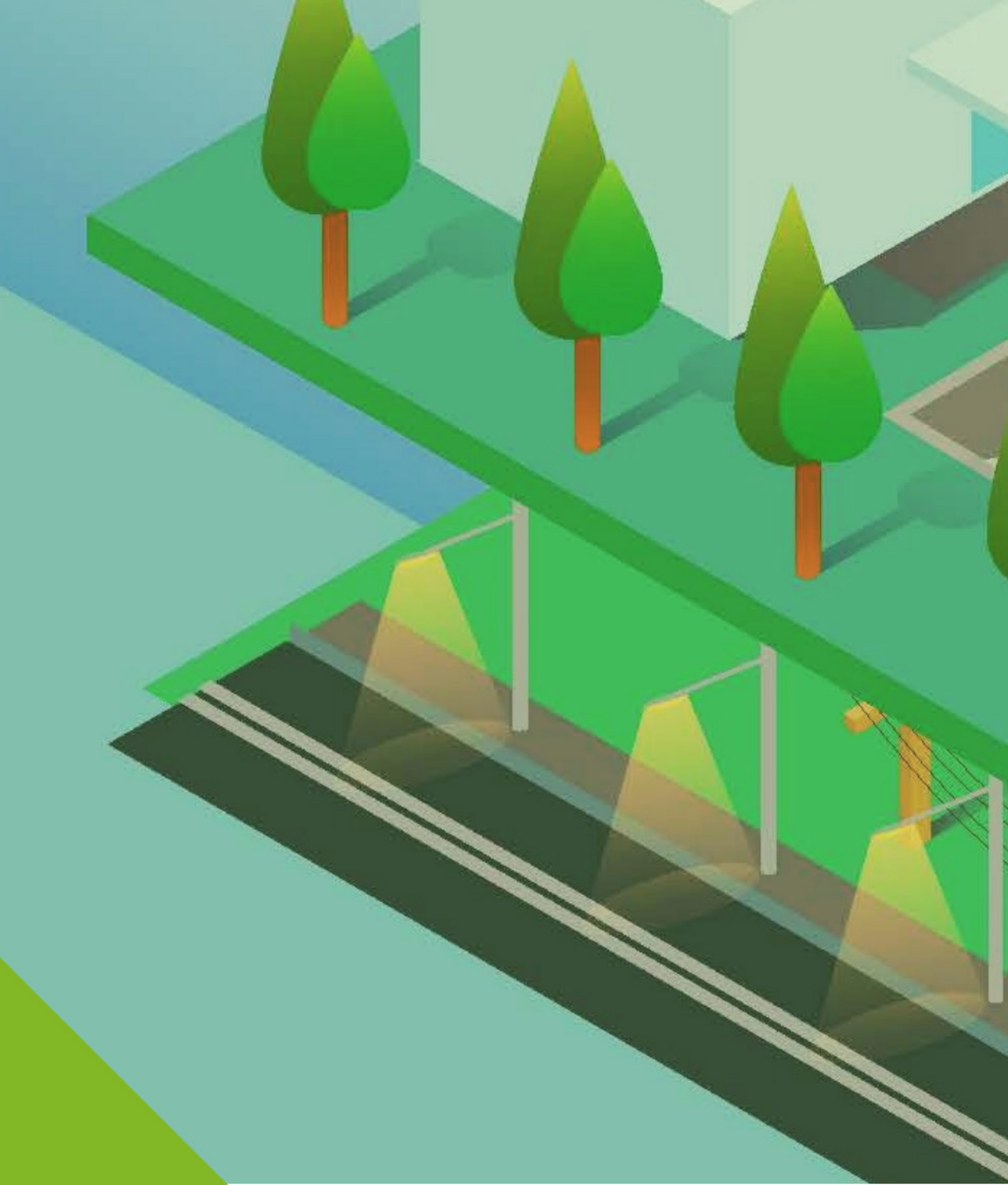


Figure 8. Net-Metering Capacity, MERALCO and other DUs, 2020



These statistics present great opportunity for growth in the Net-Metering program. It must be stressed that these statistics are only for on-grid areas. With the latest DOE policy issuance of opening up the Net-Metering Program to off-grid areas, this will further boost the participation of Electricity End-users leading to broadening of the adoption of the renewable energy systems in the country.



Steps in applying for a Net-Metering Program

4. Steps in Applying for a Net-Metering Program

Electricity customers who are applying for the Net-Metering program shall be guided by the following steps as illustrated in **Figure 9**. The steps and procedures are discussed from the point of view of the applicant or the QE. In practice, most of the steps to be performed by the QE are being done by the contractor/installer in their behalf. The QEs are enjoined to understand these steps which will be the scope of services of the contractor/installer in addition to design, installation, and commissioning.

Figure 9 shows detailed steps in applying for net metering as well as the roles and requirements of DUs and LGUs.

Figure 9. Steps in Applying for Net-Metering

4.1. Application

4.1.1. Write a Request

A customer goes to the DU with a written request to participate to Net-Metering program; this is the Letter of Intent or Letter of Interest (LOI). The qualification of electricity customers to participate in the Net Metering Program is discussed in Chapter 3.3.1.

Before applying for net metering, make sure that there is enough space within the QE's premises where the RE systems will be installed. For rooftop solar, bear in mind that the capacity of the solar PV to be installed can be accommodated in the area of the roof and that the roofs can withstand the mounting structure of the solar PV. The required surface area for one (1) kWp by type of solar cell material is provided in Chapter 6.4.1 (**Table 9**).

Before venturing into a renewable energy project, it is important for the implementor to find out if there is a GMBD in its contract, as it will impact the economics of the project. If there is, at the very least one has to study whether the peak demand of electricity coincides with the availability of the renewable energy generation.

Guaranteed Minimum Billing Demand (GMBD) is the minimum demand in kilowatts (kW) for business customers with contracted capacity of 5kW and above. It is based on the 70% of contracted capacity (in kW), which in turn is the projected load demand of a facility/building when it applied for energisation.

Read more in Technical Considerations for Rooftop Solar PV through this URL:
https://www.c40cff.org/knowledge-library/quezon-city-updates OR scan the QR Code:

REMEMBER

- ✓ Renewable energy systems should be installed within the QE's premises and the capacity is not to exceed 100kW.
- ✓ For a customer to be qualified as a end-user for the net-metering program, there must be no unsettled or outstanding obligations with the DU at the time of the application.
- ✓ New customer of DU is also eligible to apply.

4.1.2. Submit application (together with required data and fees)

4.1.2.1. Requirements of Distribution Utility

Upon receipt of the request, the DU shall provide the customer the required documents listed below. Requirements may vary depending on the DU but deviations are not much.

- Certificate of compliance form- to be secured from the distribution utility. The interested customer shall accomplish it accordingly.
  - ✓ Application Form (CoC Form No. 1)
  - ✓ Company Profile (CoC From No. 2), as applicable
- Identification documents - includes valid IDs and proof of valid occupancy for residential customers and secretary's certificate in case of business or commercial establishments.
- Detailed planning data - consist of information necessary for the DU to evaluate the impact of any user development on the distribution system. The detailed planning data are specified in *5.4 of the Philippine Distribution Code.*

- List of certified equipment - list of equipment that will be required to run the RE facility. For example, for solar PV facility will require: solar array, mounting structure, inverter, , cables, etc. The bi-directional meter will be provided by the DU.
- Plant parameters form - contains technical details. Seek assistance from contractor/ supplier/developer on how to fill up this form; including updated electrical plan, duly signed and sealed by a Professional Electrical Engineer (PEE) with a photocopy of PRC ID and PTR.
- Certificate of Compliance (CoC) Application fee amounting to Php1,500 in manager's check payable ERC. A manager's or cashier's check payable to the Energy Regulatory Commission. A manager's check can be secured from a bank and will be issued to an individual who has purchased it.
- DU Certification that the QE is technically compliant with the Net Metering Interconnection Standards issued by the ERC.
- Net-Metering Agreement with concerned DU.

Once the requirements are in order, the customer files the accomplished Net-Metering application form with the supporting documents. The DU will then verify the accuracy and completeness of the documents.

4.1.2.2. Requirements of Local Government Units

As the Net-Metering Program involves the installation of RE systems, building permit is required. Generally, all LGUs include the application for electrical permits to the procedure for application of a building permit. The processing of building permits falls under the overall control and supervision of the Office of the Building Official (OBO) of the LGU.

Table 1. Requirements in securing electrical permit: Makati and Quezon City

Makati	Quezon City
▪ Duly accomplished and signed application form (DPWH Form No. 96-001E) ▪ Five (5) sets of complete electrical plans and specifications, duly signed and sealed by a Professional Electrical Engineer ▪ Proof of ownership (e.g., certified true coy of CCT/TCT tax declaration, current realty tax receipt, and copy of duly notarized contract of lease or deed of absolute sale for tenants or new owner	▪ Photocopy of building permit (if applicable) ▪ Complete electrical plans signed/sealed by PEE ▪ Filled out electrical permit application Form and CFEI Form ▪ Photocopy of yellow card from Meralco ▪ Photocopy of updated PRC and PTR of professionals ▪ Photocopy of ID of applicant/owner ▪ Photocopy of TCT of lot owner If applicant will utilize old or existing building, he/she has to comply the above requirements including submission of copy of current Meralco Bill

Building permit is issued by the LGU-OBO to applicant to proceed with the construction, installation, addition, alteration, renovation, conversion, repair, demolition or other work activity of a specific project/building/structure. Such building permit is issued once the accompanying principal plans and specifications and other pertinent documents are found satisfactory and substantially confirming with the Implementing Rules and Regulations of the *National Building Code*.

In processing the electrical permits, the Electrical Division of the OBO will see to it that the applicant complies with the standards and requirements on electrical safety in the *Philippine Electrical Code (PEC)*, the *Electrical Engineering Law*, and the concerned LGU. The list of requirements of LGUs may vary. As an example, **Table 1** shows the requirements for securing electrical permit for Makati and Quezon City.

Once all the required documents are secured, the applicant will submit the filled-out application forms together with the necessary documents to the Electrical Division of OBO. The Electrical Division will check the completeness of the submitted documents as well as review the electrical plan. When all the documents are in order, total electrical fees will be assessed. Generally, all LGUs adopt the schedule of fees set by the *National Building Code of the Philippines* for electrical fees as per *National Building Code Development Office (NBCDO) Memorandum Circular No. 03 Series of 2016* issued on 14 March 2016 which supersedes *NBCDO Memorandum Circular No. 01 Series of 2004* issued on 16 November 2004.

In the questionnaire filled up by the Quezon City LGU, an applicant with a total connected load of 100 Amp. MCB 18 kVA has to pay Php902.40. The applicant also has to pay for building permit which is computed based on the area of the facility. For example, a facility with an area of 5,000 square meter and less has to pay Php23.00[9].

Figure 9 shows the schedule being used for computing electrical fees in residential, institutional, commercial, and industrial structures. The LGU of Makati confirmed that they are using this schedule.

If the electrical work or installation is found not in conformity with the minimum safety requirements of the *Philippine Electrical Codes (PEC)* and the *Electrical Engineering Law (RA 7920)*, and the owner fails to perform correction actions within the reasonable time provided by the Building Official, the latter and/or their duly authorized representative will cancel the permit and the fees thereon will be forfeited.

Provided that all requirements are complete and in order, it takes 4-5 days to issue the electrical permit in Makati and 5 days in Quezon City.

REMEMBER

✓ LGUs and DUs have different set of requirements, procedures, and timeline for processing a net-metering application.

[9] NBCDO Memorandum Circular No. 03, Series of 2016, Annex "A"

Figure 10. Schedule in Computing Fees for Electrical Permit

The following schedule shall be used for computing electrical fees in residential, institutional, commercial and industrial structures:

a. Total Connected Load (kVA)

		Fee		
i.	5 kVA or less	P 200.00		
ii.	Over 5 kVA to 50 kVA	P 200.00	+	P 20.00/kVA
iii.	Over 50 kVA to 300 kVA	1,100.00	+	10.00/kVA
iv.	Over 300 kVa to 1,500 kVA	3,600.00	+	5.00/kVA
v.	Over 1,500 kVA to 6,000 kVA	9,600.00	+	2.50/kVA
vi.	Over 6,000 kVA	20,850.00	+	1.25/kVA

NOTE: Total Connected Load as shown in the load schedule.

b. Total Transformer/Uninterrupted Power Supply (UPS)/Generator Capacity (kVA)

		Fee		
i.	5 kVA or less	P 40.00		
ii.	Over 5 kVA to 50 kVA	P 40.00	+	P 4.00/kVA
iii.	Over 50 kVA to 300 kVA	220.00	+	2.00/kVA
iv.	Over 300 kVa to 1,500 kVA	720.00	+	1.00/kVA
v.	Over 1,500 kVA to 6,000 kVA	1,920.00	+	0.50/kVA
vi.	Over 6,000 kVA	4,170.00	+	0.25/kVA

NOTE: Total Transformer/UPS/Generator Capacity shall include all transformer, UPS and generators which are owned/installed by the owner/applicant as shown in the electrical plans and specifications.

c. Pole/Attachment Location Plan Permit

i.	Power Supply Pole Location	P 30.00/pole
ii.	Guying Attachment	P 30.00/attachment

This applies to designs/installations within the premises.

d. Miscellaneous Fees: Electric Meter for union separation, alteration, reconnection or relocation and issuance of Wiring Permit:

Use or Character of Occupancy	Electric Meter	Wiring Permit Issuance
Residential	P 15.00	P 15.00
Commercial/Industrial	60.00	36.00
Institutional	30.00	12.00

e. Formula for Computation of Fees

The Total Electrical Fees shall be the sum of Sections 4.a. to 4.d. of this Rule.

f. Forfeiture of Fees

If the electrical work or installation is found not in conformity with the minimum safety requirements of the Philippine Electrical Codes and the Electrical Engineering Law (RA 7920), and the Owner fails to perform corrective actions within the reasonable time provided by the Building Official, the latter and/or their duly authorized representative shall forthwith cancel the permit and the fees thereon shall be forfeited.

4.2. Evaluation

If application is complete, the DU shall conduct a technical evaluation. The DU will perform an initial assessment to determine if a Distribution Impact Study (DIS) is necessary. A DIS is being conducted to assess the ability of the distribution system to safely and reliably accommodate a proposed interconnection of a new generation source and if any upgrades may be required. The applicant will not incur any additional charges for the conduct of the DIS.

For new housing developments, the DU shall conduct a DIS upon receipt of the LOI from the project developer, provided that all necessary documents and permits from different concerned agencies have been submitted. The requirements should include Standard Planning Data and all other technical data that may be required by the DU for a proper independent evaluation of the RE facility's impact to the DU's distribution network. The individual homeowners of the housing developments shall undergo the same process as in any other net metering applicants. New housing development refers to a group of individual dwelling or apartment houses that are usually built and sold or leased by management.

During the conduct of the DIS, additional information may be requested from the applicant. The Ditribution Services and Open Access Rules (DSOAR) provided that the DU has sixty (60) days[10] to complete the study from receipt of complete information. Within five (5) days[11] from completion of the DIS, the DU forwards to the applicant the results of the study and the DU's findings on whether a subsequent stage of a Distribution Assets Study (DAS) is necessary.[12] The DAS determines all additional distribution assets and costs required to accommodate the proposed generation source of the Net-Metering customer and is usually being done for big system sizes.

REMEMBER

- ✓ The DU will require technical information. The applicant or QE can then seek assistance from their PV installer or supplier.
- ✓ The conduct of DIS will be by the DU without charges to the QE.
- ✓ Some housing development already included solar rooftops in their housing units but application for net-metering shall be done by individual homeowners.

[10] Section 2.9.3.7. Distribution Services and Open Access Rules (DSOAR).
[11] Section 2.9.3.10. DSOAR.
[12] Section 5.6 and 5.7 Annex A-1 "Net-Metering Interconnection Standards, ERC Resolution No. 09 Series of 2013.

4.3. Inspection

4.3.1. Installation of the Renewable Energy System

With the conclusion of the technical evaluation phase, the DU finalizes the design of the interconnection facilities based on the results of the DIS and /or DAS, along with the corresponding project costs, if applicable. This stage includes an inspection of the Service Entrance depending on the bi-directional meter set-up.

It is important to check the roof, inspect the structure and position where the panels will be installed. Selecting a right solar provider is a key to ensure safe, stable and worry-free solar PV installation. Selecting a supplier who is reputable, offers after sales service support and is knowledgeable in safety standards is a must.

The solar PV should be equipped with appropriate metering equipment. The DU shall furnish and install bi-directional meter at the QE's premises. The QE shall provide the required space and the associated civil works for the location of metering facilities. The metering facilities shall be installed in a clean place free of vibration and where it will be accessible and visible for reading and testing by both the DU and QE.

REMEMBER

- ✓ Before installing the solar PV, it is important to determine the right size of the system and the appropriate location of the solar PV and bi-directional and REC meters.
- ✓ Selecting a supplier who is reputable, offers warranties, certified products, after sales service support, and is knowledgeable in safety standards is a must!

The DU shall also furnish and install an REC meter in proximity to the solar PV to measure the total RE generated for compliance with the Renewable Portfolio Standards (RPS). The meter will also be used to measure the actual consumption to determine non-exemption from paying subsidies such as lifeline subsidy rate, senior citizen subsidy rate and other relevant subsidies.

4.3.2. Inspection

Before signing the Net-Metering Agreement, the DU with the QE shall inspect the RE facility and check if it meets the technical requirements of the Net-Metering Agreement and the Net-Metering interconnection standards. Any non-conformance has to be corrected before the Net-Metering Agreement is signed and the RE system is connected and energized. Likewise, the LGU will inspect the facility before the issuance of certificate of final electrical inspection (CFEI). The table below shows the requirements in securing the CFEI for Makati and Quezon City. Processing of the CFEI ranges from 1 to 5 days.

Table 2. Requirements in securing Certificate of Final Electrical Inspection: Makati and Quezon City

Makati	Quezon City
▪ Certificate of completion ▪ Photocopy of electrical permit ▪ Approved electrical plans ▪ Revised electrical plans ▪ Electrical test results ▪ Revised Electrical Plan with PRC ID and PTR	▪ Copy of Electrical Permit ▪ Duly filled out Certificate of Final Electrical Inspection (CFEI) ▪ Revised Electrical Plan with PRC ID and PTR

In the case of Makati, the CFEI is issued with the Certificate of Use/Occupancy. The cost of CFEI is equivalent to 10% of the cost of electrical permit while the cost of Certificate of Use is computed at Php1,000 per every million of the cost of the facility.

As the QE has its own generation facility, the same will apply for a certificate of compliance (COC) with ERC. The DU shall provide assistance to QE to facilitate the application and shall submit to ERC all documents related to the application including the Net-Metering Agreement entered into within five (5) days from its execution. The executed Net-Metering Agreement is deemed effective upon submission to ERC. To facilitate the submission and compliance with the five (5) days period submission, electronic copy of the revised NMAs may be emailed to *ercmosred.netmetering@gmail.com*, *licensing-qe@erc.ph* and *jrorejola@erc.ph*, hard copies shall be forwarded to Commission's Docket Section addressed to the Chief of Market Operations Service – Renewable Energy Division (MOS-RED).

4.4. Completion

The QE and the DU will execute the Net-Metering Agreement using the ERC approved template (Annex 7). In the event that the QE/DU makes some changes on the approved template, the ERC will review such and may approve or disapprove.

Scaling up or adding capacity to existing solar PV systems

✓ After completing your first system, installing additional capacity requires its own applcation and will follow the process described here in section 4.

4.5. Energization

The DU has the right to witness the testing and commissioning upon completion of construction and shall have a copy of the test data.

After the interconnection system is installed and ready for operation, a testing and commissioning process will be conducted to confirm that the installation is safe and complete, ensure safety to equipment and people and verify that the systems performs to design specifications. The testing and commissioning process consists of the following:

- Verification and inspections
- Reactive power test
- Protection tests
- Reconnection timing test (blocking test)
- Synchronization test

The amended rules on Net-Metering have provided the rules and standards for the interconnection of QE's RE generating facility to the distribution system. All specifications and detailed plans for installation of the communication, control and protective devices should meet the DU's standards. The DU shall inspect the RE facility onsite and check if it's in conformity with the technical requirements prescribed in amended rules on Net-Metering. Any non-conformance shall be corrected before the Net-Metering Agreement is signed and the RE facility is connected and energized. The following are the system's parameters for interconnection:

- Voltage Level – should be the same level as the DU with automatic method of disconnecting.
- Frequency – 60 Hz with automatic method of disconnecting.
- Power quality
    - ✓ Limitation of DC injection – not to inject current greater than 0.5% of the full load rated output current at connection point.
    - ✓ Flicker severity – not to exceed 1.0 unit for short term and 0.8 units for long term
    - ✓ Harmonics – within limits in *Sec. 3.2.4 of Philippine Distribution Cod*e.
- Power Factor – not less than 85% lagging measured at the connection point.

The QE is also responsible in providing adequate protection for its system under any operating condition. The following are the protection parameters:

- Synchronization – QE to provide synchronizing devices with typical limits in the Net-Metering Standards.
- Islanding – QE system should detect islanding and disconnect within 2 seconds from formation.
- Integration with DU's Distribution System Grounding–shall be grounded in accordance to *Philippine Electrical Code*
- Protective Control Devices
    - Disconnect device – visible for use by the DU within 10 feet from connection point
    - Protective relays – protective relays provided in Net-Metering Standard
    - Reclosing – immediate disconnection from the DU system when the system is down.

The RE facility must have the necessary equipment required to perform this test. The DU shall not be responsible for verifying any control or signal wiring not directly related to the interconnection protection.

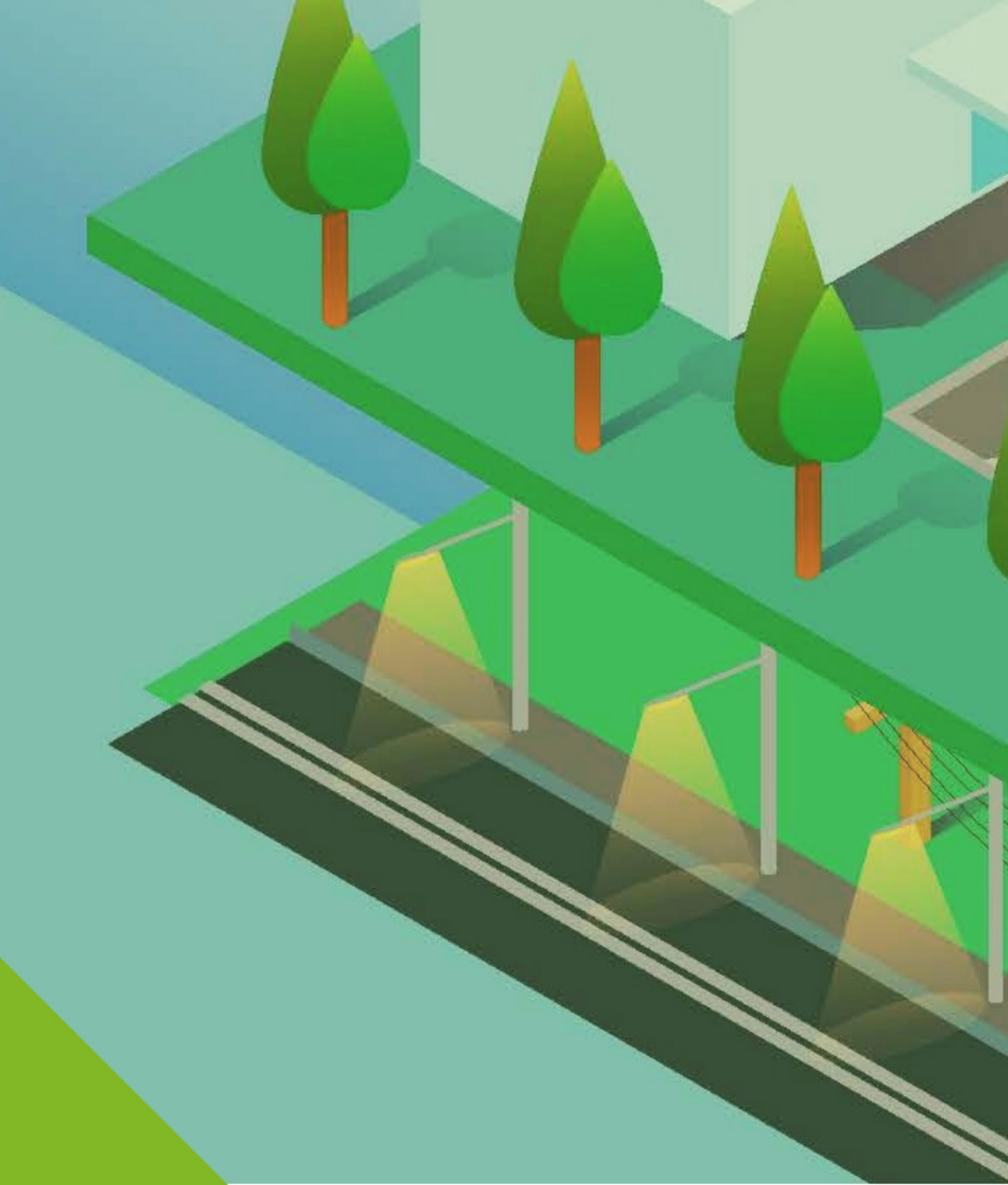
Prior to final approval by the DU or any time thereafter, the DU reserves the right to test the relaying and control related to the protection of the DU's Distribution System.

Provided that all necessary permits and licenses from various relevant agencies are secured and completed, all DUs shall complete all the inter connection process within 20 working days from the receipt of written request from the applicant or QE.

As soon as all these procedures are undertaken, the full benefit of RE system particularly solar PV can now be realized through net metering.

REMEMBER

✓ All DUs shall complete all the interconnection process within 20 working days from the receipt of written request from the applicant, provided that the required documents are complete.



Procurement of a Solar Photovoltaic System and its Components

5. Procurement of Solar Photovoltaic System and its Components

Producing electricity partly for own consumption, is available in the Philippines since 2009. This chapter provides an overview of important points to consider when planning and purchasing a small photovoltaic (PV) system intended for Net-Metering.

The Guidebook is directed towards interested parties considering installing a grid-connected PV system up to 100 kW, under Net-Metering. It attempts to walk the reader through the different stages beginning from the day the idea to buy a PV system is conceived, up to the realization of the PV project. What this section intends is to assure quality and reliable installations. The system can be either a residential PV installation or a larger commercial PV system. The most common installation is rooftop solar PV as no additional space is required and anyone who has a roof suitable for solar energy can generate its own power.

Efforts are made to make the discussion simpler; however, some technical points cannot be avoided thus, these can be discussed by the QE with the supplier/installer. Unless otherwise specified, information provided were mostly taken from the 2013 Net Metering Reference Guide.

5.1. Selection of Solar Modules

There are different types of modules in the market and the crystalline silicon modules (c-Si) have the largest market share. The crystalline modules are of two types: the monocrystalline and polycrystalline. The other type of solar panel is thin film which is a cheaper alternative due to less materials needed for its production[13]. There are new types of solar modules emerging in the market such as the Passivated Emitter and Rear Contact (PERC), half-cell, and bi-facial.

Monocrystalline solar panels are the most popular solar panels used in rooftop solar installations today because of how they look. They usually have the highest efficiency ranging from 15% to 20%[14] which means they need lesser space to reach a given power capacity. However, they cost more than other kinds of solar panels.

The polycrystalline solar panels have lower efficiency than monocrystalline panels ranging from 13% to 16% (footnote 15). With the advancement of technology, polycrystalline panels are now much closer in efficiency to monocrystalline panels as they have been in the past. Cost of polycrystalline is cheaper than monocrystalline modules.

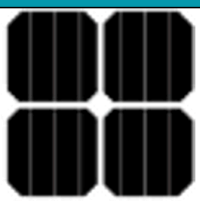
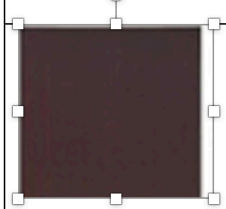
Thin film solar panels are completely different from monocrystalline and polycrystalline solar panels in terms of appearance. Thin film solar panels are lightweight and sometimes

[13] Andrew Sendy. Types of solar panels: which one is the best choice? SolarReviews. January 2021.
[14] Taraba, Michal & Adamec, Juraj & Danko, Matus & Drgona, Peter & Urica, Tomas. (2019). Properties measurement of the thin film solar panels under adverse weather conditions. Transportation Research Procedia. https://doi.org/10.1016/j.trpro.2019.07.077.

flexible, making them easy to install. They are appropriate for large-scale or industrial solar installations because of lower efficiency ratings ranging from 6% to 14.5% (footnote 15). Thin film solar panels have the lowest cost out of the three solar panel types because of their low performance, however, the larger area required by thin film module also results to the high cost of mounting structure and land area. Table 3 shows the comparison of the three solar modules.

There are three main parameters to consider in choosing the right type of solar modules: production (electricity generation), durability and quality, and warranty.

Table 3. Comparison of Solar Modules

Type of solar module	Efficiency	Pros	Cons
 Monocyrstalline	15% -20%	• High efficiency • Aesthetics	• Higher cost
 Polycrystalline	13% - 16%	• Lower cost	• Lower efficiency • Aesthetics
 Thin film	6% - 14.5%	• Flexible and lightweight • Aesthetics • Easy to install	• Lower efficiency • Short life expectancy

Sources: https://www.solterra.ph/topics/solar-panels/mono-vs-poly-panels/; Taraba, Michal & Adamec, Juraj & Danko, Matus & Drgona, Peter & Urica, Tomas. (2019). Properties measurement of the thin film solar panels under adverse weather conditions. Transportation Research Procedia. https://doi.org/10.1016/j.trpro.2019.07.077.

5.1.1. Production (Electricity Generation)

The amount of electricity that the solar panel can produce is dependent on number of factors such as power rating, power tolerance, efficiency and temperature coefficient. By looking at these factors one can determine how much electricity can a solar panel produce[15].

- All solar panels have nameplate "power rating" which indicates the amount of power that the panels can produce under industry test conditions. The power examples are 100 watts, 200 watts, etc.
- "Power tolerance" indicates how the power output of a solar panel might differ from its nameplate rating. They are typically expressed as a plus-or-minus percentage. For example, a 250-watt panel with a +/= 5% power tolerance could actually produce anywhere from 237.5 watts to 262.5 watts under ideal conditions.
- Solar panel "efficiency" represents how effectively a solar panel can convert solar radiation (e.g. sunlight) into electricity. A higher solar panel efficiency rating means a panel will produce more kilowatt-hours of energy per watt of power capacity. The efficiency of various type of solar modules are presented in **Table 8** above.
- The "temperature coefficient" simply measures how much power output drops in hotter temperatures. According to specifications, mono panels perform about 0.04% better per degree Celsius than poly panels. This results to a less than 1% increase in power output for mono systems, given weather conditions in the Philippines[16].

5.1.2. Quality and Durability

The amount of electricity that the solar panel can produce is dependent on number of factors such as power rating, power tolerance, efficiency and temperature coefficient. By looking at these factors one can determine how much electricity can a solar panel produce.

- For crystalline silicon modules, choose the modules with standard IEC 61215 which comprises the examination of all parameters linked to ageing of PV modules and describes various qualification tests based on the artificial load of the materials (radiation, thermal and mechanical testing).
- For thin-film modules, choose the modules with standard IEC 61646, where additional test procedures are done to adapt to special properties of thin-film technologies.

[15] Energy Sage, LLC. Evaluating solar panel quality. July 2020. https://news.energysage.com/how-to-choose the-best-solar-panel-for-you/

[16] Solterra Energy Corporation. Monocrystalline vs. Polycrystalline Solar Panels. September 2019. https:/ www.solterra.ph/topics/solar-panels/mono-vs-poly-panels/

- Check the safety qualification according to IEC 61730, as these are used in conjunction with above mentioned standards. Focus on fundamental construction requirements for PV modules such as the prevention of electrical shocks, fire hazards and personal injury.

- The Bureau of Product Standards (BPS) issued the Philippine National Standards (PNS) to ensure the safety and quality of the solar PV panels and their components to be sold in the Philippine market.In the near future, there may be Philippine Standard (PS) Quality and/or Safety Mark and Import Commodity Clearance (ICC) Sticker issued for the solar PV products.

5.1.3. Warranty

A strong warranty ensures that the service and support needs for the solar PV are covered in case problems occur after installation. The warranties complement well with solar panel efficiency, quality, and durability metrics.

Below are some of the industries best practices:

- Many module manufacturers offer a product or workmanship warranty for one to three years.

- The average warranty offered for the solar panels is around 20 years. If the warranty is for a shorter period of time you can safely assume that the quality of the panels is lower.

- Most manufacturers guarantee a 25-year limited warranty on the power output, usually 90% of the minimum output power rating of the modules during the first 10 years of operation, and 80 % during the following 15 years. Sometimes, manufacturer provides a warranty stating guaranteed power output of 97% of the minimum output power rating during the first year of operation and a guaranteed maximum linear degradation of 0.7% p.a. until the 25th year.

- Reminder: Examination of European PV systems done by research and testing institutes indicate that the actual degradation is far lower than the module power guarantee offers.

- Remember: The warranty of the solar module is only good if the manufacturer is still in operation to honor the warranty.

Table 4. Selection of pertinent Philippine National Standards for Solar PV Systems and Components

PNS IEC 61215-1:2016 Terrestrial PV modules - Design and qualification and type approval - Part 1: Test requirements
PNS IEC 61646:2016 Thin-film terrestrial PV modules - Design and qualification and type approval
PNS IEC 61727:2016 PV systems - characteristics of the utility interface
PNS IEC 61730-1:2016 PV module safety qualification Part1: requirements for construction
PNS IEC 61730-2:2016 PV module safety qualification Part2: requirements for testing
PNS IEC 62093:2016 Balance of systems components for PV systems - design qualification and type approval
PNS IEC 62108-1:2016 Concentrator PV modules and assemblies - design qualification and type approval
PNS IEC 62109-1:2016 Safety of power converters for use in PV power systems - Part 1: General requirements
PNS IEC 62109-2:2016 Safety of power converters for use in PV power systems - Part 2: Particular requirements for inverters
PNS IEC 62116:2016 Utility- interconnected PB inverters - Test procedure of island prevention measurers
PNS IEC 62446-1:2016 PV systems - Requirements for testing, documentation and maintenance - Part 1: Grid Connected systems - Documentation commissioning tests and inspections
PNS IEC 62509:2016 Battery charge controller for PV systems - performance and functioning
PNS IEC 62516:2016 PV modules - Ammonia corrosion testing
PNS IEC 62570-1:2016 CPV - Performance testing - Part 1: Standards conditions
PNS IEC 62570-2:2016 CPV - Performance testing - Part 1: Energy measurement
PNS IEC 62759-1:2016 PV transportation testing
PNS IEC 62788-1-2:2016 Measurement of materials used in PV
PNS IEC 62788-1-5:2016 Measurement of materials used in PV: encapsulants
PNS IEC 62790:2016 PV Junction Box safety requirements and tests
PNS IEC 62817:2016 PV design qualification for solar trackers
PNS IEC 62852:2016 Connectors for DC-applications in PV systems - safety requirements and test
PNS IEC 628941:2016 PV inverters - Data sheet and name plate
PNS IEC TS 62548:2016 PV arrays - design requirements
PNS IEC TS 62727:2016 PV modules - Specification for solar trackers
PNS IEC TS 62782:2016 PV cyclic mechanical load testing
PNS IEC TS 62789:2016 PV concentrator cell documentation
PNS IEC TS 62804-1:2016 PV test method for PID detection Part1: Crystalline silicon
PNS IEC TS 628910:2016 Utility-interconnected PV inverters- Test procedures for low voltage ride-through measurements

REMEMBER

- ✓ Check compliance of module type with PNS IEC standards and type of warranty.
- ✓ Buy modules with measurement record and serial numbers as reference.
- ✓ Secure technical data sheet and choose modules with low tolerance ranges of nominal output or positive sorting of power output categories.
- ✓ If modules with high tolerance values (>5%) are used by your installers, ask how they will be pre-sorted so connection of modules with a similar maximum powe current within one string reduces losses caused by mismatch.
- ✓ Be aware of the design. Modules with different poer output categories e.g. 215/220/225 Wp, should be stringed with modules with the same performance.

5.2. Selection of Inverters

The inverter represents the connection between the PV system and the public distribution grid. It converts the direct current generated by the PV array system into alternate current. Therefore, the inverters have to adapt to the grid frequency (60 Hz) and the voltage level, typically 230 VAC for single phase system. Check the line connection of the grid for three phase systems to match the output of the inverter. If the inverter has different line connection configuration an additional matching transformer needs to be installed. It is important to use an inverter that can be connected to the grid without the need for a matching transformer. In addition, for Net-Metering installations the inverter should have an anti-islanding function. Anti-islanding senses when there is a brown-out and the inverter stops the feeding of electricity to the grid. This safety feature is necessary for the protection of utility crew who may be conducting repair works in the grid.

Figure 11. Picture of an Inverter

It's the job of the inverter in your solar energy system to convert the solar energy into something you can use. Solar panels take solar energy and make it into direct current (DC) power. The inverter's job is to convert that DC power into the alternating current (AC) electricity that can be used in your home.

Grid-tie inverter is the inverter used in Net-Metering.

In selecting a grid-tie inverter, the following parameters[17] can be considered:

- Output voltage, phase, and frequency - This should match the connection point of the system.

- Efficiency - Select an inverter which is close to 100% efficiency, there are inverters available in the market which have efficiencies between 96 and 99%. Efficiency measures how much energy is lost when converting power from DC to AC.

- Inverter strength and resistance - Try to select inverter that can withstand high environmental temperature. Inverters with fans for cooling are more prone to damage from corrosive environment than inverters designed without fans.

Good inverters also have smart feature that can be connected to the internet so the output, system generation and other parameters can be viewed remotely. This system has special feature as it can provide alerts in case of abnormal conditions like exceeding temperature threshold, etc. and can also store information. If this feature is available and the cost is reasonable, it might be good to consider this option to achieve optimal operation and easy troubleshooting.

The inverter product is essential as it is most likely to be the first thing that needs replacement. Inverters have a warranty of 5 to 15 years with an average standard warranty period of 10 years[18].

5.2.1. Place of Installation

The amount of electricity that the solar panel can produce is dependent on number of factors such as power rating, power tolerance, efficiency and temperature coefficient. By looking at these factors one can determine how much electricity can a solar panel produce.

- As much as possible, the inverter should be installed near the near the electrical panel of the tapping point.

- Inverters get slightly warm during their operations. To achieve higher performance, there should be adequate ventilation.

- Always comply with the external conditions demanded by the manufacturer, particularly permissible humidity and ambient temperature.

[17] How to Select a Right Grid Tie String Inverter? January 2020. www. Inverter.com
[18] Generation Solar. Inverter Warranties. September 2020. https://www.generationsolar.com/inverters/inverter-warranties/

REMEMBER

- ✓ Ensure adequate venitlation
- ✓ Consider a range of permissible ambient temperature for the inverter to avoid power limitation due to high temperatures..
- ✓ If an inverter is mounted outdoors, it has to be protected against the elements
- ✓ Pay attention to local high tide levels

5.3. Roofing and Selection of Mounting Systems

Equally important to selection of mounting systems is the assessment of the roofing where the rooftop solar PV system will be installed.

5.3.1. Assessment of Roofing

Flat roof or GI sheet are ideal roof types for putting in solar panels as the materials will allow for easier installation. Some roofing materials, which are made of light materials, like wood and slate roofs are not ideal because they are brittle.

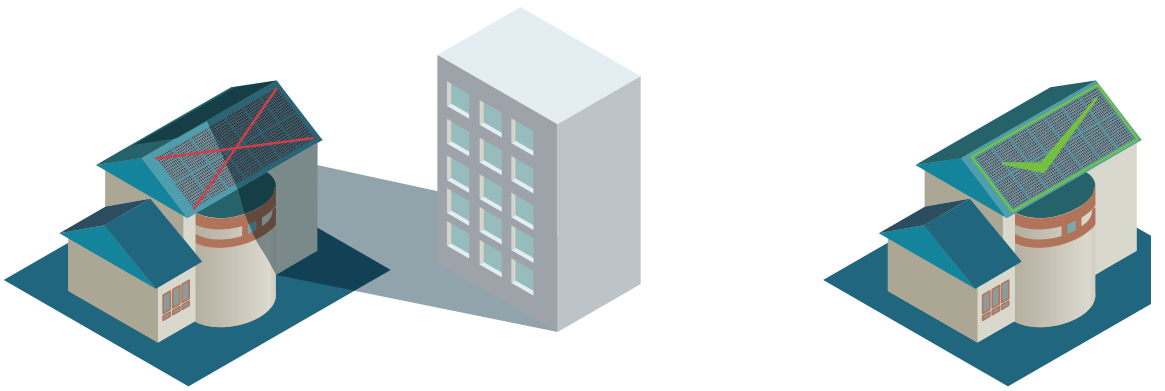
In installing the solar panels, it is critical to assess the condition of the existing roof:

- If roof is relatively new, say around 5 years old, an expert will assess its current shape and condition and if it is feasible for solar PV system installation;
- If the roof is too old or nearing its expected lifespan, then it is advisable to replace the roof before installing the solar PV system.

The amount of energy that will be generated by the solar PV also depends on the tilting of the roof:

- If the roof is too steep, i.e., more than 40 degrees, then energy production is lesser;
- If roof is flat, some structures need to be put up to angle the panels.

The amount of shading around will also greatly affect the energy production from the solar panels. If the house is surrounded by buildings and that the roof will be receiving minimal sunlight, then rooftop solar may not be the best option. It is also important to consider the size of the roof. The space requirement per type of material of solar modules are provided in **Table 4**.

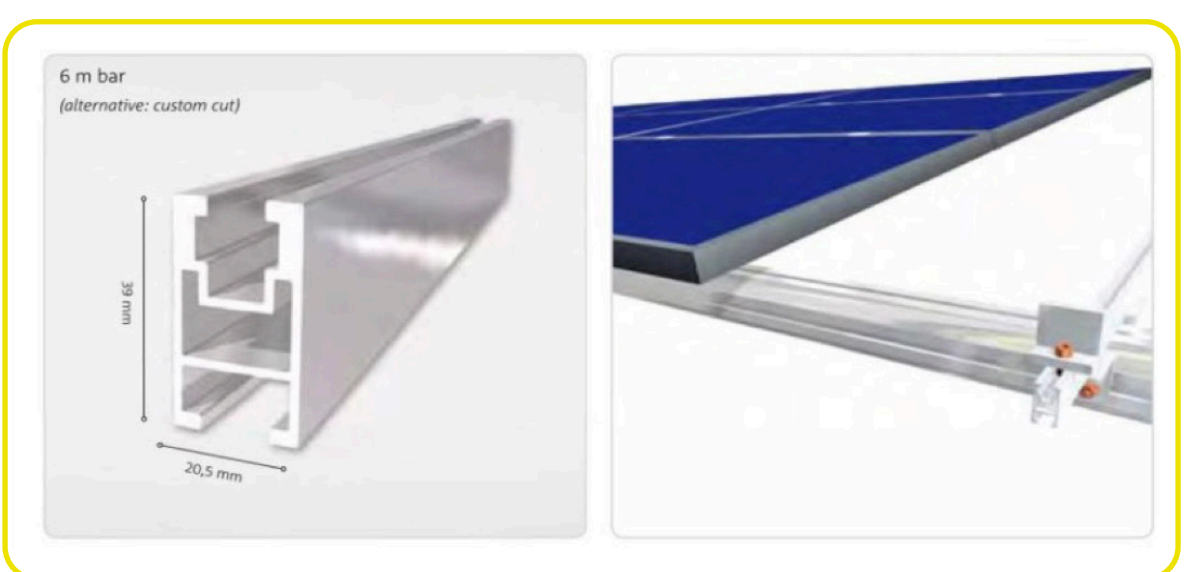


Shaded vs Not Shaded

5.3.2. Mounting Systems

Unlike in the past, manufacturers now offer easy to install mounting systems for flat roofs. For large roofs on industrial and commercial buildings, frames are now generally lightweight, aerodynamic, self-supporting, and without roof penetration challenges. These features are ideally suited for roofs with water proofing membrane or bitumen surfaces as they represent only a slight additional load to the roof.

Figure 12. Mounting System of Solar Panels



Source: 2013 Net-Metering Reference Guide

- When fixing or clamping the solar panels on the rails of the chosen mounting system the appropriate points have to be considered as recommended by the module manufacturer and framing instructions.

- The weight of the modules is approximately 20 kg per module. Always check the kind of roof bearing capacity to support the modules, frames, and wiring systems.

- In case no information is provided by the manufacturer, the module attachment should be along the longer side of the module, at around ¼ of the module length. The pre-drilled module holes are mostly in this part of the frame.

REMEMBER

✓ Choose a corrosion-resistant and statically tested mounting system.
✓ Check if the chosen mounting system complies with the requirements of the solar PV module manufacturer.
✓ Consider the maximum local wind loads.

5.4. Sizing of the PV System

It is important to know the load demand to determine the size of the solar PV. Below are simple ways of determining your load demand and calculating the solar PV size. The above steps can only serve as an indication but the solar PV installer can come up with the right size of the system by taking into consideration various parameters such as actual loads, i.e., appliances, bulbs, etc. (in the case of the households), the actual hours of usage, time of usage, etc.

- Estimate energy use - This can be done by looking at the electricity bill from DU. The electricity bill often includes one year electricity consumption including the average monthly consumption (**Figure 13**). From the electricity bill, compute for your daily usage, by simply dividing average monthly consumption by 30.

- Use the capacity factor - "Capacity factor is the measure of how often a power plant runs for a specific period of time. It's expressed as a percentage and calculated by dividing the actual unit electricity output by the maximum possible output."[19] The estimated capacity factor for small-scale solar PV application in the Philippines is 16%.

[19] https://nuclear.duke-energy.com/2015/02/18/capacity-factor-a-measure-of-reliability.

- Note that different solar panels will differ in efficiency, therefore different system sizes may be needed for the same output. Conversely, the same size system will have different outputs as shown in the following sample efficiency scenarios and computations

- Calculate size of the PV system - divide the daily kWh energy requirement by 24 hours multiplied with 16% capacity factor of solar PV system.[20]

Using the electric bill as an example (**Figure 13**), below is a sample calculation:

$$\text{Daily kWh} = \frac{541\text{kWh}}{\text{month}} * \frac{\text{month}}{30\text{ days}} = 18.06\text{ kWh per day}$$

To adopt the example computation by a distribution utility in Net-metering
Solar PV Capacity Factor: 16%

$$Size\ of\ the\ PV\ system = \frac{average\ daily\ kWh\ requirement}{24\ hrs * capacity\ factor}$$

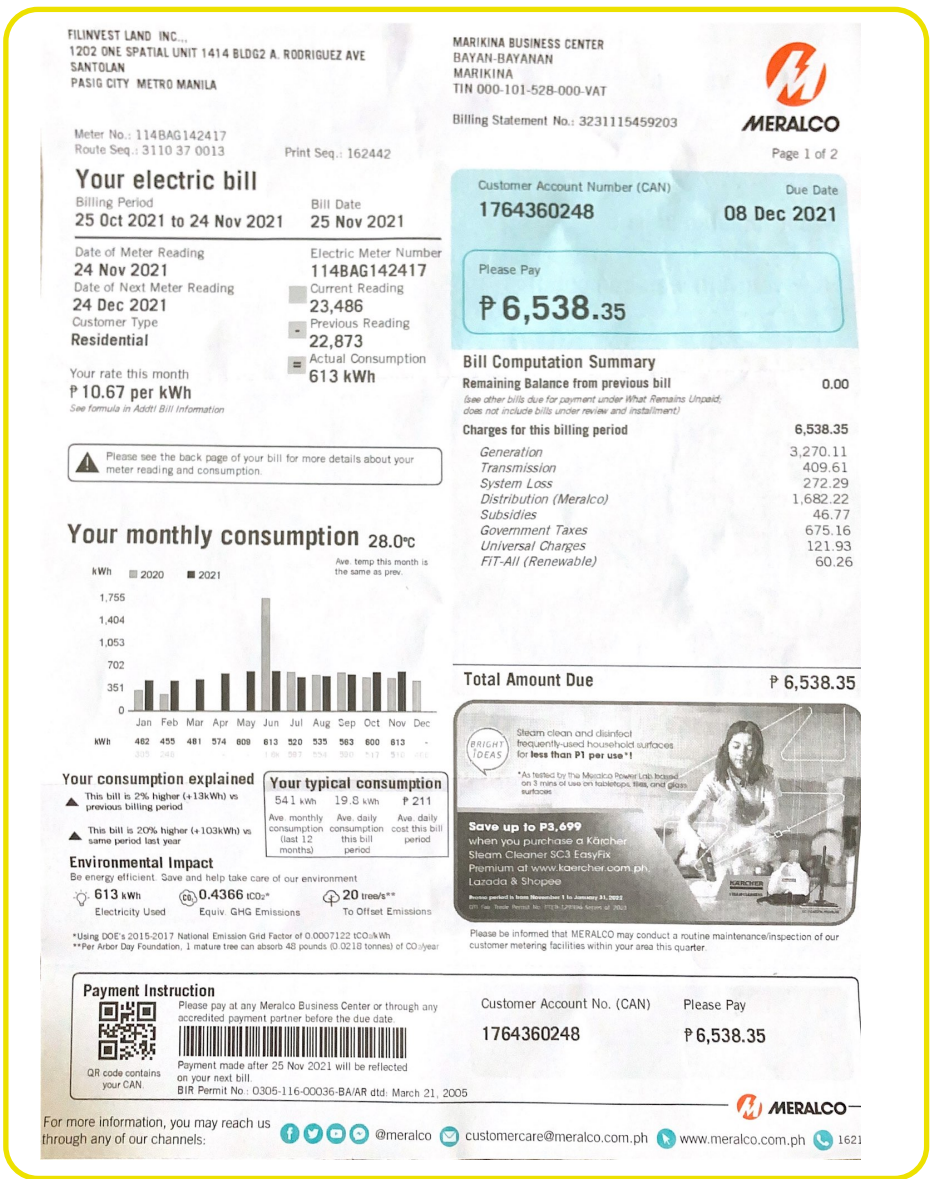
$$Size\ of\ the\ PV\ system = \frac{18.06\text{ kWh}}{24\text{ hr} * 0.16} = 4.84\text{ kWp}$$

As shown, the capacity factor of the panels also plays a major role in the sizing computations. A higher capacity factor translates to relatively smaller solar PV system size requirement. It should be remembered, however, that the final size of the solar PV for net metering should be lower than the calculated kWp size to minimize export to the grid.

If the system will be sized to 3 kWp, a total of 3,000 Wp of panel is required. If you choose a solar panel with rating of 300 Wp, the total number of panels that will be needed is 10 (10 x 300 Wp).

[20] Unbound Solar. 2020. How to size a Solar System: Step-by-Step. https://unboundsolar.com/blog/how-to-size-solar-system.

Figure 13. Sample of Electricity Bill



FILINVEST LAND INC...
1202 ONE SPATIAL UNIT 1414 BLDG2 A. RODRIGUEZ AVE
SANTOLAN
PASIG CITY METRO MANILA

MARIKINA BUSINESS CENTER
BAYAN-BAYANAN
MARIKINA
TIN 000-101-528-000-VAT

MERALCO

Billing Statement No.: 3231115459203

Page 1 of 2

Meter No.: 114BAG142417
Route Seq.: 3110 37 0013
Print Seq.: 162442

Your electric bill

Billing Period
25 Oct 2021 to 24 Nov 2021

Bill Date
25 Nov 2021

Date of Meter Reading
24 Nov 2021

Date of Next Meter Reading
24 Dec 2021

Customer Type
Residential

Your rate this month
₱ 10.67 per kWh
See formula in Addtl Bill Information

Electric Meter Number
114BAG142417

Current Reading
23,486

Previous Reading
22,873

Actual Consumption
613 kWh

Please see the back page of your bill for more details about your meter reading and consumption.

Customer Account Number (CAN)
1764360248

Due Date
08 Dec 2021

Please Pay
₱ 6,538.35

Bill Computation Summary

Remaining Balance from previous bill	0.00
(see other bills due for payment under What Remains Unpaid; does not include bills under review and installment)	
Charges for this billing period	6,538.35
Generation	3,270.11
Transmission	409.61
System Loss	272.29
Distribution (Meralco)	1,682.22
Subsidies	46.77
Government Taxes	675.16
Universal Charges	121.93
FIT-All (Renewable)	60.26

Your monthly consumption 28.0°C

Ave. temp this month is the same as prev.

Total Amount Due ₱ 6,538.35

Your consumption explained

▲ This bill is 2% higher (+13kWh) vs previous billing period

▲ This bill is 20% higher (+103kWh) vs same period last year

Your typical consumption

541 kWh	19.8 kWh	₱ 211
Ave. monthly consumption (last 12 months)	Ave. daily consumption this bill period	Ave. daily cost this bill period

Environmental Impact

Be energy efficient. Save and help take care of our environment

613 kWh Electricity Used
0.4366 tCO2e* Equiv. GHG Emissions
20 tree/s** To Offset Emissions

*Using DOE's 2015-2017 National Emission Grid Factor of 0.0007122 tCO2e/kWh
**Per Arbor Day Foundation, 1 mature tree can absorb 48 pounds (0.0218 tonnes) of CO2/year

Please be informed that MERALCO may conduct a routine maintenance/inspection of our customer metering facilities within your area this quarter.

Payment Instruction

Please pay at any Meralco Business Center or through any accredited payment partner before the due date.

QR code contains your CAN.

Payment made after 25 Nov 2021 will be reflected on your next bill.

BIR Permit No.: 0305-116-00036-BA/AR dtd: March 21, 2005

Customer Account No. (CAN)
1764360248

Please Pay
₱ 6,538.35

MERALCO

For more information, you may reach us through any of our channels: @meralco customercare@meralco.com.ph www.meralco.com.ph 1621

5.4.1. Smaller PV systems for Residential Use

The electrical power of a PV system is measured in kilowatt peak (kWp) and refers to the rated power of the solar array under standard test conditions (STC). For the installation of a 1 kWp power system, only 6 square meters of area is needed using highly efficient modules. If roof area is small, it is advisable to choose solar modules with higher efficiency. Below is the required surface area for 1 kWp per type solar cell materials.

Table 5. Roof Space Requirements per Type of Solar Cell Material

Solar cell material	Typical Module efficiency	Best research efficiency	Required surface area for 1 kWp (square meter)
Monocrystalline	15 - 20%	25%	6 - 9
Polycrystalline	13 - 16%	20.4%	8 - 9
Thin film: Copper Indium Gallium Selenide(CIGS)	10 - 14.5%	20.4	9 - 11
Amorphous silicon	6 - 8%	13.45%	13 - 20

Source: Taraba, Michal & Adamec, Juraj & Danko, Matus & Drgona, Peter & Urica, Tomas. (2019). Properties measurement of the thin film solar panels under adverse weather conditions. Transportation Research Procedia. https://doi.org/10.1016/j.trpro.2019.07.077.

REMEMBER

Under the net-metering program, consuming self-generated solar power makes more economic sense than selling excess power to the DU. Consider what portion of your present electricity demand you would like the solar PV system to meet. The ideal is to plan for a system lower than your peak demand.

Only a portion of the household electricity consumption will be covered by the PV system. It is therefore important to get a rough estimate of the overall power of the PV system obtained - based on the space allowed on your roof – and match the PV energy output with your consumption. Solar PV allows to reduce the electricity consumption during daytime, thus it is essential to improve the demand profile by utilizing washing machines, dryers and other loads whenever the PV system delivers a lot of electricity and reaches peak capacity. Managing the load this way will reduce the peak demand for electricity from the grid. Under the Net-Metering regime, consuming self-generated solar power makes more economic sense than selling excess power to the distribution utility. Of course, storing energy is an option. As the prices for battery decreases in the near future, storing energy for later use can be considered in order to use all electricity generated by the PV system.

REMEMBER

- ✓ Choose roof area free of shading, as shaded modules significantly reduce the system output.
- ✓ If your roof is oriented towards south, you will have the highest yield with a module inclination of over 8 degrees.
- ✓ Inclination between 0-20 degrees is appropriate too.
- ✓ Inclining the modules provides a washing effect with rain.
- ✓ Integrating solar PV system in building design can save money on roof tiles and materials.
- ✓ For flat roofs with titled modules, consider the distance between modules to avoid shading.
- ✓ Consider what portion of your present electricity demand you would like to meet with the solar PV system.

5.4.2. Larger PV system for commercial installations

The installation of a PV system is a good investment, which can provide higher returns than a savings deposit with only an average interest rate of 0.25% - 1.25% per annum.
Larger PV systems for commercial use will make sense if loads can be arranged to coincide with high solar generated electricity. Sometimes this is realized by applying remote controlled relays or sockets to switch on additional selected loads. More recently load management components are offered that also consider weather forecasts and thereby set time frames corresponding to the projected electricity generation.

In the case that the owner of the building is the operator of the PV system, it can be considered to include the solar roof top in the property insurance. The insurance coverage should already be provided during the construction phase.

A data logger to measure the hourly kW demand of the facility can be installed to study the daytime load that will coincide with the solar generation. This will help in properly sizing the capacity of the solar installation and in the calculation of the reduction of the electric bill.

Net-Metering customer with large capacity system may ask the following questions to their installer:

- Is the quality of the roofing of the building suitable for the mounting of a solar system?
- Is the chosen area for the PV installation free of any shading? The solar installer shall provide the QE with shading analysis.

- Can loads be easily switched on and off (demand response)? This option should be requested by the QE upon initial design of the system.
- Is the PV system divided in different arrays with intermediary spaces (for maintenance and safety reasons)?
- Has an insurance policy been concluded? The insurance is paid by the QE but it might be good to ask this question to make sure that the system as well as installation are covered.

REMEMBER

- ✓ Consider if you can rearrange some loads to peak capacity time in order to maximize the use of the solar generated electricity.
- ✓ Check with your LGU for electrical and building permits.
- ✓ On large roof areas, consider modules with lower efficiency at a more competitive price.
- ✓ A relation between nominal power of PV generator and inverter of 1:1 is preferable (DC/AC ratio 100%) because a lower ratio would lead to losses.
- ✓ Consider an intermediary space of 1 meter and a maximum width of 40 meters as protective measure or the event of a fire in the building (thus, fire fighters can maintain safety distance for fire-fighting purposes at electrical installations. Refere to fire safety codes.
- ✓ Check with your property insurance firm about insuring the solar PV installation.

5.5. Selecting a Solar Installer

The first question to ask is: Where will I find a good PV installation company? System installation can be found by advertisements in printed media and internet search. There are several associations like Philippine Solar and Storage Energy Alliance (PSSEA), Renewable Energy Association of the Philippines (REAP) and the Confederation of Solar Developers of the Philippines (CSDP), which can be a good source of information for possible solar installer. However, it is important that QEs must exercise due diligence in selecting the right installer.

A good solar installer must have the most of the following characteristics[21]:

[21] Energy Sage. 2020. How to choose a solar installer. https://www.energysage.com/solar/decision-guide/how-to-choose-a-solar-installer/

- Expertise - Currently, there is no accreditation of solar PV companies and installers yet in the Philippines. Such being the case, it might be good to check the company's work history and qualifications of its personnel. It is also worthy to look if it has a number of net metering installations.

- Licenses and Permits - Make sure that the company is registered with different government organizations like Securities and Exchange Commission (SEC), Department of Trade and Industry (DTI) and Bureau of Internal Revenue (BIR). It is also important to look at the trade licenses, certifications, or licenses from manufacturers. Usually, the licenses and permits are posted in the company's office.

- Track record and experience - The company must have an established solar track record. It should be able to discuss about its previous clients. The more clients that the company has would mean that it has already established itself in the industry. The number of years it has been in the business can also be a gauge of its experience, installer with more than 5 years of doing Net-Metering installations can be a good candidate.

The end-user can also talk to previous customers to get information about after sales service, warranties and if there are any major issues with the system. It is important not to rely on online testimonials. Care must be taken to those companies that make exaggerated claims like short pay-back period or 'zero electric bills', selling electricity, etc. Simply put, make sure that the following questions are considered when choosing the solar installer:

- Is the installer able to explain the working of the PV system in simple words and a comprehensible way?

- Does the installer cite potential benefits from Net-Metering that are not in accordance with the implementing rules and regulations?

- In case you have a GMBD with the utility, does the installer has a suggestion on the best option to size the PV system?

- Does the installer provide electrical plans and other documents required for LGU Electrical and Building Permits?

- Is the processing of permits included in the services?

- Does the supplier has an environmental and personnel safety plans, PPE etc, proper training and experience (show proof, photos etc)

- Does the offer include the delivery of all required components and services to produce electric power and feed it into the grid?

- Are grid-connection, and commissioning of the PV system included? In other words: is it a turn-key installation?

- Is the client stipulated to provide any item (e.g., scaffolding or labor)?
- Are optional and mandatory items distinguished and terms and conditions of the contract included?
- Does the installer observe current applicable standards and guidelines and know compliance standards set by the electrical and distribution codes valid in the Philippines?
- Compare the warranties being offered
- Compare after-sales service offer especially on workmanship
- Payment conditions: are installments included?

REMEMBER

✓ Ask your installer to conduct on-site inspection to consider existing electrical installations
✓ A calculation of the estimated yield should be included in the technical proposal so you can calc late the potential savings.
✓ Include in the contract, the installer's declaration stating compliance with current applicable standards, guidelines, and rules.
✓ Check on insurance for the solar PV installation. It should provide security against storms, hail, lightning, overvoltage, theft, vandalism, and other circumstances.
✓ Always include regular inspection of the PV system and a prompt sevice in case of defect.

5.5.1. Comparing Offers

It is expected that the end-user will receive several offers for the installation of solar PV facility. The following are the parameters that can be looked into when comparing offers:

- Solar and inverter
  - ✓ Type and brands (see Chapter 5.1 and 5.2)
  - ✓ Cost (Php/Wp for solar PV and Php/kW for inverter)
  - ✓ Total price of the whole system
  - ✓ Efficiency
  - ✓ Standards (for solar PV see Chapter 5.1.2)
  - ✓ Warranty: number of years
  - ✓ After sales service: (includes regular inspection of equipment, prompt service in case of defects).

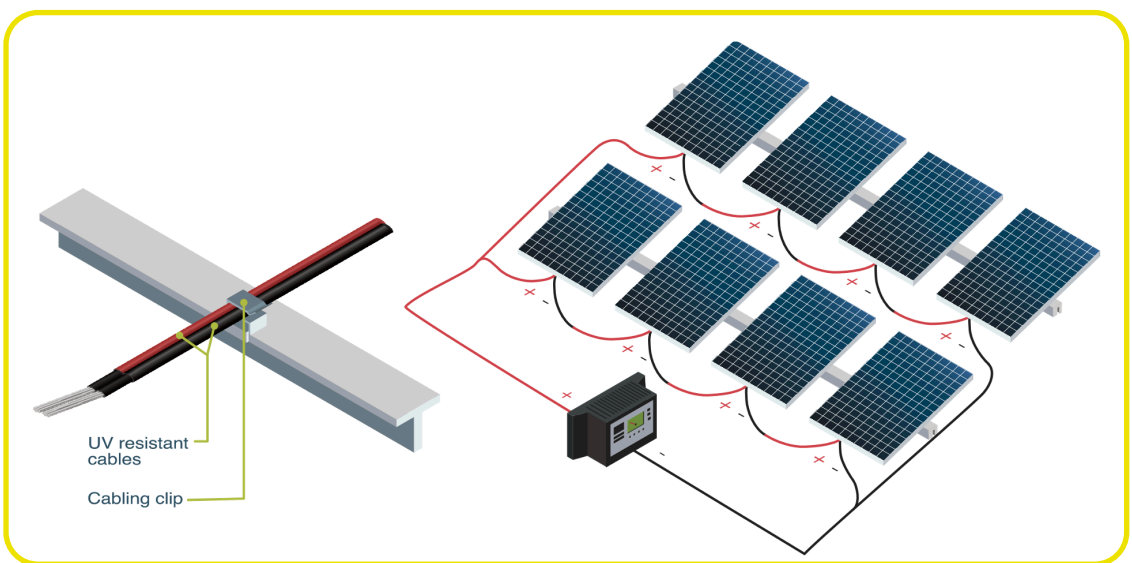
- Commissioning (including tests)
- Financing options - solar company may have financing options available in case the customer does not want to pay in full upfront.
- Credibility of the company as discussed in Chapter 5.5.
- Compilation and delivery of documentation, instruction for maintenance and operation.
- System design - shows how the system will look like at your premises and the amount of power that the system can generate and the projected savings in the electric bill.

5.6. Installation, Actual Operation, Operation and Maintenance, and Safety

Although the installation will be done by PV supplier/installer, there are important aspects that the end-user has to observe during and post installation.

5.6.1. Quality aspects of installation and mounting

On flat roofs, protection mats should be provided as an installation foundation, as these protect the roof membrane. Enough space should be provided in between PV arrays for accessibility in times of servicing and repair purposes. The commissioning of the PV system has to be carried out by a registered electrician. During the commissioning a protocol has to be written by the PV plant installer. This document points out important data about the PV system and records measured electrical values.



The points below are very technical but it is good to remind the supplier/installer about the following issues during installation:

- The running cables has to be short circuit proof, if possible, laying the positive and negative lines separately with a double isolation.

- The cables have to be UV resistant and properly fixed on the substructure or be conducted in adequate properly fixed on the substructure or be conducted in adequate fixings to prevent a lying on the roofing or on sharp edges. The installer should follow the Philippine Electrical Code on wiring of PV systems.

- Some modules require the earthing of a pole (e.g., thin-film modules with string-ribbon cells: negative pole; Sun power cells: positive pole)

- For self-consumption: appropriate meters have to be installed. Under the net metering rules, bi-directional meters are installed to measure exported and imported energy and REC meters to measure the total generation from solar PV. These meters will be provided by the DU as per net metering guidelines.

Similarly, remind the supplier/installer to observe the following during commissioning:

- Before switching on the PV system several values are logged: earthing resistance of the grounding system, insulating resistance of the PV system, insulating resistance of the DC main line, short circuit current for each string, open circuit voltage for each string.

- After switching on the PV installation: check the operation current of each string as well as voltage drop of diodes and fuses. It is important that the inverter feeds in and that the solar array is not running in open circuit but in the operation point, generally the maximum power point (MPP).

REMEMBER - Check with the installer/supplier the following:

✓ Check if cables are properly fixed. No lying on the roofing or on sharp edges
✓ Include protection glass for outdoor installation
✓ Ask the installer to use appropriate cables and materials for DC installation
✓ Preferntial use of solar cables (characterization: PV1-F)
✓ Connectors have to fit together and should not be permanently under water
✓ Avoid looped circuits
✓ Observe distance at about 0.5 meters between cabling and lightning protective system.

5.6.2. Quality assurance during operation time

The installer should offer a warranty on construction works for a certain period of time (at least one year). This has to be reviewed with the installer and should form part of the documentation of the PV system. The inverter should be checked on a regular basis (on vision panel or data logger) and yield values indicated on meter (every month).

5.6.3. Maintenance of the solar PV System

The maintenance of the RE facility/rooftop solar system is a responsibility of the owner and/or the solar supplier/installer.

5.6.3.1. Solar supplier/installer after sales services

After sales services provided after installation by solar suppliers/installers are very minimal for small/residential rooftop solar systems compared to commercial and industrial or projects that have been structured such as an ESCO (Energy Service Company) style engagement.

Substantial deficits in after sales service is fatal; as it may expose the QEs to safety risk when technical problems arise. This is also one of the reasons for solar products' negative image. Typical problems of an insufficient after sales service are[22]:

- Customers do not know who to contact in case of technical problems;
- If customers received contact information of technicians or the company, oftentimes information are not updated;
- Customers have insufficient information on prices of non-durable components such as lighting fixture;
- Customers don't know anything about warranty and warranty periods for the product and components;
- Customers do not know what to do in case of warranty claim;
- Customers do not know how to maintain adequately the system;

The QE should pay attention to the solar supplier/installer's offer for after sales service. It will be noted that some of the maintenance activities cannot be done by the QE.

[22] https://energypedia.info/wiki/After_Sales_Service_for_Solar_Systems

For small systems, the after-sales service support that will be provided is usually spelled out in the Request for Quotation (RFQ) or Proposal that will be presented by the solar installer to the QE. The Proposal/RFQ includes the system's technical specifications, costs (breakdown per component), inclusions and exclusions of offer, warranty of the different components, after sales coverage of the system being offered, delivery and terms of payment. Once the Proposal/Offer is signed, both the QE and the solar installer agree to the terms and conditions provided therein.

Normally, solar installer provides an industry standard after sales support for up to one (1) year. Additional costs will be incurred by the QE, if he/she opted to extend the after-sales service support provided by the installer through preventive maintenance. The longer the duration of the preventive maintenance service and the more frequent of visits, the higher fees will be required from the QE. Preventive maintenance is not only carried out if a problem arises but is conducted regularly to ensure the optimum operation of the system.

Below are suggested after sales-services to be included in the basic 1-year maintenance[23]:

- Orientation and/or training. Prior to the turnover of the system to the QE, the installer will conduct training and orientation to the person who will directly oversee and monitor the system. The training comprises of basic principles of the system, basic operation, parts and components and functions of the same, fault identification and their corrective measures, etc. Within the warranty period, the installer as much as possible does not want the QE to conduct repairs as it may aggravate the problem.

- RE facility inspection. Solar supplier/installer will conduct visit and inspection of the RE facility/rooftop solar system twice during the basic 1-year after sales support. Ideally, this can be done six months after the installation and at end of the 1-year after sales support. After natural force majeure events, such as but not limited to, typhoons, earthquakes, volcanic eruptions, the solar supplier/installer should also send a technician to inspect the condition of RE facility. Repair or corrective services will be provided free of charge if still within the basic 1-year after sales support period. Any replacement of parts not covered with a warranty will be for the expenses of the QE.

- Supply of parts for replacement. The solar supplier/installer is expected to maintain an inventory of replacement parts so as not to burden the QE in sourcing them when needed. This will minimize downtime of the RE facility/rooftop solar system.

- Communication channels. Key to developing very good relationship between the solar supplier/installer, particularly after the sales/installation services, is presence of effective communication channels. The solar supplier/installer must provide the QE its office phone number, mobile number, facebook page, or other social media account to ensure effective communication.

Warranties that are being provided by installer and supplier vary. A certain supplier/installer shared the following warranties which can be used as guide when comparing offers:

[23] https://energypedia.info/wiki/After_Sales_Service_for_Solar_Systems.

Inclusions:

- Professional services (design and engineering)
- Delivery to site, installation and electrical works, including testing and commissioning
- After-sales on-call maintenance service (1 year free of charge)

Warranties for each component:

- Solar PV Module - 25 year linear performance warranty, 10 years manufacturing warranty against defects.
- Solar Inverter – 5 years
- Rapid Shutdown Switch (Tigo TS4-A-2F brand) – 25 years
- Rapid Shutdown Switch Transmitter Communication Kit Dual Core – 10 years
- Workmanship – 1 year

For safety purposes, the *Philippine Electrical Code of 2017 (PEC 2017)* requires a Rapid Shutdown Switch (RSS) in *Article 6.90.2.6* for rooftop PV installations. *PEC 2017* stipulates that rapid shutdown needs to occur at the individual solar modules, rather than at the solar PV array as a whole. The RSS is intended to ensure the safety of firefighters when responding on fires in buildings with solar PV installations. *PEC 2017* mandates that solar PV systems installed on the roof of structures or buildings required that the PV source circuits be de-energized from all sources within 10 seconds or when the utility supply has been de-energized or which the solar PV power source disconnecting means has been opened. The RSS will perform that task as the inverter can take around 45 seconds to disengage from the solar PV array and as long as 5 minutes for AC and DC capacitors inside the inverter to de-energize. Solar modules for micro inverters with DC output of less than 30 volts does not require an RSS. DC-DC optimizers with rapid shut-down function can be used as RSS.

5.6.3.2. Maintenance by the owner

After sales services provided after installation by solar suppliers/installers are very minimal for small/residential rooftop solar systems compared to commercial and industrial or projects that have been structured such as an ESCO (Energy Service Company) style engagement.

The owner having received orientation and/or training from the solar supplier/installer, below are basic maintenance activities that the owner can do at the minimum twice a year[24]:

- Visual inspection of the rooftop solar PV system and the roof. Check if all modules are properly attached and fixed to the mounting structures.

- Check if cables been bitten by animals and if the connectors are OK

[24] ADB, Handbook for Rooftop Solar Development in Asia, 2014.

- Cleaning of solar modules. Soiling is especially a problem in dusty and polluted environments, such as motorways, railroad tracks or pig farms. Although rainfall can clean the panels, there is also a possibility that once the rainwater evaporates, there may be residual dirt or salt deposits. In most situations, panels can be cleaned with water; do not use harsh chemicals, abrasive scrubbers and pressure washers. The frequency of cleaning is dictated by monitoring output. In case the monitored energy production (from inverter reading) show that it is lower than 5% or more from the baseline, then maybe it is time to check if the panels are dirty. However, cleaning times can also be anticipated more or less depending on weather, nearby construction, or other circumstances. For instance, panels will need cleaning less often during the rainy season, as the rain will wash away much of the debris. Cleaning will need to occur more often if there is nearby construction, since it would result in additional dust in the air;

- Removal of shading, if any.

- After a lightning: check if electric-surge arresters remain intact or needs replacement.

5.6.4. Safety

A rooftop solar PV is an electrical system and therefore susceptible to electrical risk of fires and shocks. Compliance to electrical safety requirements and standards is critical to ensure safety. Solar panels that are not properly installed can cause electrical fires and electrocution as well as fluctuation in the quality of power across the circuit thereby affecting the whole community. The following are some useful tips to ensure that the PV system is safe from fire risks and shocks. The list is not exhaustive but is helpful in minimizing risks, injury and harm.

- Engaging experiences and trained installers. Make sure that the solar PV installers are from reputable companies that have qualified personnel doing the installation. The personnel should have undergone training/s on PV or certified electricians. The installer should preferably be licensed by the Philippine Contractors Accreditation Board (PCAB) and comply with the *Philippine Electrical Code*.

- Call your installer immediately if something strange is noticed with the solar system so appropriate remedy can be given. Most grid-tie systems flash red light at the inverter when something goes wrong.

- If the roof has accumulated a lot of leaves or has trees covering it, consider trimming the trees or regularly clean the panels. Buildup of leaves under the solar panel is a fire hazard and promotes water seepage through the roof during rainy season. It is important that the panels have air gaps between the roofs and should not be installed over light materials like nipa or other flammable materials.

- Ensure that your solar PV system has safety features such as islanding function for inverter and rapid shutdown switch for solar PV as described above. These features are necessary for the protection of the personnel who are conducting repair works in the grid or fire fighting .

- During commissioning of the solar PV system, ask the installer to give walk through on the de-energization procedures or how to shut down the system in case of fire or maintenance. It is important to train more people as possible on this walk through and regularly conducts it especially, if there are new household member or staff in the case of commercial/ industrial establishments.

- If located in coastal area, consider triple railing the solar setup or enhance the anodization of the racking equipment. The system should also be designed that it can withstand severe weather conditions that it is exposed to.

- Avoid installing solar PV system in areas with flammable gases.

- Make sure to follow the installer's instructions during maintenance. Regularly consult the manual provided by the installer as this have specific procedures for the maintenance of the system. Having your own way of maintaining the system and veering away from what is advised may results in hazards. It is also advisable to call the solar installer and ask questions about the overall maintenance if something different is noticed on its operation.

- After a major storm or after New Year celebration, it is advisable to conduct visual check to see if there are potential of foreign object damage. A broken or shattered solar panel is a safety concern that needs to be quickly addressed.

- If your system is nearing its life span, replace or remove it to avoid further risk of fire or electrocution. Solar PV is expected to provide 25 years of reliable power.

5.7. Return on Investment

QEs are interested to know when they can recover their investment for the installation and procurement of solar PV facilities. In contrast to conventional power plants, PV systems have no fuel costs. Moreover, there are no mechanically or thermally highly stressed parts; therefore, the maintenance is limited primarily to few activities. Nevertheless, it is prudent to allocate a small budget for the eventual replacement of defective or end-of life parts.

For instance, the inverter may have to be replaced once within 20 years. It is also important to know the yearly demand for electricity, and the amount being paid for electricity.

It would be best if the quote for the PV installation would include an estimate of cost-effectiveness. This calculation is based on the expected yield, the electricity demand and the achievable degree of self-consumption as well as the excess energy that is fed into the grid.

REMEMBER

✓ Provide the installer with the current electricity bill and 6 months back or more
✓ Ask the installer if they can provide an estimate of cost-effectiveness such ROI, payback period, and other metrics of the proposed system.
✓ Make sure that expected yield, self-consumption, and excess feedin are according to current pricing for retail rate and generation rate.

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5.7.1. Calculating ROI of Solar Facility for Net-Metering

The example below shows a sample of ROI calculation of a solar roof top in the Philippines. Please check with solar installer and DU the appropriate figures. Those shaded in yellow are the values that need to be replaced by actual numbers.

The example below is just a hypothetical calculation which shows the methodology on how the ROI of solar facility is computed under the Net-Metering rules in the Philippines.

Assumptions:

Ref	Items	Value	Unit
A0	Lifetime of PV	20	Years
A1	Capacity of PV system (RC)	3	kWp
A2	Capacity Factor (CF)	16	%
A3	Hours per year	8,760	H
A4	Yield (RC * CF *H)	4,205	kWh/year
A5	Degradation factor	0.50	%
A6	% Self-consumption	80	%
A7	DU Total customer charge	9.537	Php/kWh
A8	Annual increase in DU generation/customer charge	0.02	%
A9	% Net export	20	%
A10	DU Generation rate	4.3749	Php/kWh
A11	O&M/Year/kWp	900.00	Php
A12	Annual increase in O&M	0	%
A13	Cost of installed PV system	45000	Php/kWp
A14	Total cost of installed PV system	135,000.00	Php

Year	Total solar energy produced	Solar energy own consumption	DU total customer charge	Avoided cost	Solar energy export	Generation charge	Credit from export	Gross savings	O&M	Net savings (cash flow)	Investment and cumulative savings
	(kWh)	(kWh)	PhP/kWh	PhP	(kWh)	PhP/kWh	PhP	PhP	PhP	PhP	PhP
Column A	Column B	Column C	Column D	Column E	Column F	Column G	Column H	Column I	Column J	Column K	Column L
0			9.537			4.3749					(135,000.00)
1	4,151.35	3,321.08	9.73	31,673.12	830.27	4.46	3,704.99	35,378.11	900.00	31,570.32	(103,429.68)
2	4,130.59	3,304.47	9.92	32,145.05	826.12	4.55	3,760.20	35,905.25	900.00	34,961.92	(68,467.76)
3	4,109.83	3,287.87	10.12	32,623.19	821.97	4.64	3,816.13	36,439.31	900.00	35,495.42	(32,972.34)
4	4,089.08	3,271.26	10.32	33,107.59	817.82	4.74	3,872.79	36,980.38	900.00	36,035.91	3,063.57
5	4,068.32	3,254.66	10.53	33,598.32	813.66	4.83	3,930.20	37,528.52	900.00	36,583.47	39,647.03
6	4,047.56	3,238.05	10.74	34,095.44	809.51	4.93	3,988.35	38,083.79	900.00	37,138.15	76,785.18
7	4,026.81	3,221.45	10.96	34,599.00	805.36	5.03	4,047.25	38,646.25	900.00	37,700.02	114,485.20
8	4,006.05	3,204.84	11.17	35,109.07	801.21	5.13	4,106.92	39,215.99	900.00	38,269.16	152,754.37
9	3,985.29	3,188.23	11.40	35,625.70	797.06	5.23	4,167.35	39,793.05	900.00	38,845.62	191,599.99
10	3,964.54	3,171.63	11.63	36,148.95	792.91	5.33	4,228.56	40,377.51	900.00	39,429.47	231,029.46
11	3,943.78	3,155.02	11.86	36,678.89	788.76	5.44	4,290.55	40,969.43	900.00	40,020.78	271,050.25
12	3,923.02	3,138.42	12.10	37,215.56	784.60	5.55	4,353.32	41,568.88	900.00	40,619.61	311,669.86
13	3,902.27	3,121.81	12.34	37,759.02	780.45	5.66	4,416.90	42,175.92	900.00	41,226.03	352,895.88
14	3,881.51	3,105.21	12.58	38,309.34	776.30	5.77	4,481.27	42,790.61	900.00	41,840.09	394,735.97
15	3,860.75	3,088.60	12.84	38,866.57	772.15	5.89	4,546.45	43,413.02	900.00	42,461.86	437,197.83
16	3,840.00	3,072.00	13.09	39,430.76	768.00	6.01	4,612.45	44,043.21	900.00	43,091.41	480,289.25
17	3,819.24	3,055.39	13.35	40,001.97	763.85	6.13	4,679.27	44,681.24	900.00	43,728.80	524,018.05
18	3,798.48	3,038.79	13.62	40,580.26	759.70	6.25	4,746.91	45,327.18	900.00	44,374.08	568,392.13
19	3,777.73	3,022.18	13.89	41,165.68	755.55	6.37	4,815.39	45,981.08	900.00	45,027.33	613,419.46
20	3,756.97	3,005.58	14.17	41,758.29	751.39	6.50	4,884.71	46,643.00	900.00	45,688.60	659,108.06

Here's an example computation and the formulas!

(Taken from a sample ROI calculation of a solar rooftop in the Philippines)

Year	Total solar energy produced kWh Column B	Solar energy own Consumption kWh Column C	DU total customer charge Php/kWh Column D	Avoided cost Php Column E	Solar energy export kWh Column F	Generation charge Php/kWh Column G	Credit from Export Php Column H	Gross Savings Php Column I	O&M Php Column J	Net savings (cash flow) Php Column K	Investment & cumulative Savings Php Column L
4	4,089.08	3,271.26	10.32	33,107.59	817.82	4.74	3,872.79	36,980.38	900.00	36,035.91	3,063.57

Column B

Total solar energy produced (kWh) = Rated capacity of system x Capacity Factor x 8,760 hours

Column C

Solar energy own consumption (kWh)
= Total energy produced x % Own consumption

Column D

DU total customer charge (Php/kWh)
= DU total customer charge x (1+annual increase in DU customer generation charge) ^ (Year-1)

Column E

Avoided cost (Php) = Solar energy own consumption x DU total customer charge

Column F

Solar energy export (kWh) =
Total solar energy produced x % Net export

Column G

DU generation charge (Php/kWh) = DU generation charge x (1+annual increase in DU customer/generation charge)^(Year-1)

Column H

Credit from export (Php) = Solar energy export x DU generation charge

Column I

Gross savings =
Avoided cost +
Credit from export

Column J

O&M =
(Rated capacity of system x O&M/Year/kWp) x (1+Annual increase in O&M)^(Year-1)

Column K

Net savings (cash flow, Php) =
Gross savings - O&M

Column L

Investment and cumulative savings =
Cost of installed PV system - Net savings

Feedback and Grievance Redress Mechanism

6. Feedback and Grievance Redress Mechanism

The DOE subscribes to the *Consumer Act of the Philippines (RA 7394)* that provides for the:

- Protection of the interests of the consumer, promote his general welfare and to establish standards of conduct for business and industry;
- Protection against hazards to health and safety; and
- Protection against DECEPTIVE, UNFAIR and UNCONSCIONABLE sales acts and practices.

Aligned to these objectives, the government and the private sectors, among others, have already instituted in their operation the feedback and grievance/complaint redress mechanism for voices to be heard.

Particularly for the energy sector, the national government agencies include their local and satellite offices, DUs, LGUs and other stakeholders have created and mobilized resources that handles inquiries, feedbacks, and even grievances of their clients. The modes for communicating the inquiries, feedbacks and/or grievances are through the following, but not limited to:

- Website: there is a "Contact us" section or icon that can be readily found;
- Hotlines posted in the bulletin board in their offices or their business centers; and
- Social media platform such as Facebook.

Focusing on the implementation of the Net-Metering program, the DOE and other offices have received complaints and grievances. This is not surprising as the program is still evolving. The benefits of streamlining of the feedback and grievance redress mechanism can be many-fold:

- Resolution of the concerns/issues of the aggrieved parties;
- Demonstration that concerned government entities and other stakeholders are advocates of consumer protection, thereby strengthening trust; and
- Documentation of the experiences will aid in developing a responsive multi-stakeholder framework for feedback and grievance redress mechanism.

It is always best that the concerned parties resolve among themselves any concerns or issues that may arise in the course of the engagement. However, there may still be cases wherein the issues need to be elevated to the proper authorities. A matrix showing a system on how the feedbacks/complaints can be addressed is shown in **Table 10.**

Table 10. Feedback and Grievance Redress Mechanism

How to send feedback?	Feedbacks and grievances may be directed to different entities depending on the type of issue. If concern regarding electric cooperatives, send com-plaints/ feedbacks through telephone call, email or fb messenger to: **Department Manager** Total Electrification and Renewable Energy Develop-ment Department Email: @nea.gov.ph Tel. No. (02) 8927-5158 https://www.facebook.com/OfficialNEA/ OR **Chief Energy Regulations Officer** Email: @erc.ph Tel. No. (02) 8631 5818 https://www.facebook.com/ERCgovPH/ Concerns regarding private distribution utilities, solar PV installers/ suppliers and local government units: **DOE Luzon Field Office (Luzon area)** Email: dept.ofenergylfo@yahoo.com Tel. No. (075) 656 0114 https://www.facebook.com/DOELuzonFieldOffice/ **DOE Visayas Field Office (Visayas area)** Email: vfo@doe.gov.ph Tel No. (032) 253 7222 https://www.facebook.com/doevisayas/ **DOE Mindanao Field Office (Mindanao Area)** Email: doe.mfo@doe.gov.ph Tel. No. (082) 224 0740 https://www.facebook.com/doemindanao/ **National Capital Region (DOE Main Office)** c/o Consumer Welfare and Promotions Office (CWPO) Email: icwpo@doe.gov.ph Tel. No. (02) 84792900 https://www.facebook.com/doe.gov.ph/

How to file a complaint?	Feedbacks/Complaints may be filed through the following means: • Email • Phone call • Facebook messenger The following information are required from the complainant: • Name • Contact number • Date of the incident • Details of the complaint • Name of person being complained (if any) A template of the Complaint/Grievance Report form is presented in Annex 8.
How feedbacks are processed?	• Feedbacks/Complaints received are reviewed every week, i.e., every Monday. • A designated staff from each entity, i.e., DOE field offices and DOE main, ERC and NEA, will be assigned to handle feedbacks/complaints. • Feedbacks/Complaints will be collated and those requiring answer will be addressed by the designated staff within 3 days, i.e., until Wednesday. • Critical issues will be elevated to a senior staff.

References

References

Andrew Sendy. 2021. Types of solar panels: which one is the best choice? SolarReviews. https://www.solarreviews.com/blog/pros-and-cons-of-monocrystalline-vs-polycrystalline-solar-panels

Asian Development Bank. 2014.Handbook for Rooftop Solar Development in Asia. Manila. https://hdl.handle.net/11540/2497

Duke energy.com. https://nuclear.duke-energy.com/2015/02/18/capacity-factor-a-measure-of-reliability.

Department of Energy. 2020. DOE-DILG Joint Memorandum Circular No. 2020-01 "Guidelines for LGUs to Facilitate the Implementation of Energy Projects". Manila. doe.gov.ph/laws-and-issuances/dilg-doe-joint-memorandum-circular-no-2020-01

Department of Energy. 2020. Department Circular No. 2020-10-0022 "Prescribing the Policies to Enhance the Net-Metering Program for Renewable Energy Systems". Manila. https://www.doe.gov.ph/laws-and-issuances/department-circular-no-dc2020-10-0022

Development Bank of the Philippines. 2021. Energy Efficiency Savings (E2SAVE) Financing Program. Manila. https://www.dbp.ph/developmental-banking/environment-initiatives/energy-efficiency-savings-e2save-financing-program/

Energypedia. 2018. After Sales Service for Solar Systems. https://energypedia.info/wiki/After_Sales_Service_for_Solar_Systems

Energy Regulatory Commission. 2005. Distribution Services and Open Access Rules. Manila. https://www.doe.gov.ph/sites/default/files/pdf/downloads/dsoar.pdf

Energy Regulatory Commission. 2013. ERC Resolution No. 09 Series of 2013 "Net-Metering Interconnection Standards". Manila. http://www.erc.gov.ph/Files/Render/issuance/511

Energy Regulatory Commission. 2014. ERC Resolution No. 16 Series of 2014 is the "Resolution Adopting the 2014 Revised Rules for the Issuance of Certificates of Compliance (COCs) for Generation Companies, Qualified End-Users and Entities with Self-generation Facilities." Manila. https://www.erc.gov.ph/Files/Render/issuance/6276

Energy Regulatory Commission. 2019. ERC Resolution No. 06 Series of 2019 "A Resolution Adopting to the Amendments to the Rules Enabling the Net Metering Program for Renewable Energy". Manila. https://www.erc.gov.ph/Files/Render/issuance/29981

Energy Regulatory Commission. 2020. ERC Resolution No. 05 Series of 2020 "A Resolution Clarifying the ERC Resolution No. 6 Series of 2019 entitled A Resolution Adopting to the Amendments to the Rules Enabling the Net Metering Program for Renewable Energy". Manila. https://erc.gov.ph/Files/Render/issuance/30414

Energy Sage, LLC. 2020. Evaluating solar panel quality. https://news.energysage.com/how-to-choose-the-best-solar-panel-for-you/

Energy Sage. 2020. How to choose a solar installer. https://www.energysage.com/solar/decision-guide/how-to-choose-a-solar-installer/

How to Select a Right Grid Tie String Inverter? January 2020. www. Inverter.com

Generation Solar. Inverter Warranties. 2020. https://www.generationsolar.com/inverters/inverter-warranties/

GIZ. 2013. Net Metering Reference Guide: How to avail solar roof tops and other renewables below 100 KW in the Philippines. Manila. https://www.doe.gov.ph/sites/default/files/pdf/netmeter/net-metering-reference-guide-philippines-E.pdf

Institute for Energy Economics and Financial Analysis. 2018. Unlocking Rooftop Solar in the Philippines. Manila. https://ieefa.org/wp-content/uploads/2018/08/IEEFA_Unlocking-Rooftop-Solar-in-the-Philippines_August-2018.pdf

Inverter.com. 2020. How to Select a Right Grid Tie String Inverter? https://www.inverter.com/how-to-select-a-right-grid-tie-string-inverter

National Building Code Development Office. 2016. NBCDO Memorandum Circular No. 03, Series of 2016. Manila. https://www.dpwh.gov.ph/DPWH/files/NBCDO%20MC/16-NBCDO%20MC/NBCDO%20MC_03_s2016.pdf

NREL/USAID/HNEI. 2020. Technical Input for the Philippines: Net-Metering Standards and Guidelines for PV practitioners (First Draft).

Pacudan, Romeo. 2018. The Economics of Net Metering Policy in the Philippines. International Energy Journal. 18. 283-296. https://www.researchgate.net/publication/327752572_The_Economics_of_Net_Metering_Policy_in_the_Philippines

Solaric. 2019. WHAT IS THE BEST TYPE OF ROOF FOR SOLAR PANELS? https://solaric.com.ph/blog/best-roof-solar-panels/

Solterra Energy Corporation. 2019. Monocrystalline vs. Polycrystalline Solar Panels. September 2019. https://www.solterra.ph/topics/solar-panels/mono-vs-poly-panels/

Taraba, Michal & Adamec, Juraj & Danko, Matus & Drgona, Peter & Urica, Tomas. 2019. Properties measurement of the thin film solar panels under adverse weather conditions. Transportation Research Procedia.

The World Bank. Global Solar Atlas. Washington D.C. https://globalsolaratlas.info/map?c=14.528887,121.069917,11&s=14.528887,121.069917&m=site&pv=small,180,14,1

Unbound Solar. 2020. How to size a Solar System: Step-by-Step. https://unboundsolar.com/blog/how-to-size-solar-system

BRPL Solar City Initiative. Benefits of Rooftop Solar. https://studylib.net/doc/25482449/benefits-of-rooftop-solar

Annex 1:
ERC Resolution No. 09
Series of 2013

Republic of the Philippines
ENERGY REGULATORY COMMISSION
San Miguel Avenue, Pasig City

RESOLUTION NO. 09, SERIES OF 2013

A RESOLUTION ADOPTING THE RULES ENABLING THE NET-METERING PROGRAM FOR RENEWABLE ENERGY

WHEREAS, it is the policy of the state to accelerate the exploration and development of renewable energy resources, increase its utilization and establish the necessary infrastructure and mechanisms;

WHEREAS, Section 10 of Republic Act No. 9513 (R.A. 9513), entitled "An Act Promoting the Development, Utilization and Commercialization of Renewable Energy Resources and for Other Purposes," and Section 7 of its Implementing Rules and Regulations (IRR) mandate the Energy Regulatory Commission (ERC), in consultation with the National Renewable Energy Board (NREB), to establish, within one (1) year from effectivity of the Act, the net-metering interconnection standards and pricing methodology and other commercial arrangements necessary to ensure the success of the net-metering for renewable energy program;

WHEREAS, Section 10 of R.A. 9513 further provides that the Department of Energy (DOE), ERC, National Transmission Corporation (TRANSCO) or its successors-in-interest, Distribution Utilities (DUs), Philippine Electricity Market Corporation (PEMC) and all relevant parties shall provide the mechanism for the physical connection and commercial arrangements necessary to ensure the success of the program, consistent with the Philippine Grid Code (PGC) and the Philippine Distribution Code (PDC);

WHEREAS, on April 12, 2012, the NREB transmitted to the ERC its proposed Rules Enabling the Net-Metering Program for Renewable Energy, and made a presentation thereon to the ERC on July 3, 2012;

WHEREAS, the proposed Rules already incorporate the proposed preliminary Pricing Methodology for Net-Metering, as well as the Net-Metering Interconnection Standards and Net Metering Agreement template;

WHEREAS, on August 28, 2012, the ERC approved the posting of the proposed Rules and set the deadline for the submission of comments on September 10, 2012 and the public consultation on September 21, 2012 at the ERC Head Office, Pacific Center Building, San Miguel Avenue, Ortigas Center, Pasig City;

WHEREAS, the following stakeholders submitted their comments on the proposed Rules, and were therefore considered as parties of record during the public consultation: (1) Cagayan Electric Power and Light Company, Inc. (CEPALCO); (2) Distribution Management Committee (DMC); (3) Enfinity Philippine Renewable Resources, Inc.; (4) Manila Electric Company (MERALCO); (5) Philippine Electricity Market Corporation (PEMC); (6) Philippine Sugar Millers Association (PSMA); (7) SMA (Inverter Manufacturer); and (8) Visayan Electric Company (VECO);

WHEREAS, the ERC-Technical Working Group for Renewable Energy and the NREB-Technical Working Group for Net-Metering conducted several coordination meetings/workshops with relevant stakeholders to clarify and discuss possible revisions to the proposed Rules;

WHEREAS, after careful consideration of the comments submitted by interested parties, the ERC deems it appropriate to adopt and implement the Rules Enabling the Net-Metering Program for Renewable Energy;

NOW THEREFORE, the ERC, after thorough and due deliberation, hereby **RESOLVES**, as it is hereby **RESOLVED**, to **APPROVE** and **ADOPT**, the **"Rules Enabling the Net-Metering Program for Renewable Energy"**, hereto attached as **Annex "A"** and made an integral part hereof.

This Resolution shall take effect fifteen (15) days after its publication in a newspaper of general circulation in the country.

Let copies of this Resolution be furnished the University of the Philippines Law Center – Office of the National Administrative Register (UPLC-ONAR) and all parties concerned.

Pasig City, 27 May 2013.

ZENAIDA G. CRUZ-DUCUT
Chairperson

MARIA TERESA A.R. CASTAÑEDA
Commissioner

JOSE C. REYES
Commissioner

ALFREDO J. NON
Commissioner

GLORIA VICTORIA C. YAP-TARUC
Commissioner

Annex A

RULES ENABLING THE NET-METERING PROGRAM FOR RENEWABLE ENERGY

ARTICLE I - GENERAL PROVISIONS

Section 1. Net-Metering for Renewable Energy. Subject to technical considerations and without discrimination, and upon request by distribution end-users, the Distribution Utilities (DUs) shall enter into net-metering agreements with qualified end-users who will be installing an RE system.

Section 2. Purpose. These Rules seek to:

a) Encourage end-users to participate in renewable electricity generation;

b) Enable data-gathering for the creation of a knowledge-based resource on net-metering, and enhance or accelerate viability of net-metering program and its successful integration to the grid; and

c) Allow local players to gain actual experience and the confidence in installing RE systems for net-metering application under local conditions.

Section 3. Applicability. These Rules shall be applicable to On-Grid Systems.

Section 4. Definition of Terms. As used in these Rules, the following terms shall have the following meaning:

(a) **Department of Energy (DOE)** refers to, as defined in Section 4(e) of Republic Act No. 9513, the government agency created pursuant to Republic Act No. 7638 whose functions are expanded in Republic Act No. 9136 and further expanded in Republic Act No. 9513.

(b) **Distributed Generation** refers to a system of small generation entities supplying directly to the distribution grid, any one of which shall not exceed one hundred kilowatts (100 kW) in capacity, as defined in Section 4(j) of Republic Act No. 9513.

(c) **Distribution System** refers to the system of wires and associated facilities belonging to a franchised distribution utility extending between the delivery points on the transmission or subtransmission system or generator connection and the point of connection to the premises of the end-user, as defined in Section 4(o) of Republic Act No. 9136.

(d) **Distribution Services and Open Access Rules (DSOAR)** refers to the Rules promulgated by the Energy Regulatory Commission under ERC Resolution No. 2, Series of 2010 including any subsequent amendments thereto, covering, among others, the terms and conditions for the connection of generating facilities to the Distribution System.

(e) **Distribution Utility (DU)** refers to any electric cooperative, private corporation, government-owned utility or existing local government unit which has an exclusive franchise to operate a Distribution System in accordance with its franchise and R.A. No. 9136, as defined in Section 4(l) of Republic Act No. 9513.

(f) **Energy Regulatory Commission (ERC)** refers to the independent quasi-judicial regulatory agency created pursuant to Republic Act No. 9136, as defined in Section 4(n) of Republic Act No. 9513.

(g) **End-User** refers to any person or entity requiring the supply and delivery of electricity for its own use, as defined in Section 4(t) of Republic Act No. 9136.

(h) **Export Energy** refers to the energy exported or delivered by the Qualified End-user to the Grid/Distribution System.

(i) **Import Energy** refers to the energy imported or received by the Qualified End-user from the Grid/Distribution System.

(j) **Metering Service Provider (MSP)** refers to a person or entity authorized by ERC to provide Metering Services. The DU shall be the sole metering service provider for the retail market until such time that the ERC determines the provision of metering services at the retail level as competitive.

(k) **National Power Corporation (NPC)** refers to the government corporation created under Republic Act No. 6395 as amended

by Republic Act No. 9136, as defined in Section 4(ee) of Republic Act No. 9513.

(l) **National Renewable Energy Board (NREB)** refers to the board created under Republic Act No. 9513 tasked under Section 10 thereof to recommend to ERC the establishment of net-metering interconnection standards, pricing methodology and other commercial arrangements necessary to ensure success of the net-metering for renewable energy program.

(m) **National Transmission Corporation (TRANSCO)** refers to the corporation created pursuant to Republic Act No. 9136 responsible for the planning, construction and centralized operation and maintenance of high voltage transmission facilities, including interconnection and ancillary services, as defined in Section 4(ff) of Republic Act No. 9513.

(n) **Net-Metering** refers to a system, appropriate for distributed generation, in which a distribution grid user has a two-way connection to the grid and is only charged or credited, as the case may be, the difference between its import energy and export energy.

(o) **Net-Metering Agreement** refers to the agreement between a Qualified End-User (QE) and the DU governing the commercial and interconnection arrangements between the DU and the QE.

(p) **Net-Metering Interconnection Standards** refers to the set of requirements and procedures to ensure safe, reliable and efficient connection of QE's RE system, and its operation thereof in parallel to the Distribution System.

(q) **On-Grid Systems** refers to electrical systems composed of interconnected transmission lines, distribution lines, substations and related facilities for the purpose of conveyance of bulk power on the grid of the Philippines, as defined in Section 4(kk) of Republic Act No. 9513.

(r) **Philippine Distribution Code (PDC)** refers to the set of Rules, requirements, procedures and standards governing DUs and Users of Distribution System in the operation, maintenance and development of the Distribution System. It also defines and establishes the relationship of the Distribution System with the facilities or installations of the parties connected thereto.

(s) **Philippine Electrical Code (PEC)** refers to the electrical safety Code that establishes basic materials quality and electrical work standards for the safe use of electricity for light, heat, power, communications, signaling, and for other purposes.

(t) **Philippine Electricity Market Corporation (PEMC)** refers to the Corporation incorporated upon the initiative of the DOE which administers and governs the operation of the Wholesale Electricity Spot Market (WESM).

(u) **Qualified End-Users (QE)** refers to entities that generate electric power from an eligible on-site RE generating facility, such as, but not limited to, house or office building with photovoltaic system that can be connected to the grid, for the purposes of entering into a Net-Metering agreement, as defined in Section 7 of the Implementing Rules and Regulations of R.A. 9513.

(v) **Renewable Energy (RE) Certificate** refers to a certificate issued by the RE Registrar to electric power industry participants showing the energy sourced, produced, and sold or used. RE Certificates may be traded in the RE Market in complying with the RPS, as defined in Section 3(tt) of the Implementing Rules and Regulations of R.A. 9513.

(w) **Renewable Energy Market (REM)** refers to the market where the trading of RE Certificates equivalent to an amount of power generated from RE Resources is made, as defined in Section 4(qq) of Republic Act No. 9513.

(x) **Renewable Energy Resources (RE Resources)** refers to energy resources that do not have an upper limit on the total quantity to be used. Such resources are renewable on a regular basis, and whose renewal rate is relatively rapid to consider availability over an indefinite period of time. These include, among others, biomass, solar, wind, geothermal, ocean energy, and hydropower conforming with internationally accepted norms and standards on dams, and other emerging renewable energy technologies, as defined in Section 4(uu) of Republic Act No. 9513.

(y) **Renewable Portfolio Standards (RPS)** refers to a market-based policy that requires electric power industry participants,

including suppliers, to source a portion of their energy supply from eligible RE Resources, as defined in Section 4(ss) of Republic Act No. 9513.

(z) **Renewable Energy Systems (RE Systems)** refers to energy systems which convert RE resources into useful energy forms, like electrical, mechanical, etc., as defined in Section 4(vv) of Republic Act No. 9513.

(aa) **Wholesale Electricity Spot Market (WESM)** refers to the wholesale electricity spot market created pursuant to Republic Act No. 9136, as defined in Section 4(eee) of Republic Act No. 9513.

ARTICLE II - QUALIFICATIONS AND ELIGIBILITY

Section 5. Qualifications. All end-users who are in good credit standing in the payment of their electric bills to the DU are qualified to participate in the Net-Metering program for Renewable Energy.

Section 6. Eligible RE Technologies. RE Systems such as wind, solar, biomass or biogas energy systems or such other RE Systems capable of being installed within the QE's premises are eligible to participate in the net-metering program.

ARTICLE III – INTERCONNECTION STANDARDS

Section 7. Mandated Entities. As provided in Section 10 of Republic Act No. 9513, the DOE, ERC, TransCo or its successor-in-interest, DUs, PEMC and all relevant parties are mandated to provide mechanisms for the physical connection and commercial arrangements necessary to ensure the success of net-metering for renewable energy program, consistent with the Grid and Distribution Codes.

The DUs and the QEs shall, upon request, grant ERC, DOE and NREB free access to all data generated by net-metering to enable the creation of a knowledge-based resource on net-metering, and enhance or accelerate viability of the net-metering program and successful integration to the grid.

Section 8. Compliance Standards. The RE System to be installed within the QE's premises must be compliant with the standards set by

Philippine Electrical Code (PEC), Philippine Distribution Code (PDC), Distribution Service Open Access Rules (DSOAR) and the Net-Metering Interconnection Standards (See Annex "A-1").

Section 9. Interconnection Set-Up. The RE system shall be embedded in the QE's premises and shall be equipped with appropriate metering equipment. The DU shall install two uni-directional meters, one for import and one for export, or a single bi-directional meter, whichever is more economical on a case-to-case basis. The DU may, at any time, also install a third meter in proximity to the RE System to measure the total RE generated.

Section 10. DU Inspection. The QE shall allow the DU to enter the QE's premises to inspect, test, maintain and operate the protective devices and read or test the meters and other facilities. The DU may also disconnect the interconnection facilities if it reasonably believes a hazardous condition exists and such immediate action is necessary to protect persons, or the DU's facilities or property of others, damage or interference caused by the QE's facilities, or lack of properly operating protective devices; provided, that prior notice is given of the intent to disconnect, and the QE is given at least three (3) days within which to remedy the hazardous condition.

ARTICLE IV – COMMERCIAL ARRANGEMENTS

Section 11. Net-Metering Agreement. Subject to technical considerations and without discrimination and upon request by a QE, the DU shall enter into a Net-Metering Agreement with the requesting QE (See Annex "A-2"). Thereafter, the DU shall furnish the executed Net-Metering Agreement to ERC, DOE and NREB, within five (5) days from its execution. The executed Net-Metering Agreement shall be deemed approved and effective upon submission thereof to ERC.

Section 12. Pricing Methodology. The ERC, in consultation with the NREB and the electric power industry participants, shall establish in a subsequent issuance a pricing methodology applicable to net-metering. Meantime, the DU's monthly generation charge, which is based on its blended generation cost, shall be used as the preliminary reference price in net-metering agreements. In case of DUs with special programs, the applicable preliminary reference price shall be the generation charge it imposes on its regular captive market, which is based on its blended generation cost excluding other generation adjustments.

Section 13. Cost Recovery of Net-Metering Agreements. The cost of RE exported to the DU system and purchased by the DU under net-metering agreements shall automatically be included in the DU's total generation cost to be recovered from all DU customers as part of the adjusted generation rate pursuant to Section 2, Article 2 of ERC Resolution No. 19, Series of 2009.

Section 14. Net-Metering Charge - The DUs shall impose a net-metering charge to all customers who avail of the Net-Metering program equivalent to their existing ERC-approved Php/customer/month supply and metering rates; plus the existing ERC-approved Php/kilowatthour metering rate based on the export energy to the Distribution System as registered in the export meter. This Net-Metering Charge shall cover the incremental costs related to system enhancement and additional meter reading and other operating costs.

The DUs may file with the ERC their applications for approval of different Net-Metering Charges for Net-Metering customers in accordance with Section 4 (e), Rule 3 of the IRR of the EPIRA, and Rule 6 of the ERC Rules of Practice and Procedure. Meantime, the Net-Metering Charges as provided above shall be effective until a different charge is approved by the ERC, upon application by the DUs.

Section 15. Billing Charges. The net amount payable by or creditable to the QE shall be obtained by subtracting from the subtotal amount for import energy, the following: (a) the subtotal peso amount for export energy, and (b) the peso amount credited in the previous month, if any. If the resulting peso amount is positive, QE shall pay this positive peso amount to the DU. If the resulting peso amount is negative, the DU shall credit the negative peso amount to the QE's electric bill in the immediately succeeding billing period.

Section 16. RE Certificate. The DU shall be entitled to any RE Certificate resulting from Net-Metering arrangements with the QE who is using an RE Resource to provide energy. Such RE Certificate shall be based on gross generation and shall be credited in compliance of the DU's obligations under the RPS.

Section 17. Final Provisions

17.1. Exception Clause. Where good cause appears, the ERC may allow an exemption from any provision of these Rules, if such is

found to be in the public interest and is not contrary to law or any other related rules and regulations.

17.2. Separability Clause. If any provision of these Rules is declared invalid or unconstitutional by a court of competent jurisdiction, those provisions which are not affected thereby shall continue to be in full force and effect.

17.3. Repealing. All prior rules and guidelines or portion thereof, issued by the ERC that are inconsistent with these Rules are hereby repealed or modified accordingly.

17.4. Effectivity. These Rules shall take effect within fifteen (15) days following its complete publication in a newspaper of general circulation.

Pasig City, 27 May 2013.

ZENAIDA G. CRUZ-DUCUT
Chairperson

MARIA TERESA A.R. CASTAÑEDA
Commissioner

JOSE C. REYES
Commissioner

ALFREDO J. NON
Commissioner

GLORIA VICTORIA C. YAP-TARUC
Commissioner

ANNEX "A-1"

NET-METERING INTERCONNECTION STANDARDS

TABLE OF CONTENTS

1. OVERVIEW

These guidelines set forth the Net-Metering Interconnection Standards for Qualified End-users (QE) who enter into Net-metering Agreements with on-grid Distribution Utilities (DUs).

2. SCOPE AND PURPOSES

These guidelines cover distributed generation, which is connected to and operates in synchronism with the on-grid DUs, and apply to single-phase or three-phase generation with a maximum capacity of 100 kW.

These guidelines establish the rules and standards for the interconnection of RE generating facilities to the DU's Distribution System. They provide technical guidance to address engineering, electric system reliability, and safety concerns for net-metering interconnections.

3. DEFINITIONS

The following terms shall be understood to have the following meanings when used in these guidelines.

3.1. **Commissioning Test** refers to a test conducted when the equipment is installed to verify correct operation.

3.2. **Connection Point** refers to the point of connection of the QE System or Equipment to the Distribution System.

3.3. **Distributed Generation** refers to a system of small generation entities supplying directly to the distribution grid, any one of which shall not exceed one hundred kilowatts (100 kW) in capacity, as defined in Section 4(j) of Republic Act No. 9513.

3.4. **Distribution Asset Study (DAS)** refers to a study to determine all distribution assets and costs necessary to accommodate a proposed net-metering interconnection.

3.5. **Distribution Impact Study (DIS)** refers to a set of technical studies which are used to assess the possible effects of a proposed expansion, reinforcement, or modification of the

Distribution System or a User Development and to evaluate Significant Incidents.

3.6. **Distribution Services and Open Access Rules (DSOAR)** refers to the Rules promulgated by the Energy Regulatory Commission under ERC Resolution No. 2, Series of 2010 including any subsequent amendments thereto, covering, among others, the terms and conditions for the connection of generating facilities to the Distribution System.

3.7. **Distribution System** refers to the system of wires and associated facilities belonging to a franchised distribution utility extending between the delivery points on the transmission or subtransmission system or generator connection and the point of connection to the premises of the end-user, as defined in Section 4(o) of Republic Act No. 9136.

3.8. **Distribution Utility (DU)** refers to any electric cooperative, private corporation, government-owned utility or existing local government unit which has an exclusive franchise to operate a Distribution System in accordance with its franchise and R.A. No. 9136, as defined in Section 4(l) of Republic Act No. 9513.

3.9. **Energy Regulatory Commission (ERC)** refers to the independent quasi-judicial regulatory agency created pursuant to Republic Act No. 9136, as defined in Section 4(n) of Republic Act No. 9513.

3.10. **Interconnection** refers to the result of the process of adding a RE facility to the Distribution System.

3.11. **Island** refers to a condition in which a portion of the DU's distribution network is energized solely by one or more RE facilities.

3.12. **Metering Service Provider (MSP)** refers to a person or entity authorized by ERC to provide Metering Services. The DU shall be the sole metering service provider for the retail market until such time that the ERC determines the provision of metering services at the retail level as competitive.

3.13. **Net-Metering** refers to a system, appropriate for distributed generation, in which a distribution grid user has a two-way connection to the grid and is only charged or credited, as the

case may be, the difference between its import energy and export energy.

3.14. **Net-Metering Agreement** refers to the agreement between a QE and the DU governing the commercial and inter-connection arrangements between the DU and the QE (See Annex "A-2").

3.15. **Parallel Operation** refers to the operation of an RE facility with or without an exporting capacity while connected to DU's Distribution System.

3.16. **Philippine Distribution Code (PDC)** refers to the set of Rules, requirements, procedures and standards governing DUs and Users of Distribution System in the operation, maintenance and development of the Distribution System. It also defines and establishes the relationship of the Distribution System with the facilities or installations of the parties connected thereto.

3.17. **Philippine Electrical Code (PEC)** refers to the electrical safety Code that establishes basic materials quality and electrical work standards for the safe use of electricity for light, heat, power, communications, signaling, and for other purposes.

3.18. **Qualified End-user (QE)** refers to entities that generate electric power from an eligible on-site RE generating facility, such as, but not limited to, house or office building with photovoltaic system that can be connected to the grid, for the purposes of entering into a Net-Metering agreement, as defined in Section 7 of the Implementing Rules and Regulations of R.A. 9513.

3.19. **Reclosing** refers to the automatic return of power lines to service following their disconnection for fault conditions.

3.20. **Renewable Energy (RE) Certificate** refers to a certificate issued by the RE Registrar to electric power industry participants showing the energy sourced, produced, and sold or used. RE Certificates may be traded in the RE Market in complying with the RPS, as defined in Section 3(tt) of the Implementing Rules and Regulations of R.A. 9513.

3.21. **Renewable Energy Facility (RE facility)** refers to the generator(s) and/or inverter(s) together with all protective, safety, and associated equipment located on the QE's side

of the Connection 'Point which the QE requests to interconnect to the DU's Distribution System.

3.22. **Renewable Energy Resources (RE Resources)** refers to energy resources that do not have an upper limit on the total quantity to be used. Such resources are renewable on a regular basis, and whose renewal rate is relatively rapid to consider availability over an indefinite period of time. These include, among others, biomass, solar, wind, geothermal, ocean energy, and hydropower conforming with internationally-accepted norms and standards on dams, and other emerging renewable energy technologies, as defined in Section 4(uu) of Republic Act No. 9513.

3.23. **Standard Planning Data** refers to the general data required by the distribution utility as part of the application for a net-metering interconnection.

3.24. **Synchronization** refers to the process of attaining the state when connected Generating Units and/or interconnected AC Systems operate at the same Frequency and where the phase angle displacements between their voltages vary about a stable operating point.

4. GENERAL GUIDELINES

4.1. A QE who intends to operate in parallel with the DU's Distribution System shall, in consultation with the DU, design, install, operate, and maintain all necessary equipment on its property for interconnection, unless otherwise stated in the Net-metering Agreement.

4.2. The requirements in these guidelines shall be met at the Connection Point, although the devices used to meet these requirements can be located elsewhere.

4.3. The DU shall only allow interconnection of RE facilities with a maximum capacity of 100 kW to the DU's Distribution System per QE account.

4.4. The DU shall conduct inspections and witness calibration and testing of the QE's lines, wires, and switches and shall remove the QE's generation from the Distribution System at any time due to maintenance, test, repair, and emergency condition or safety concerns related to the DU.

4.5. All specifications and detailed plans for the installation of the communication, control and protective devices shall be of the DU's standards.

4.6. The QE shall inform and seek the approval of the DU prior to the execution of any changes or modifications in the RE facility or to the connection point and shall be liable for any costs and/or damages incurred by the DU as a result thereof.

4.7. The RE facility shall conform to the latest revision of the PEC, PDC, DSOAR, other local codes, and the Terms and Conditions of Service and Standard Rules and Regulations as approved by the ERC.

5. APPLICATION FOR INTERCONNECTION

5.1. Upon written request, the DU shall provide information and documents (such as the *pro forma* agreements and the application, technical requirements, specifications, listing of certified equipment, application fee information, applicable rate schedules and metering requirements) in response to a QE's inquiry. All such information shall be sent to the QE as agreed upon by the DU and the QE.

5.2. The application form shall include the following information:

- A description of the proposed connection or modification to an existing connection to the Distribution System;
- The relevant Standard Planning Data as specified in Section 6.4 of the PDC, and other data as required by the DU; and
- The completion date of the proposed interconnection.

5.3. The QE shall complete and file an application and any possible Detailed Planning Data as specified in Section 6.5 of the PDC. The filing must include the completed application and a fee (if required) for processing the application.

5.4. Within ten (10) business days upon receiving the application, the DU shall acknowledge its receipt and state whether or not the application is complete.

5.5. Once an application is accepted by the DU as complete, the DU shall determine on a non-discriminatory basis whether or not a specific DIS and/or DAS are necessary in accordance with the DSOAR.

5.6. Upon completion of the study, the DU shall provide the applicant with the results of the study, including any additional interim agreements, such as construction agreements that may be necessary and a cost estimate to complete the interconnection.

5.7. Prior to signing of the Net-metering Agreement, the DU, together with the QE, shall inspect the RE facility onsite and check its conformance to the technical requirements in the Net-metering Agreement and of these guidelines. Any non-conformance shall be corrected first before the Net-metering Agreement is signed and the RE facility is connected and energized.

5.8. The DU and QE, taking into consideration the agreed target completion date, shall use their reasonable endeavors, in coordination with each other, to complete their respective connection arrangements as agreed in the Net-metering Agreement.

6. SYSTEM PARAMETERS

Any RE facility causing interference, problems, or any unacceptable parameters to the DU's Distribution System shall be disconnected from the Distribution System and shall remain disconnected until the condition has been corrected. If the cause of the problem is the RE facility, all costs associated with determining and correcting the problem shall be at the QE's expense.

6.1. Voltage Level

The QE shall operate its facility to maintain the same voltage level as the DU's Distribution System at the Connection Point. The QE must provide an automatic method of disconnecting its facility from the Distribution System within DU's limits as stated in Table 1.

Table 1 – Minimum Time Requirements for RE to Remain Connected at Different Voltage Ranges

Voltage Range (% of Base Voltage)	Time (s)
V<30	0.15
V=30	0.6
30<V≤90	Linear interpolation between 0.60 second at 30% of base voltage and 3.0 seconds at 90% base voltage
90<V ≤110	Continuous Operation
110<V<120	1.00
V≥120	0.16

6.2. Frequency

All RE facility shall operate at a frequency of 60 Hz. The QE shall provide automatic disconnecting means from the DU's Distribution System within the time prescribed in Table 2.

Table 2 - Minimum Time Requirements for RE to Remain Connected at Different Frequency Ranges

Frequency Range (Hz)	Time
F > 62.4	Automatic disconnection allowed, if so decided by the VRE operator.
61.8 < F ≤ 62.4	5 minutes
58.2 ≤ F ≤ 61.8	Continuous Operation
57.6 ≤ F < 58.2	60 minutes
F < 57.6	5 seconds

6.3. Power Quality

6.3.1. Limitation of DC Injection

The RE facility and its interconnecting system shall not inject DC current greater than 0.5% of the full load rated output current at the Connection Point.

6.3.2. Flicker Severity

The flicker severity at the Connection Point shall not exceed 1.0 unit for short term and 0.8 units for long

term as specified in Section 3.2.6 of the PDC, or any amendments thereto.

6.3.3. **Harmonics**

The harmonic content of the voltage and current waveforms in the DU's Distribution System shall be restricted to levels that will not cause interference or equipment-operating problems. The harmonics shall be within the limits defined in Section 3.2.4 of the PDC or any amendments thereto.

6.4. **Power Factor**

The QE shall maintain a power factor of not less than 85% lagging measured at the Connection Point. Failure to maintain the power factor within this range may result in rate penalties and/or discontinuation of interconnection with the DU's Distribution System.

7. SYSTEM PROTECTION

The QE shall be responsible for providing adequate protection for its facility under any operating conditions, and regardless of whether or not the interconnected generation is in operation. Conditions include, but are not limited to, single phasing of supply, system faults, equipment failures, abnormal voltage or frequency, lightning and switching surges, excessive harmonic voltages, excessive negative sequence voltages and islanding.

7.1. **Synchronization**

The QE shall provide synchronizing devices for synchronizing the RE facility to the DU's Distribution System. Automatic synchronization devices shall be installed to monitor and control the synchronism, frequency, power factor and the voltage level of the RE facility. The DU shall review, approve, and inspect the method of synchronization. Automatic synchronizing settings shall not be changed following installation unless mutually agreed by both parties. Typical limits for synchronizing parameters are given in Table 3.

Table 3 - Typical Synchronizing Parameter Limits

Aggregate Rating of RE Resource (kW)	Maximum Frequency Difference Δ f (Hz)	Maximum Voltage Difference Δ V (%)	Maximum Phase Angle Difference Δ Φ (Degrees)
≤ 100	0.3	10	20

7.2. Islanding

To prevent islanding, in which the RE facility energizes a portion of the DU's Distribution System through the Connection Point, the QE's interconnection system should detect islanding and should disconnect from the Distribution System within two seconds from the formation of an island. The QE shall provide facilities against islanding to isolate and block the RE facility from closing back into the Distribution System until the system is energized for several minutes from the normal utility source.

7.3. Integration with DU's Distribution System Grounding

The grounding scheme of the QE shall not cause over voltages that exceed the rating of the equipment connected to the DU's Distribution System and shall not disrupt the coordination of the ground fault protection on the Distribution System. All electrical systems and equipment shall be grounded in accordance with the requirements of the PEC.

7.4. Protective and Control Devices

The QE's protection system shall coordinate with the DU's protection system. The QE shall submit proposed fused types or relay settings to the DU for review and acceptance. Any subsequent relay changes shall also be submitted to the DU.

7.4.1. Disconnect Device

The QE shall provide a visible disconnect device for use by the DU to electrically isolate the DU's Distribution System from the RE facility and to establish working clearances for maintenance, safety and system considerations. The disconnect device shall be physically located for ease of access by the DU personnel located within 10 feet from the

Connection Point. If this is not practical, the disconnect device should be located between the RE facility and the Connection Point. The type of disconnect device must allow for visual indication of the contact's position and the handle must be lockable in the open position with a padlock. It shall be readily accessible at all times by the DU personnel.

Labels, markings and warning signs shall be applied near the Connection Point to alert DU personnel of an RE facility installed within the QE's premises.

7.4.2. Protective Relays

Protective relays shall be installed to trip the corresponding circuit breaker during abnormal conditions. Protective relays for a given RE Resource rating typically include, but are not limited to, the lists shown in Tables 4, 5 and 6.

Table 4 - Interconnection Protective Function Requirements for Induction Generators

Device #	Protective Equipment	Generator Size	
		≤ 20 kW	>20 kW - 100 kW
27	Under-voltage Relay	x	x
27 GEN	Voltage Check Relay	x	x
59	Over-voltage Relay		x
81/O, 81/U	Over/Under Frequency Relay		x

Table 5 - Interconnection Protective Function Requirements for Synchronous Generators

Device #	Protective Equipment	Generator Size		
		≤ 8 kW	>8 - 20kW	>20 - 100 kW
25	Synchronism-Check Relay	x	x	x
27	Under-voltage Relay	x	x	x
51V	Over-current Relay, Voltage Restrained			x
59	Over-voltage Relay		x	x
81/O, 81/U	Over/Under frequency Relay		x	x

Table 6 - Interconnection Protective Function Requirements for Inverters

Device #	Protective Equipment	Inverter Size
		≤ 100 kW
27	Under-voltage Relay	x
59	Over-voltage Relay	x
81/O, 81/U	Over/Under Frequency Relay	x

7.5. **Reclosing**

The RE facility should immediately disconnect from the Distribution System when the system is down. For a Distribution System with automatic reclosing, the RE facility should wait for 2 minutes until the recloser has normalized the portion of the system to which the RE facility is connected before synchronizing back to the system.

8. OPERATIONS & MAINTENANCE

8.1. A QE's RE facility shall be capable of operating in parallel with the DU's Distribution System at the point of interconnection.

8.2. The QE must inform the DU's System Operator if it is going to synchronize to or isolate from the DU system.

8.3. In the event there is no power from the DU, the RE facility should automatically disconnect from the DU's system.

8.4. The QE shall provide the DU the contact number of the person who is responsible for the operation of the RE facility.

8.5. The QE shall also maintain the RE facility and interconnection facilities in a safe manner as approved by the DU and in conformity with all applicable laws, rules and regulations.

9. METERING

9.1. An RE facility used for Net-Metering shall be equipped with metering equipment that can measure the flow of electricity in both directions at the same rate, through the use of either two uni-directional meters, one for import and one for export,

or single bi-directional meter, whichever is more economical on a case-to-case basis.

9.2. A generation check meter may be installed in proximity to the RE facility (at low voltage side) to record all energy production of the RE facility for purposes of issuance of RE Certificate, which the DU can use to comply with its RPS obligations.

9.3. The Metering Service Provider (MSP) shall own and shall be responsible for the design, provision, installation, operation, maintenance, testing and sealing of the meter and associated metering equipment in accordance with Section 2.11 of the DSOAR.

9.4. The QE shall provide the required space and the associated civil works for the location of the metering facilities.

9.5. Metering facilities shall be installed in a clean place free of vibration and where it will be easily accessible and visible for reading and testing by both the DU and the QE. The applicable provisions of the DSOAR and Magna Carta for Residential Electricity Consumers shall apply.

10. TESTING AND COMMISSIONING

The DU shall have the right to witness the testing and commissioning upon completion of construction and shall have a copy of the test data. The commissioning test shall be conducted after the interconnection system is installed and is ready for operation. Commissioning test shall include the following:

- Verification and inspections
- Production test
    - Response to abnormal voltage
    - Response to abnormal frequency
    - Synchronization
- Unintentional islanding functionality test
- Cease-to-energize functionality test

The RE facility shall be equipped with whatever equipment is required to perform this test. The DU shall not be responsible for verifying any control or signal wiring not directly related to the interconnection protection.

Prior to final approval by the DU or any time thereafter, the DU reserves the right to test the relaying and control related to the protection of the DU's Distribution System.

11. BIBLIOGRAPHY

Republic Act No. 9513. Renewable Energy Act of 2008.

Philippine Electrical Code (PEC) Part I. Institute of Integrated Electrical Engineers of the Philippines, Inc., 2000.

Philippine Electrical Code (PEC) Part II. Institute of Integrated Electrical Engineers of the Philippines, Inc., 2008.

Philippine Distribution Code (PDC). Energy Regulatory Commission, December 2001.

Distribution Services and Open Access Rules (DSOAR). Energy Regulatory Commission, January 2006.

IEEE Std. 519-1992 - IEEE Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems. Institute of Electrical and Electronics Engineers, Inc., 1992.

IEEE Std. 929-2000 - IEEE Recommended Practice for Utility Interface of Photovoltaic (PV) Systems. Institute of Electrical and Electronics Engineers, Inc., 2000.

IEEE Std. 1547 – 2003 (R2008), IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems. Institute of Electrical and Electronics Engineers, Inc., 2008.

IEEE Std. 1547.1 – 2005, IEEE Standard Conformance Test Procedures for Equipment interconnecting Distributed Resources with Electric Power Systems. Institute of Electrical and Electronics Engineers, Inc., 2005.

IEEE Std. 1547.2 – 2007, IEEE Application Guide for IEEE Std. 1547, IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems. Institute of Electrical and Electronics Engineers, Inc., 2007.

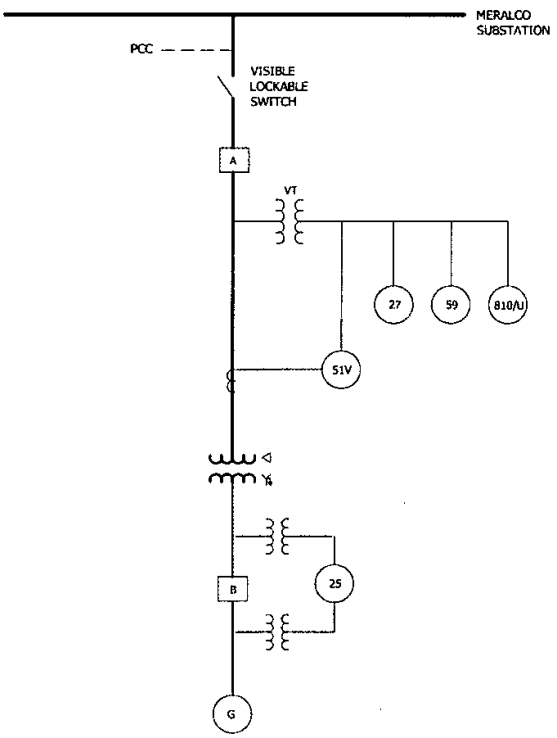
The NRECA Guide to IEEE 1547, Application Guide for Distributed Generation Interconnection. National Rural Electric Cooperative Association, March 2006.

Relay and Control Requirements for Parallel Operation of Generation. PPL, Electric Utilities Corp., Inc., March 2003.

IREC Model Interconnection Standards and Procedures for Small Generator Facilities. Interstate Renewable Energy Council MR-I 2005

12. APPENDIX

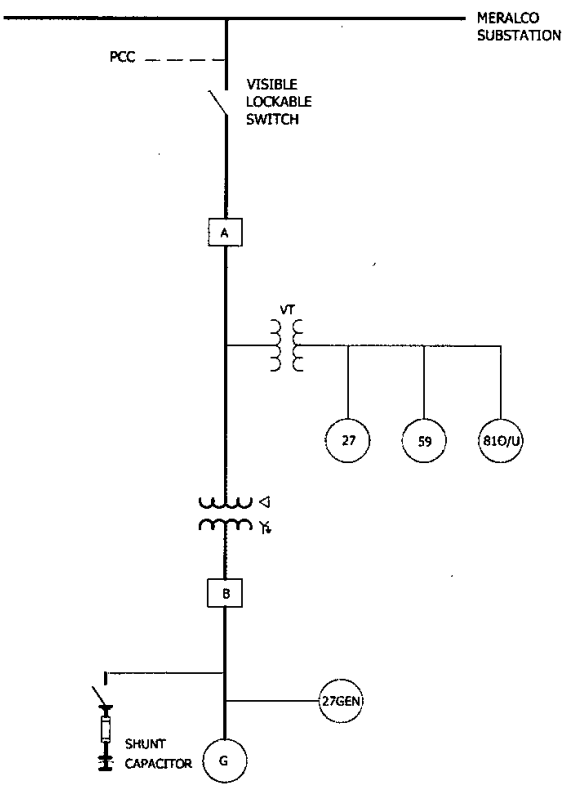
Appendix A - Typical Single-Line Diagram for the Protection of Synchronous Generator



LEGEND:

25	SYNCHRONISM CHECK RELAY
27	UNDERVOLTAGE RELAY
51V	OVERCURRENT RELAY, VOLTAGE RESTRAINED
59	OVERVOLTAGE RELAY
81O/U	OVER/UNDER FREQUENCY RELAY
PCC	POINT OF COMMON COUPLING

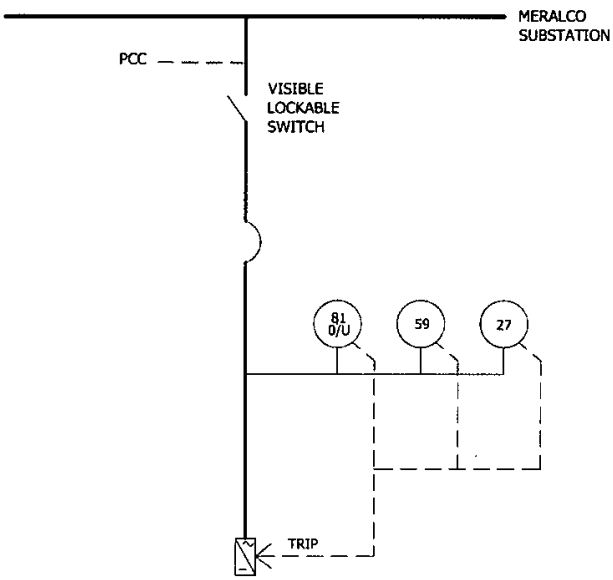
Appendix B - Typical Single-Line Diagram for the Protection of Induction Generator



LEGEND:

27	UNDERVOLTAGE RELAY
27GEN	VOLTAGE CHECK RELAY
59	OVERVOLTAGE RELAY
81O/U	OVER/UNDER FREQUENCY RELAY
PCC	POINT OF COMMON COUPLING

Appendix C - Typical Single-Line Diagram for the Protection of Inverter



LEGEND:

27	UNDERVOLTAGE
59	OVERVOLTAGE
81O/U	OVER/UNDER FREQUENCY
PCC	POINT OF COMMON COUPLING

Annex A-2

NET-METERING AGREEMENT

This **Net-metering Agreement** is entered into by and between:

[ ], of legal age, single/married, with postal address at [ ], hereinafter referred to as the Qualified End-User (QE);

-and-

[ ], an electric distribution utility duly organized and existing under Philippine law, with principal office address at [ ], franchised to construct, own, operate and maintain an electric distribution facility in the city/municipalities/barangays of [ ], all in the Province of [ ], represented herein by its President/General Manager [ ], hereinafter referred to as the DU;

WITNESSETH THAT:

WHEREAS, QE intends to install within its premises for purposes of net-metering a Renewable Energy (RE) facility, more particularly described as follows:

Technology Type: _____
Rated Capacity: _____
Location: _____

WHEREAS, DU has pre-qualified QE to be eligible to participate in the net-metering program;

NOW, THEREFORE, the parties enter into this net-metering agreement under the following terms and conditions:

Section 1. Compliance Standards. - The RE System to be installed within the QE's premises must be compliant with the standards set by Philippine Electrical Code (PEC), Philippine Distribution Code (PDC),

Distribution Service Open Access Rules (DSOAR) and the Net-Metering Interconnection Standards.

Section 2. Interconnection Set-Up. - The RE facility shall be embedded in the QE's premises and shall be equipped with appropriate metering equipment.

a. The DU shall install, own, operate and maintain two uni-directional meters, one for import and one for export, or single bi-directional meter, whichever is more economical on a case-to-case basis.

b. The DU may, at any time, also install a third meter in proximity to the RE System to measure the total RE generated.

A complete and more detailed plans and specifications of the interconnection set-up and facilities are attached as an integral of this net-metering agreement.

Section 3. DU Inspection. - The QE shall allow the DU to enter the QE's premises to inspect, test, maintain and operate the protective devices and read or test the meters and other facilities. The DU may also disconnect the interconnection facilities if it reasonably believes a hazardous condition exists and such immediate action is necessary to protect persons, or the DU's facilities or property of others, against damage or interference caused by the QE's facilities, or lack of properly operating protective devices; provided, that prior notice is given of the intent to disconnect, and the QE is given at least three (3) days within which to remedy the hazardous condition.

Section 4. Meter Readings. - The DU shall be the Metering Service Provider and shall conduct the meter reading of the import and export meters every ____ day of the month for billing purposes. The DU shall immediately leave a copy of the results of its meter readings at the QE's premises, in accordance with Section 2.11.2 of the Distribution Services and Open Access Rules (DSOAR).

Section 5. Pricing of Exported Renewable Energy. – The DU's blended generation cost shall be used as the price of the renewable energy exported by the QE's RE facility to the DU's distribution system. The DU's blended generation cost shall be computed in accordance with the methodology prescribed in the Rules Enabling the Net-Metering for Renewable Energy issued by the Energy Regulatory Commission (ERC).

In the event that the ERC approves a pricing methodology applicable to net-metering, such pricing methodology shall automatically substitute as the price of renewable energy exported by the QE to the distribution system.

Section 6. Net-Metering Charge - The DUs shall impose a net-metering charge to all customers who avail of the Net-Metering program equivalent to their existing ERC-approved Php/customer/month supply and metering rates; plus the existing ERC-approved Php/kilowatthour metering rate based on the export energy to the Distribution System as registered in the export meter. This Net-Metering Charge shall cover the DU's incremental costs related to system enhancement and additional meter reading and other operating costs.

The DUs may file with the ERC their applications for approval of different Net-Metering Charges for Net-Metering customers in accordance with Section 4 (e), Rule 3 of the Implementing Rules and Regulations of Republic Act No. 9136 and Rule 6 of the ERC Rules of Practice and Procedure. Meantime, the Net-Metering Charges as provided above shall be effective until a different charge is approved by the ERC, upon application by the DUs.

Section 7. Billing Charges. The net amount payable by or creditable to the QE shall be obtained by subtracting from the subtotal amount for import energy, the following: (a) the subtotal peso amount for export energy, and (b) the peso amount credited in the previous month, if any. If the resulting peso amount is positive, QE shall pay this positive peso amount to the DU. If the resulting peso amount is negative, the DU shall credit the negative peso amount to the QE's electric bill in the immediately succeeding billing period.

Section 8. Termination Date. – The agreement shall be co-terminus with the service contract of the QE with the DU under Customer Account No. [_____]. Either party may however pre-terminate this net-metering agreement for just cause.

Section 9. Dispute Resolution. – In case of dispute over the application of certain provisions of this agreement, the parties shall exert best efforts to resolve the dispute among themselves within thirty (30) days from when the dispute arose. If the dispute remains unresolved after the thirty (30) day period, either party may file a petition for dispute resolution with the Energy Regulatory Commission (ERC), who shall have original and exclusive jurisdiction over such

dispute.

While these are pending with the ERC, the status quo of cases involving violation of contract shall be maintained. The maintenance of the status quo shall only be applicable to the subject matter of the case and will not extend to any other right/s and obligation/s between the parties

IN WITNESS WHEREOF, the parties execute this Net-Metering Agreement this (date) at (place).

ABC Electric Company/Cooperative
(DU)

By:
President/General Manager

Juan Dela Cruz
Qualified End-User

Witnesses:

_____ _____

Acknowledgment

Republic of the Philippines)
) S.S.

BEFORE ME, this _____, the following persons appeared before me,

NAME	Identification Documents (TIN/Driver's License/SSS)	Date/Place of Issue

known to me to be same persons who personally appeared before me and acknowledged to me that the foregoing agreement is the result of the free act and deed and that of the corporation/cooperative which they represent.

Doc. No. _____;
Page No. _____;
Book No. _____;
Series of _____.

Annex 2:
ERC Resolution No. 06
Series of 2019

Republic of the Philippines
ENERGY REGULATORY COMMISSION
San Miguel Avenue, Pasig City

06
RESOLUTION NO. ____, SERIES OF 2019

A RESOLUTION ADOPTING THE AMENDMENTS TO THE RULES ENABLING THE NET-METERING PROGRAM FOR RENEWABLE ENERGY

WHEREAS, it is the policy of the state to accelerate the exploration and development of renewable energy resources, increase its utilization and establish the necessary infrastructure and mechanisms;

WHEREAS, Section 10 of Republic Act No. 9513 (R.A. 9513), entitled "An Act Promoting the Development, Utilization and Commercialization of Renewable Energy Resources and for Other Purposes," and Section 7 of its Implementing Rules and Regulations (IRR), mandate the Energy Regulatory Commission (ERC), in consultation with the National Renewable Energy Board (NREB), to establish, within one (1) year from effectivity of the Act, the net-metering interconnection standards and pricing methodology and other commercial arrangements necessary to ensure the success of the Net-Metering Program for renewable energy;

WHEREAS, Section 10 of R.A. 9513 further provides that the Department of Energy (DOE), the ERC, the National Transmission Corporation (TRANSCO) or its successors-in-interest, Distribution Utilities (DUs), the Philippine Electricity Market Corporation (PEMC) and all relevant parties shall provide the mechanism for the physical connection and commercial arrangements necessary to ensure the success of the Program, consistent with the Philippine Grid Code (PGC) and the Philippine Distribution Code (PDC);

WHEREAS, on 27 May 2013, the ERC issued Resolution No. 9, Series of 2013, A Resolution Adopting the Rules Enabling the Net-Metering Program. It was published in the Daily Tribune on 09 July 2013, and became effective on 24 July 2013.

WHEREAS, since its implementation, the following issues were raised:

1. Whether or not the lifeline rate should apply to Qualified End-Users;
2. Whether the mechanism of merely accumulating the credits of net exports on the customer bill is reasonable; and
3. Clarification on the effectivity of the Net-Metering Agreements;

WHEREAS, to address the above issues, the ERC, on 16 August 2016, posted on its website the proposed amendments to the Net-Metering Rules, setting the deadline for the submission of comments by 24 August 2016, and the Public Consultation on 31 August 2016;

WHEREAS, the ERC likewise engaged the services of the Asian Social Enterprise Incubator, Inc. (ASEI) in August 2016 to review the Pricing Methodology, given the fact that the existing Net Metering Rules provided for an interim pricing methodology;

WHEREAS, the ERC deemed it prudent to wait for the completion of the ASEI study and consider its findings and recommendations in finalizing the amendments to the Net Metering Rules.

WHEREAS, the ASEI submitted its final report on the pricing methodology in March 2017;

WHEREAS, on 8 February 2019, the Market Operations Service – Renewable Energy Division (MOS-RED) transmitted to the Commission its proposed amendments to the Rules Enabling the Net-Metering Program for Renewable Energy, the Net-Metering Interconnection Standards, and the Net Metering Agreement template;

WHEREAS, on 12 March 2019, the Commission approved for posting the proposed amended Rules, Interconnection Standards and Net Metering Agreement Template wherein it was stated that the deadline for the submission of comments was set on

12 April 2019, and that the public consultations will be held on 17 May 2019 at the ERC Head Office, Pacific Center Building, San Miguel Avenue, Ortigas Center, Pasig City; 23 May 2019 at the ERC Mindanao Field Office, Mintrade Bldg., Monteverde Ave. cor. Sales St. Davao City; and 24 May 2019 at the ERC Visayas Field Office, St. Mary's Drive, Banilad, Cebu City;

WHEREAS, the following stakeholders submitted their comments on the proposed Rules: (1) Bohol I Electric Cooperative, Inc. (BOHECO I); (2) Cebu I Electric Cooperative, Inc. (CEBECO I); (3) Davao City Power Consumers Action Network; (4) First Gen Corporation; (5) Institute for Climate and Sustainable Cities (ICSC); (6) Manila Electric Company (MERALCO); (7) Philippines Solar and Storage Energy Alliance (PSSEA); and (8) Visayan Electric Company (VECO);

WHEREAS, all the comments received by the Commission were considered vis-à-vis the ERC's overarching mandate of promoting consumer interest toward producing the amendments to the Rules Enabling the Net-Metering Program for Renewable Energy, including the following:

1. Annex A: Amended Rules Enabling the Net-Metering Program for Renewable Energy;
2. Annex A-1: Amended Net-Metering Interconnection Standards;
3. Annex A-2: Amended Net- Metering Agreement; and
4. Annex A-3: Net-Metering Reportorial Template;

(This space is intentionally left blank.)

NOW THEREFORE, the Commission, after thorough and due deliberation, hereby **RESOLVES**, as it is hereby **RESOLVED**, to **APPROVE** and **ADOPT**, the **"Amended Rules Enabling the Net-Metering Program for Renewable Energy"** including the **Net Metering Interconnection Standards, Net-Metering Agreement Template** and **Net-Metering Reportorial Template**, hereto attached as **Annex "A"** and made an integral part hereof.

This Resolution shall take effect fifteen (15) days after its publication in a newspaper of general circulation in the country.

Let copies of this Resolution be furnished the University of the Philippines Law Center – Office of the National Administrative Register (UPLC-ONAR) and all parties concerned.

Pasig City, 16 August 2019.

ERC
Office of the Chairperson
AVSTD-2019-10-570-0001

AGNES VST DEVANADERA
Chairperson and CEO

JOSEFINA PATRICIA A. MAGPALE-ASIRIT
Commissioner

ALEXIS M. LUMBATAN
Commissioner

CATHERINE P. MACEDA
Commissioner

PAUL CHRISTIAN M. CERVANTES
Commissioner

jmg/jgc/clb/som

Annex A

AMENDED RULES ENABLING THE NET-METERING PROGRAM FOR RENEWABLE ENERGY

ARTICLE I - GENERAL PROVISIONS

Section 1. Net-Metering for Renewable Energy. Subject to technical considerations and without discrimination, and upon request by distribution end-users, the Distribution Utilities (DUs) shall enter into Net-Metering agreements with qualified end-users who will be installing Renewable Energy (RE) system.

Section 2. Purpose. These Rules seek to:

a) Encourage end-users to participate in renewable electricity generation;

b) Enable data gathering for the creation of a knowledge-based resource on net-metering and enhance or accelerate viability of the net-metering program and its successful integration to the grid;

c) Facilitate, through the use of the data gathered, the conduct of efficient and cost effective energy planning;

d) Allow local players to gain actual experience in installing RE systems for net-metering application under local conditions; and

e) Simplify permitting procedures and reduce installation soft costs for renewable energy facilities.

Section 3. Applicability. These Rules shall be applicable to On-Grid RE Systems.

Section 4. Definition of Terms. As used in these Rules, the following terms shall have the following meaning:

(a) **Bi-directional Meter** refers to a meter capable of recording both import and export energy.

(b) **Department of Energy (DOE)** refers to, as defined in Section 4(e) of Republic Act No. 9513, the government agency created pursuant to Republic Act No. 7638 whose functions are expanded in Republic Act No. 9136 and further expanded in Republic Act No. 9513.

(c) **Distributed Generation** refers to a system of small generation entities supplying directly to the distribution grid, any one of which shall not exceed one hundred kilowatts (100

kW) in capacity, as defined in Section 4(j) of Republic Act No. 9513.

(d) **Distribution System** refers to the system of wires and associated facilities belonging to a franchised distribution utility extending between the delivery points on the transmission or sub-transmission system or generator connection and the point of connection to the premises of the end-user, as defined in Section 4(o) of Republic Act No. 9136.

(e) **Distribution Services and Open Access Rules (DSOAR)** refers to the Rules promulgated by the Energy Regulatory Commission under ERC Resolution No. 2, Series of 2010 including any subsequent amendment thereto, covering, among others, the terms and conditions for the connection of generating facilities to the Distribution System.

(f) **Distribution Utility (DU)** refers to any electric cooperative, private corporation, government-owned utility or existing local government unit which has an exclusive franchise to operate a Distribution System in accordance with its franchise and R.A. No. 9136, as defined in Section 4(l) of Republic Act No. 9513.

(g) **Energy Regulatory Commission (ERC)** refers to the independent quasi-judicial regulatory agency created pursuant to Republic Act No. 9136, as defined in Section 4(n) of Republic Act No. 9513.

(h) **End-User** refers to any person or entity requiring the supply and delivery of electricity for its own use, as defined in Section 4(t) of Republic Act No. 9136.

(i) **Export Energy** refers to the energy exported or delivered by the Qualified End-User to the Grid/Distribution System.

(j) **Import Energy** refers to the energy imported or received by the Qualified End-User from the Grid/Distribution System.

(k) **Lifeline Rate** refers to the subsidized rate given to low-income Captive Market End-users who cannot afford to pay at full cost as defined in Section 4(hh) of Republic Act No. 9136.

(l) **Lifeline Subsidy Rate** refers to the rate charged to non-lifeline customers to cover for the lifeline discount provided to marginalized/low income captive market end-users.

(m) **Metering Service Provider (MSP)** refers to a person or entity authorized by ERC to provide Metering Services as

defined in the Distribution Services and Open Access Rules (DSOAR)

(n) **National Power Corporation (NPC)** refers to the government corporation created under Republic Act No. 6395 as amended by Republic Act No. 9136, as defined in Section 4(ee) of Republic Act No. 9513.

(o) **National Renewable Energy Board (NREB)** refers to the board created under Republic Act No. 9513 tasked under Section 10 thereof to recommend to ERC the establishment of net-metering interconnection standards, pricing methodology and other commercial arrangements necessary to ensure success of the net-metering for renewable energy program.

(p) **National Transmission Corporation (TRANSCO)** refers to the corporation created pursuant to Republic Act No. 9136 responsible for the planning, construction and centralized operation and maintenance of high voltage transmission facilities, including interconnection and ancillary services, as defined in Section 4(ff) of Republic Act No. 9513.

(q) **Net-Metering** refers to a system, appropriate for distributed generation, in which a distribution grid user has a two-way connection to the grid and is only charged for his net electricity consumption and is credited for any overall contribution, as defined in Section 4 (gg) of R.A. 9513.

(r) **Net-Metering Agreement (NMA)** refers to the agreement between a Qualified End-User (QE) and the DU governing the commercial and interconnection arrangements between the DU and the QE.

(s) **Net-Metering Interconnection Standards** refers to the set of requirements and procedures to ensure safe, reliable and efficient connection of QE's RE system, and its operation thereof in parallel to the Distribution System.

(t) **Net-Metering Ready** refers to a building or housing units which have been installed with eligible RE system, as provided in Section 22 herein.

(u) **New Customer** refers to any person or entity that does not have any existing account with a particular DU.

(v) **New Housing Development** refers to a group of individual dwellings or apartment houses typically of similar design that are usually built and sold or leased by management.

(w) **On-Grid Systems** refer to electrical systems composed of interconnected transmission lines, distribution lines, substations and related facilities for the purpose of conveyance of bulk power on the grid of the Philippines, as defined in Section 4(kk) of Republic Act No. 9513.

(x) **Philippine Distribution Code (PDC)** refers to the set of Rules, requirements, procedures and standards governing DUs and Users of Distribution System in the operation, maintenance and development of the Distribution System. It also defines and establishes the relationship of the Distribution System with the facilities or installations of the parties connected thereto.

(y) **Philippine Electrical Code (PEC)** refers to the electrical safety code that establishes basic materials quality and electrical work standards for the safe use of electricity for light, heat, power, communications, signaling, and for other purposes.

(z) **Philippine Electricity Market Corporation (PEMC)** refers to the corporation incorporated upon the initiative of the DOE, which administers and governs the operation of the Wholesale Electricity Spot Market (WESM).

(aa) **Qualified End-Users (QE)** refers to entities that generate electric power from an eligible on-site RE generating facility, such as, but not limited to, house or office building with photovoltaic system that can be connected to the grid, for the purposes of entering into a Net-Metering agreement, as defined in Section 7 of the Implementing Rules and Regulations of R.A. 9513.

(bb) **Renewable Energy (RE) Certificate** refers to a certificate issued by the RE Registrar to electric power industry participants showing the energy sourced, produced, and sold or used. RE Certificates may be traded in the RE Market in complying with the RPS, as defined in Section 3(tt) of the Implementing Rules and Regulations of R.A. 9513.

(cc) **Renewable Energy Certificate (REC) meter** refers to the kilowatt-hour meter that measures the gross electricity generation from eligible RE system with type approval from ERC.

(dd) **Renewable Energy Market (REM)** refers to the market where the trading of RE Certificates equivalent to an amount of power generated from RE Resources is made, as defined in Section 4(qq) of Republic Act No. 9513.

(ee) **Renewable Energy Resources (RE Resources)** refer to energy resources that do not have an upper limit on the total quantity to be used. Such resources are renewable on a regular basis, and whose renewal rate is relatively rapid to consider availability over an indefinite period of time. These include, among others, biomass, solar, wind, geothermal, ocean energy, and hydropower conforming with internationally accepted norms and standards on dams, and other emerging renewable energy technologies, as defined in Section 4(uu) of Republic Act No. 9513.

(ff) **Renewable Portfolio Standards (RPS)** refer to a market-based policy that requires electric power industry participants, including suppliers, to source a portion of their energy supply from eligible RE Resources, as defined in Section 4(ss) of Republic Act No. 9513.

(gg) **Renewable Energy Systems (RE Systems)** refer to energy systems which convert RE resources into useful energy forms, like electrical, mechanical, etc., as defined in Section 4(vv) of Republic Act No. 9513.

(hh) **Senior Citizen Subsidy Rate** refers to the rate charged to non-senior citizen customers to cover for the discount given to senior citizens pursuant to ERC Resolution 23, Series of 2010, "A Resolution Adopting the Rules Implementing the Discounts to Qualified Senior Citizen End-Users and Subsidy from the Subsidizing End-Users on Electricity Consumption under Sections 4 and 5 of Republic Act No. 9994."

ARTICLE II - QUALIFICATIONS AND ELIGIBILITY

Section 5. Qualifications. All end-users who are in good credit standing in the payment of their electric bills to the DU; and new customers are qualified to participate in the Net-Metering program for Renewable Energy.

Section 6. Eligible RE Technologies. RE Systems such as wind, solar, run-of river hydropower, biomass energy systems or such other RE Systems capable of being installed within the QE's premises, with or without battery, are eligible to participate in the Net-Metering program.

Section 7. Certificate of Compliance (COC). All QEs shall apply for a COC with the ERC in accordance with ERC Resolution No. 16, Series of 2014, "A Resolution Adopting the 2014 Revised Rules for the Issuance of Certificates of Compliance (COCs) for Generation

Companies, Qualified End-Users and Entities with Self-Generation Facilities," and any subsequent amendment thereto.

To simplify and facilitate the process, the DU shall assist the QE in their COC application. The DU shall receive and transmit to ERC all documents related to the application, including the Net Metering Agreement (NMA) entered into in accordance with Section 12 hereof, within five (5) days from its execution. The DU shall, thereafter, inform the applicant of the ERC's action.

ARTICLE III – INTERCONNECTION STANDARDS

Section 8. Mandated Entities. As provided in Section 10 of Republic Act No. 9513, the DOE, ERC, TransCo or its successor-in-interest, DUs, PEMC and all relevant parties are mandated to provide the mechanisms for the physical connection and commercial arrangements necessary to ensure the success of the net-metering for renewable energy program, consistent with the Philippine Grid and Distribution Codes.

The DUs and the QEs shall grant ERC, DOE and NREB free access to all data generated by net-metering to enable the creation of a knowledge-based resource on net-metering, and enhance or accelerate viability of the net-metering program and successful integration to the grid.

Section 9. Compliance Standards. The RE System to be installed within the QE's premises must be compliant with the standards set by the Philippine Electrical Code (PEC), Philippine Distribution Code (PDC), Distribution Service Open Access Rules (DSOAR) and the Net-Metering Interconnection Standards (See Annex "A-1").

Section 10. Interconnection Set-Up. The RE system shall be embedded in the QE's premises and shall be equipped with appropriate metering equipment. The DU shall furnish and install a bi-directional meter at the QE's premises, without prejudice to the DU's compliance with Section 34 of the "Rules to Govern the Implementation of Advanced Metering Infrastructure (AMI) by Distribution Utilities and Other ERC-Authorized Entities," promulgated on 18 May 2016, and other relevant Rules as may be promulgated by the Commission.

All bi-directional meters and its installation shall be at the expense of the QE, except in the case of new customers, and QEs with existing separate meters required to be replaced with a bi-directional meter under "Rules to Govern the Implementation of Advanced Metering

Infrastructure (AMI) by Distribution Utilities and other ERC - Authorized Entities," the cost thereof shall be on the account of the DU.

The DU shall also furnish and install, an REC meter in proximity to the RE System. This is to measure the total RE generated for compliance with the Renewable Portfolio Standards (RPS) and to measure the actual energy consumption for the determination of the following:

(a) non-exemption from payment of the lifeline subsidy rate;
(b) payment of senior citizen subsidy rate; and
(c) other relevant subsidies mandated by law.

The location of the above-mentioned meters shall be in accordance with Section 7.2.2 of the 2017 Philippine Distribution Code, and any subsequent amendment thereto.

Section 11. DU Inspection. The QE shall allow the DU to access the QE's RE system to inspect, test, maintain and operate the protective devices and read or test the meters and other facilities, provided that the QE was given a notice in writing at least three (3) days before the DU's intended date to enter the premises.

The DU, upon the same notice requirement as stated above, may limit the operation and/or disconnect, or require the disconnection of a QE's RE system from the DU's Distribution System under the following circumstances:

(a) Routine maintenance, repairs or modification of the DU's Distribution System;

(b) Upon determination by the DU that a QE's RE system is not compliant with the DSOAR and the PDC; and

(c) Upon termination of the Agreement.

However, in cases of emergency where the DU reasonably believes that a hazardous condition exists which may warrant such limiting of the operations and/or disconnection to ensure public safety, only a reasonable notice to the QE is required.

ARTICLE IV – COMMERCIAL ARRANGEMENTS

Section 12. Net-Metering Agreement. Subject to technical considerations and without discrimination, and upon request by a

QE, the DU shall enter into a Net-Metering Agreement (NMA) with the requesting QE using the ERC-approved template (See Annex "A-2"). Notwithstanding its transmittal to the ERC, as a requirement for the application of the COC, the DU shall likewise furnish the DOE and NREB with a copy of the executed NMA within the same period provided in Section 7 hereof. The executed NMA shall be deemed effective upon submission thereof to ERC; however, billing shall retroact from the time of successful testing and commissioning.

Should the DU deviate from the ERC-approved template, a separate approval from the ERC is necessary. Pending such approval, the ERC-approved template shall be used.

Any modification to an existing RE system shall require the QE to undergo the same process as that of a new customer.

Section 13. Pricing Methodology. The price of export electricity shall be the DU's monthly generation charge, which is based on its blended generation cost, excluding other generation adjustments.

Section 14. Non-Exemption. Unless otherwise provided under Section 17 of RA 9513 and except those who are qualified to avail of the Lifeline Rate and Senior Citizen Subsidy, all QEs shall still be required to pay the Lifeline Subsidy Rate, Senior Citizen Subsidy Rate and other relevant subsidies, based on the QE's actual energy consumption. Actual energy consumption shall include import energy and own-use.

Section 15. Entitlement to the Lifeline Rate. Consistent with Section 73 of the EPIRA and RA 10150, a QE may be entitled to the Lifeline Rate in the following instances:

(a) If its actual energy consumption falls within the threshold of the DU's Lifeline Program; or

(b) If its import energy falls within the threshold of the DU's Lifeline Program and the QE was able to provide any of the following documents:

i. Certification from the National Household Targeting System for Poverty Reduction (NHTS-PR) of the Department of Social Welfare and Development (DSWD) that the QE belongs to the Pantawid Pamilyang Pilipino Program (4Ps);

ii. A certified true copy of the License to Sell issued by the Housing and Land Use Regulatory Board (HLURB) to

the housing developer, and a copy of the contract between the housing developer and the homeowner indicating that the specific lot location is part of the socialized or economic housing development; Provided that the owner is the occupant of the socialized or economic housing unit; or

iii. Three consecutive billing statements showing that the QE was already enjoying the lifeline rate prior to entering into a Net Metering Agreement.

Should the QE consistently exceed the threshold of the DU's lifeline program for twelve (12) consecutive billing periods, the QE shall no longer be entitled to the lifeline rate under this exception.

Section 16. Cost Recovery of Net-Metering Agreements. The cost of RE exported to the DU system and purchased by the DU under the NMA shall automatically be included in the DU's total generation cost to be recovered from all DU customers as part of the adjusted generation rate pursuant to Section 2, Article 2 of ERC Resolution No. 16, Series of 2009, including any subsequent amendment thereto.

Section 17. Conduct of Distribution Impact Study (DIS). The DU shall determine, in a non-discriminatory basis, whether a specific DIS is necessary, to ensure the reliability and safety of the interconnection of the RE system and the Distribution System. There will be no additional charges that will be imposed on the QE for the conduct of the DIS.

Section 18. Billing Charges. The net amount payable by or creditable to the QE shall be obtained by subtracting from the subtotal amount for import energy, the following: (a) the subtotal peso amount for export energy, and (b) the peso amount credited in the previous month, if any. If the resulting peso amount is positive, the QE shall pay this positive peso amount to the DU. If the resulting peso amount is negative, the DU shall credit the negative peso amount to the QE's electric bill in the immediately succeeding billing period.

Section 19. RE Certificate. The DU shall be entitled to an RE Certificate resulting from Net-Metering arrangements with the QE who is using an RE Resource to provide energy. Such RE Certificate

shall be based on gross generation and shall be credited as compliance of the DU's obligations under the RPS.

Section 20. Processing Timeline. All DUs shall complete the whole interconnection process within twenty (20) working days from the receipt of the letter of interest, provided all necessary permits and licenses from various concerned agencies are secured and completed.

Section 21. Reporting. All DUs shall submit a Net-Metering implementation report to the ERC, including the processing timelines of the Net-Metering applications using the ERC-provided reportorial template (See Annex "A-3"). For the first two (2) years of the implementation of this Amended Net-Metering Rules, reports shall be filed semi-annually, not later than January 31st and July 31st of each year, and annually, not later than March 31st of each year.

ARTICLE V - NEW HOUSING DEVELOPMENTS

Section 22. One time conduct of DIS. For New Housing Developments - Upon receipt of the letter of interest from the developer of a Net-Metering-ready housing development, the DU shall conduct a DIS in accordance with Section 16 of this rules, provided that all the necessary documents and permits from the different concerned agencies have been submitted.

Section 23. Application. The individual homeowners in housing developments, as provided in Section 22, shall undergo the same application process as in any other QE.

ARTICLE VI – PENALTIES AND OTHER PROVISIONS

Section 24. Penalties.

Failure or unjust refusal of the DU to undertake or implement Net Metering shall be subject to the penalties and other impositions as provided for under Rule 12 Section 36 (a)(2) of the Rules and Regulation Implementing Republic Act No. 9513.

Violation of any provision of these Rules shall also be subject to the imposition of fines and penalties in accordance with the "Guidelines to Govern the Imposition of Administrative Sanctions in the Form of Fines and Penalties Pursuant to Section 46 of the Act"

promulgated by the ERC on May 17, 2002, as amended by Resolution No. 03, Series of 2009, entitled "Resolution Amending the Guidelines to Govern the Imposition of Administrative Sanctions in the Form of Fines and Penalties Pursuant to Section 46 of Republic Act No. 9136", dated February 23, 2009, including any subsequent amendments thereto.

Section 25. Miscellaneous Provisions

25.1. Exception. Where good cause appears, the ERC may allow an exemption from any provision of these Rules, if such is found to be in the public interest and is not contrary to law or any other related rules and regulations.

25.2. Separability. If any provision of these Rules is declared invalid or unconstitutional by a court of competent jurisdiction, those provisions which are not affected thereby shall continue to be in full force and effect.

25.3. Repealing. All prior rules and guidelines or portion thereof issued by the ERC in relation to net metering that are inconsistent with these Rules are hereby repealed or modified accordingly.

25.4. Effectivity. These Rules shall take effect within fifteen (15) days following its complete publication in a newspaper of general circulation or in the Official Gazette.

Pasig City, 16 August 2019.

ERC
Office of the Chairperson
AVSTD-2019-10-570-0001

AGNES VST DEVANADERA
Chairperson and CEO

JOSEFINA PATRICIA A. MAGPALE-ASIRIT
Commissioner

ALEXIS M. LUMBATAN
Commissioner

CATHERINE P. MACEDA
Commissioner

PAUL CHRISTIAN M. CERVANTES
Commissioner

ANNEX "A-1"

AMENDED NET-METERING INTERCONNECTION STANDARDS

TABLE OF CONTENTS

1. OVERVIEW

The Net-Metering Interconnection Standards for Qualified End-users sets forth the standards that Qualified End-users (QE) should adhere to prior to entering into Net-Metering Agreements (NMAs) with on-grid Distribution Utilities (DUs).

2. SCOPE AND PURPOSES

The Net-Metering Interconnection Standards for Qualified End-users provide for the rules and standards for the interconnection of QEs' Renewable Energy (RE) generating facilities to the DU's Distribution System, and apply to single-phase or three-phase generation with a maximum capacity of 100 kW. They provide technical guidance to address engineering, electric system reliability, and safety concerns for this type of interconnection.

3. DEFINITIONS

The following terms shall be understood to have the following meanings when used in these guidelines:

3.1 Commissioning Test refers to a test conducted when the equipment is installed to verify correct operation.

3.2 Connection Point refers to the point of connection of the QE System or Equipment to the Distribution System.

3.3 Distributed Generation refers to a system of small generation entities supplying directly to the distribution grid, any one of which shall not exceed one hundred kilowatts (100kW) in capacity, as defined in Section 4(j) of Republic Act No. 9513.

3.4 Distribution Asset Study (DAS) refers to a study to determine all distribution assets and costs necessary to accommodate a proposed net-metering interconnection.

3.5 Distribution Impact Study (DIS) refers to a set of technical studies which are used to assess the possible effects of a proposed expansion, reinforcement, or modification of the Distribution System or a User Development and to evaluate Significant Incidents.

3.6 Distribution Services and Open Access Rules (DSOAR) refers to the rules promulgated by the Energy Regulatory Commission under ERC Resolution No. 2, Series of 2010 including

any subsequent amendment thereto, covering, among others, the terms and conditions for the connection of generating facilities to the Distribution System.

3.7 **Distribution System** refers to the system of wires and associated facilities belonging to a franchised distribution utility extending between the delivery points on the transmission or sub-transmission system or generator connection and the point of connection to the premises of the end-user, as defined in Section 4(o) of Republic Act No. 9136.

3.8 **Distribution Utility (DU)** refers to any electric cooperative, private corporation, government-owned utility or existing local government unit which has an exclusive franchise to operate a Distribution System in accordance with its franchise and R.A. No. 9136, as defined in Section 4(l) of Republic Act No. 9513.

3.9 **Energy Regulatory Commission (ERC)** refers to the independent quasi-judicial regulatory agency created pursuant to Republic Act No. 9136, as defined in Section 4(n) of Republic Act No. 9513.

3.10 **Flicker** refers to the impression of unsteadiness of visual sensation induced by a light stimulus whose luminance or spectral distribution fluctuates with time.

3.11 **Grounding** refers to a conducting connection by which an electrical circuit or equipment is connected to earth or to some conducting body of relatively large extent that serves as ground.

3.12 **Harmonics** refers to sinusoidal voltages and currents having frequencies that are integral multiples of the fundamental frequency.

3.13 **Interconnection** refers to the result of the process of adding an RE system to the Distribution System.

3.14 **Island** refers to a condition in which a portion of the DU's distribution network is energized solely by one or more RE systems.

3.15 **Metering Service Provider (MSP)** refers to a person or entity authorized by ERC to provide Metering Services. The DU shall be the sole metering service provider for the retail market until such time that the ERC determines the provision of metering services at the retail level as competitive.

3.16 Net-Metering refers to a system, appropriate for distributed generation, in which a distribution grid user has a two-way connection to the grid and is only charged for his net electricity consumption and is credited for any overall contribution, as defined in Section 4 (gg) of R.A. 9513.

3.17 Net-Metering Agreement refers to the agreement between a QE and the DU governing their commercial and inter-connection arrangements between the DU and the QE (See Annex "A-2").

3.18 Parallel Operation refers to the operation of an RE system with or without an exporting capacity while connected to the DU's Distribution System.

3.19 Philippine Distribution Code (PDC) refers to the set of rules, requirements, procedures and standards governing DUs and Users of Distribution System in the operation, maintenance and development of the Distribution System. It also defines and establishes the relationship of the Distribution System with the facilities or installations of the parties connected thereto.

3.20 Philippine Electrical Code (PEC) refers to the electrical safety code that establishes basic materials quality and electrical work standards for the safe use of electricity for light, heat, power, communications, signaling, and for other purposes.

3.21 Qualified End-user (QE) refers to entities that generate electric power from an eligible on-site RE generating facility, such as, but not limited to, house or office building with photovoltaic system that can be connected to the grid, for the purposes of entering into a Net-Metering agreement, as defined in Section 7 of the Implementing Rules and Regulations of R.A. 9513.

3.22 Reclosing refers to the automatic return of power lines to service following their disconnection for fault conditions.

3.23 Renewable Energy (RE) Certificate refers to a certificate issued by the RE Registrar to the electric power industry participants showing the energy sourced, produced, and sold or used. RE Certificates may be traded in the RE Market in complying with the RPS, as defined in Section 3(tt) of the Implementing Rules and Regulations of R.A. 9513.

3.24 Renewable Energy Facility (RE system) refers to the generator(s) and/or inverter(s) together with all protective, safety, and associated equipment, located on the QE's side of the

condition or other safety concerns related to it, subject to the notice requirement as provided under the Amended Net Metering Rules.

4.6 All specifications and detailed plans for the installation of the communication, control and protective devices shall be of the DU's standards.

4.7 The QE shall inform the DU prior to the execution of any changes or modifications in the RE system or to the connection point consistent with Section 12 of the Amended Net Metering Rules. The QE shall be liable for any costs and/or damages incurred by the DU as a result of any changes or modifications in the RE system or to the connection point without the latter's approval.

4.8 Unless otherwise provided under this Guidelines, the RE system shall conform to the latest version of the PEC, PDC, DSOAR, other local codes, the Terms and Conditions of Service and Standard Rules and Regulations as approved by the ERC, and any subsequent amendment thereto.

5. APPLICATION FOR INTERCONNECTION

5.1 Upon written request, the DU shall immediately provide information and documents (such as the *pro forma* agreements and the application, technical requirements, specifications, listing of certified equipment, application fee information, applicable rate schedules and metering requirements) in response to a QE's inquiry. All such information shall be sent to the QE as agreed upon by the DU and the QE.

5.2 The application form shall include the following information:

- A description of the proposed connection or modification to an existing connection to the Distribution System;
- The relevant Standard Planning Data as specified in Section 5.4 of the PDC;
- RE systems shall pass at the very least, the following Type Tests:
    - Harmonic Test
    - Flicker Test
    - DC injection Test
    - Protection Tests
        - Over-frequency

condition or other safety concerns related to it, subject to the notice requirement as provided under the Amended Net Metering Rules.

4.6 All specifications and detailed plans for the installation of the communication, control and protective devices shall be of the DU's standards.

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- The relevant Standard Planning Data as specified in Section 5.4 of the PDC;
- RE systems shall pass at the very least, the following Type Tests:
    - Harmonic Test
    - Flicker Test
    - DC injection Test
    - Protection Tests
        - Over-frequency

        - Under-frequency
        - Over and Under Voltage
        - Anti-islanding
    - Fault Level Contribution Test
    - Self-Monitoring Test and other data as required by the DU.

- The completion date of the proposed interconnection.

- Certificate of Compliance requirements as provided in Resolution No. 16, Series of 2014, "A Resolution Adopting the 2014 Revised Rules for the Issuance of Certificates of Compliance (COCs) for Generation Companies, Qualified End-Users and Entities with Self-Generation Facilities".

5.3 The QE shall complete and file an application and any possible Detailed Planning Data as specified in Section 5.5 of the PDC. The filing must include the completed application and a fee (if required) for processing the application.

5.4 Upon receiving the application, the DU shall immediately acknowledge its receipt and state whether or not the application is complete.

5.5 Once an application is accepted by the DU as complete, the DU shall determine, in a non-discriminatory basis, whether a specific DIS is necessary in accordance with the DSOAR.

5.6 Upon completion of the study, the DU shall provide the applicant with the results of the study, including any additional interim agreements, such as construction agreements that may be necessary and a cost estimate to complete the interconnection.

5.7 Prior to the signing of the Net-Metering Agreement, the DU, together with the QE, shall inspect the RE system onsite and check its conformance to the technical requirements in the Net-Metering Agreement and of these guidelines. Any non-conformance shall be corrected first before the Net-metering Agreement is signed, and the RE system is connected and energized.

5.8 The DU and QE, taking into consideration the agreed target completion date, shall use their reasonable endeavors, in coordination with each other, to complete their respective connection arrangements as agreed in the Net-metering Agreement.

6. SYSTEM PARAMETERS

Any RE system causing interference, problems, or any unacceptable parameters to the DU's Distribution System shall be disconnected by the DU from the Distribution System and shall remain disconnected until the condition has been corrected, provided that reasonable notice is given on the intent to disconnect, and the QE is given at least three (3) days within which to remedy the hazardous condition. If the cause of the problem is the RE system, all costs associated with determining and correcting the problem shall be at the QE's expense.

6.1 Voltage Level

The QE shall operate its facility, maintaining the same voltage level as the DU's Distribution System at the Connection Point. The QE must provide an automatic method of disconnecting its facility from the Distribution System within the DU's limits as stated in Table 1.

Table 1 – Minimum Time Requirements for RE to Remain Connected at Different Voltage Ranges

RE System	
Voltage Range (% of Base Voltage)	**Time (s)**
V<50	0.16
50≤V<90	2.00
90<V ≤110	Normal Operating Range
110<V<120	1.00
V≥120	0.16

6.2 Frequency

All RE systems shall operate at a frequency of 60 Hz. The QE shall provide automatic disconnection means from the DU's Distribution System within the time prescribed in Table 2.

Table 2 - Minimum Time Requirements for RE to Remain Connected at Different Frequency Ranges

RE System	
Frequency Range (Hz)	**Time**
F > 62.4	Automatic disconnection
61.8 < F ≤ 62.4	5 minutes

58.2 ≤ F ≤ 61.8	Continuous Operation
57.6 ≤ F < 58.2	5 minutes
F < 57.6	5 seconds

6.3 Power Quality

6.3.1 Limitation of Direct Current (DC) Injection

The RE system and its interconnecting system shall not inject DC greater than 0.5% of the full load rated output current at the Connection Point.

6.3.2 Flicker Severity

The flicker severity at the Connection Point shall not exceed 1.0 unit for short term and 0.8 units for long term as specified in Section 3.2.6 of the PDC, or any subsequent amendments thereto.

6.3.3 Harmonics

The harmonic content of the voltage and current waveforms in the DU's Distribution System shall be restricted to levels that will not cause interference or equipment-operating problems. The harmonics shall be within the limits defined in Section 3.2.4 of the PDC or any subsequent amendment thereto.

6.4 Power Factor

The QE shall maintain a power factor of not less than 85% lagging, measured at the Connection Point. Failure to maintain the power factor within this range may result in rate penalties and/or discontinuation of interconnection with the DU's Distribution System.

7. SYSTEM PROTECTION

The QE shall be responsible for providing adequate protection for its system under any operating condition, and regardless of whether or not the interconnected generation is in operation. Conditions include, but are not limited to, single phasing of supply, system faults, equipment failures, abnormal voltage or frequency, lightning and switching surges, excessive harmonic voltages, excessive negative sequence voltages and islanding.

7.1 Synchronization

The QE shall provide synchronizing devices for synchronizing the RE system to the DU's Distribution System. Automatic synchronization devices shall be installed to monitor and control the synchronism, frequency, power factor and the voltage level of the RE system. The DU shall review, approve, and inspect the method of synchronization. Automatic synchronizing settings shall not be changed following installation unless mutually agreed by both parties. Typical limits for synchronizing parameters are given in Table 3.

Table 3 - Typical Synchronizing Parameter Limits

Aggregate Rating of RE Resource (kW)	Maximum Frequency Difference Δ f (Hz)	Maximum Voltage Difference Δ V (%)	Maximum Phase Angle Difference Δ Φ (Degrees)
≤ 100	0.3	10	20

7.2 Islanding

In case the QE's interconnection system detects islanding, the QE shall disconnect from the Distribution System within two (2) seconds. The QE shall provide systems against islanding to isolate and block the RE system from closing back into the Distribution System until the system is energized for at least ten (10) minutes from a normal utility source.

7.3 Integration with DU's Distribution System Grounding

The grounding scheme of the QE shall not cause over voltages that exceed the rating of the equipment connected to the DU's Distribution System and shall not disrupt the coordination of the ground fault protection on the Distribution System. All electrical systems and equipment shall be grounded in accordance with the requirements of the PEC.

7.4 Protective and Control Devices

The QE's protection system shall coordinate with the DU's protection system. The QE shall submit proposed fused types or relay settings to the DU for review and acceptance. Any subsequent relay changes shall also be submitted to the DU.

7.4.1 Disconnect Device

The QE shall provide a visible disconnect device to be used by the DU to electrically isolate the DU's Distribution System from the RE system and to establish working clearances for maintenance, safety and system considerations. The disconnect device shall be physically located within 10 feet from the Connection Point for ease of access by the DU personnel. If this is not practical, the disconnect device should be located between the RE system and the Connection Point. The type of disconnect device must allow for visual indication of the contact's position and the handle must be lockable in the open position with a padlock. Only the DU personnel and the QE will have access to the disconnect device.

The RE system installed within the QE's premises must be properly labeled and marked at the Connection Point to guide the DU personnel.

7.4.2 Protective Relays

Protective relays shall be installed to trip the corresponding circuit breaker during abnormal conditions. Protective relays for a given RE Resource rating typically include, but are not limited to, the lists shown in Tables 4, 5 and 6.

Table 4 - Interconnection Protective Function Requirements for Induction Generators

Device #	Protective Equipment	RE System Size	
		≤ 10 kW	>10 kW - 100 kW
27	Under Voltage Relay	x	x
27 GEN	Voltage Check Relay	x	x
59	Overvoltage Relay		x
81/O - 81/U	Over-Under Frequency Relay		x
	Anti-Islanding Relay (phase shift or RoCoF)	x	x

Table 5 - Interconnection Protective Function Requirements for Synchronous Generators

Device #	Protective Equipment	RE System Size	
		≤10 kW	>10 kW - 100 kW
25	Synchronism-Check	x	x

	Relay		
27	Under Voltage Relay	x	x
51V	Over current Relay, Voltage Restrained		x
59	Over-voltage Relay		x
81/O - 81/U	Over/Under frequency Relay	x	x
	Anti-Islanding Relay (phase shift or RoCoF)	x	x

Table 6 - Interconnection Protective Function Requirements for Inverters

Device #	Protective Equipment	RE System Size	
		≤10kW	≤ 100 kW
27	Under-voltage Relay	x	x
59	Over-voltage Relay	x	x
81/O – 81/U	Over/Under Frequency Relay	x	x
	Anti-Islanding Relay (phase shift or RoCoF)	x	x

7.5 Reclosing

The RE system should immediately disconnect from the Distribution System when the system is down. For a Distribution System with automatic reclosing, the RE recloser should wait for two (2) minutes from the time the DU recloser has normalized the portion of the system to which the RE system is connected before synchronizing back to the system.

8. OPERATIONS & MAINTENANCE

8.1 A QE's RE system shall be capable of operating in parallel with the DU's Distribution System at the point of interconnection.

8.2 The QE must inform the DU's System Operator if it is going to synchronize to or isolate from the DU system.

8.3 In the event there is no power from the DU, the RE system should automatically disconnect from the DU's system.

8.4 The QE shall provide the DU the contact number of the person who is responsible for the operation of the RE system.

8.5 The QE shall also maintain the RE system and interconnection facilities in a safe manner as approved by the DU and in conformity with all applicable laws, rules and regulations.

9. METERING

9.1 The RE system used for Net-Metering shall be equipped with metering equipment that can measure the flow of electricity in both directions at the same rate, through the use of a single bi-directional meter.

9.2 A Renewable Energy Certificate (REC) meter shall be installed in accordance with Section 7.2.2 of the 2017 Philippine Distribution Code to record all energy production of the RE system for purposes of issuance of REC, which the DU can use to comply with its RPS obligations. This is also to measure the actual consumption for the determination of non-exemption from paying the of the Lifeline Subsidy Rate, Senior Citizen Subsidy Rate and such other subsidies that may be relevant.

9.3 The Metering Service Provider (MSP) shall own and shall be responsible for the design, provision, installation, operation, maintenance, testing and sealing of the meter and associated metering equipment in accordance with Section 2.11 of the DSOAR.

9.4 The QE shall provide the required space and the associated civil works for the location of the metering facilities.

9.5 Metering facilities shall be installed in a clean place free of vibration and where it will be easily accessible and visible for reading and testing by both the DU and the QE. The applicable provisions of the DSOAR and Magna Carta for Residential Electricity Consumers shall apply.

10. TESTING AND COMMISSIONING

The DU shall have the right to witness the testing and commissioning upon completion of construction, and shall have a copy of the test data. The commissioning test shall be conducted after the interconnection system is installed and is ready for operation. Commissioning test shall include the following:

- Verification and inspections
- Reactive Power Test;
- Protection Tests;
- Reconnection Timing test (Blocking Test); and
- Synchronization Test

The DU and the RE system shall be equipped with whatever equipment is required to perform these tests. The DU shall not be responsible for verifying any control or signal wiring not directly related to the interconnection protection.

The DU reserves the right to test the relaying and control related to the protection of the DU's Distribution System.

11. BIBLIOGRAPHY

Republic Act No. 9513. Renewable Energy Act of 2008.

Philippine Electrical Code (PEC) Part I. Institute of Integrated Electrical Engineers of the Philippines, Inc., 2000.

Philippine Electrical Code (PEC) Part II. Institute of Integrated Electrical Engineers of the Philippines, Inc., 2008.

Philippine Distribution Code (PDC). Energy Regulatory Commission, December 2017.

Distribution Services and Open Access Rules (DSOAR). Energy Regulatory Commission, January 2006.

IEEE Std. 519-1992 - IEEE Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems. Institute of Electrical and Electronics Engineers, Inc., 1992.

IEEE Std. 929-2000 - IEEE Recommended Practice for Utility Interface of Photovoltaic (PV) Systems. Institute of Electrical and Electronics Engineers, Inc., 2000.

IEEE Std. 1547 – 2003 (R2008), IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems. Institute of Electrical and Electronics Engineers, Inc., 2008.

IEEE Std. 1547.1 – 2005, IEEE Standard Conformance Test Procedures for Equipment interconnecting Distributed Resources with Electric Power Systems. Institute of Electrical and Electronics Engineers, Inc., 2005.

IEEE Std. 1547.2 – 2007, IEEE Application Guide for IEEE Std. 1547, IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems. Institute of Electrical and Electronics Engineers, Inc., 2007.

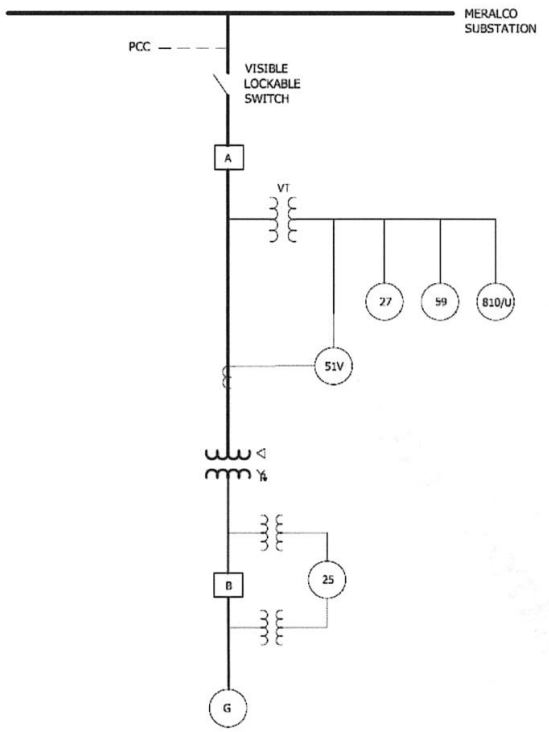
The NRECA Guide to IEEE 1547, Application Guide for Distributed Generation Interconnection. National Rural Electric Cooperative Association, March 2006.

Relay and Control Requirements for Parallel Operation of Generation. PPL, Electric Utilities Corp., Inc., March 2003.

IREC Model Interconnection Standards and Procedures for Small Generator Facilities. Interstate Renewable Energy Council MR-I 2005

12. APPENDIX

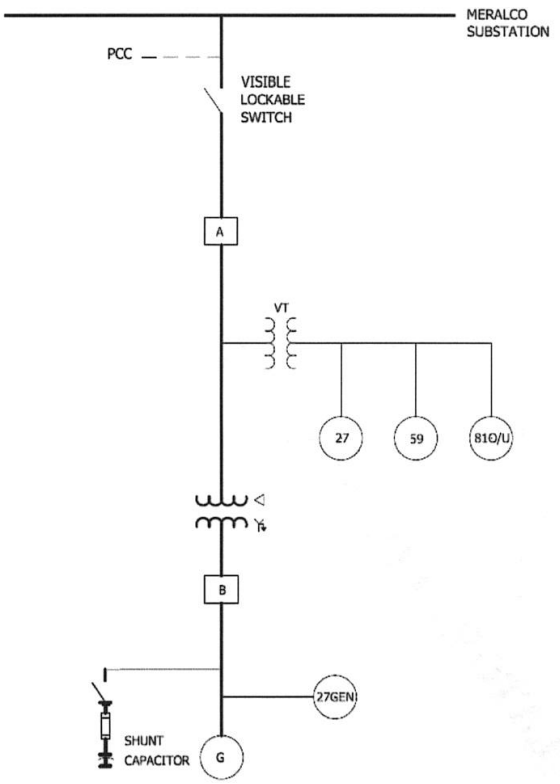
Appendix A - Typical Single-Line Diagram for the Protection of Synchronous Generator



LEGEND:

25	SYNCHRONISM CHECK RELAY
27	UNDERVOLTAGE RELAY
51V	OVERCURRENT RELAY, VOLTAGE RESTRAINED
59	OVERVOLTAGE RELAY
81O/U	OVER/UNDER FREQUENCY RELAY
PCC	POINT OF COMMON COUPLING

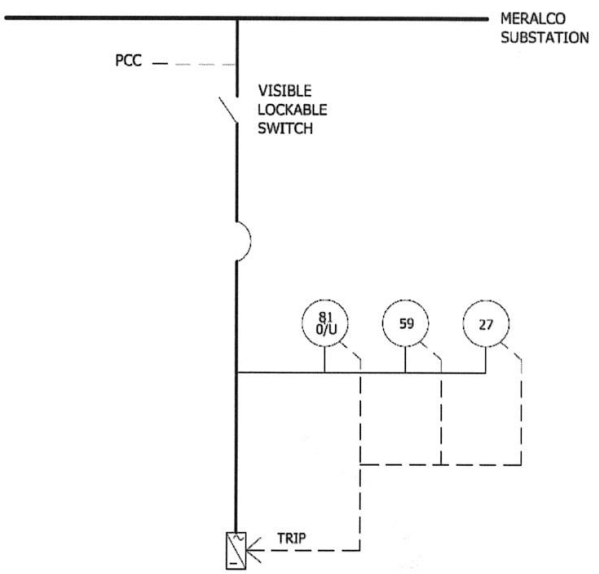
Appendix B - Typical Single-Line Diagram for the Protection of Induction Generator



LEGEND:

27	UNDERVOLTAGE RELAY
27GEN	VOLTAGE CHECK RELAY
59	OVERVOLTAGE RELAY
81O/U	OVER/UNDER FREQUENCY RELAY
PCC	POINT OF COMMON COUPLING

Appendix C - Typical Single-Line Diagram for the Protection of Inverter



LEGEND:

27	UNDERVOLTAGE
59	OVERVOLTAGE
81O/U	OVER/UNDER FREQUENCY
PCC	POINT OF COMMON COUPLING

Annex A-2

AMENDED NET-METERING AGREEMENT

This **Net-metering Agreement** is entered into by and between:

_____, of legal age, single/married, with postal address at _____, hereinafter referred to as the Qualified End-User (QE);

-and-

_____, an electric distribution utility duly organized and existing under Philippine laws, with principal office address at _____, franchised to construct, own, operate and maintain an electric distribution facility in the city/municipalities/barangays of _____, all in the Province of _____, represented herein by its President/General Manager _____, hereinafter referred to as the DU;

WITNESSETH THAT:

WHEREAS, QE intends to install within its premises for purposes of net-metering a Renewable Energy (RE) system, more particularly described as follows:

Technology Type: _____
Rated Capacity: _____
Location: _____

WHEREAS, DU has pre-qualified QE to be eligible to participate in the net-metering program;

NOW, THEREFORE, the parties enter into this net-metering agreement under the following terms and conditions:

Section 1. Compliance Standards. - The RE System to be installed within the QE's premises must be compliant with the standards set by Philippine Electrical Code (PEC), Philippine

Distribution Code (PDC), Distribution Service Open Access Rules (DSOAR) and the Net-Metering Interconnection Standards.

Section 2. Interconnection Set-Up. - The RE system shall be embedded in the QE's premises and shall be equipped with appropriate metering equipment.

a. The DU shall furnish and install a bi-directional meter at the QE's premises, without prejudice to the DU's compliance with Section 34 of the "Rules to Govern the Implementation of Advanced Metering Infrastructure (AMI) by Distribution Utilities and Other ERC-Authorized Entities," promulgated on 18 May 2016, and other relevant Rules as may be promulgated by the Commission.

b. All bi-directional meters and its installation shall be at the expense of the QE; except in the case of new customers; and QEs with existing separate meters required to be replaced with a bi-directional meter under "Rules to Govern the Implementation of Advanced Metering Infrastructure (AMI) by Distribution Utilities and other ERC - Authorized Entities," the cost thereof shall be on the account of the DU.

c. The DU shall also furnish and install, an REC meter in proximity to the RE System. This is to measure the total RE generated for compliance with the Renewable Portfolio Standards (RPS) and to measure the actual energy consumption for the determination of the following:

    i. non-exemption from payment of the lifeline subsidy rate;
    ii. payment of senior citizen subsidy rate; and
    iii. other relevant subsidies mandated by law.

d. The location of the above-mentioned meters shall be in accordance with Section 7.2.2 of the 2017 Philippine Distribution Code, and any subsequent amendments thereto.

A complete and more detailed plans and specifications of the interconnection set-up and facilities are attached as an integral part of this net-metering agreement.

Section 3. DU Inspection. - The QE shall allow the DU to access the QE's RE system to inspect, test, maintain and operate the protective devices and read or test the meters and other facilities,

provided that the QE was given a notice in writing at least three (3) days before the DU's intended date to enter the premises.

The DU, upon the same notice requirement as stated above, may limit the operation and/or disconnect, or require the disconnection of a QE's RE system from the DU's Distribution System under the following circumstances:

1. Routine maintenance, repairs or modification of the DU's Distribution System;

2. Upon determination by the DU that a QE's RE system is not compliant with the DSOAR and the PDC; and

3. Upon termination of the Agreement.

However, in cases of emergency where the DU reasonably believes that a hazardous condition exists which may warrant such limiting of the operations and/or disconnection to ensure public safety, only a reasonable notice to the QE is required.

Section 4. Meter Readings. - The DU shall be the Metering Service Provider and shall conduct the meter reading of the import and export meters every ____ day of the month for billing purposes. The DU shall immediately leave a copy of the results of its meter readings at the QE's premises, in accordance with Section 2.11.2 of the Distribution Services and Open Access Rules (DSOAR).

Section 5. Pricing of Exported Renewable Energy. - The price of export electricity shall be the DU's monthly generation charge, which is based on its blended generation cost, excluding other generation adjustments.

Section 6. Conduct of Distribution Impact Study (DIS). The DU shall determine, in a non-discriminatory basis, whether a specific DIS is necessary, to ensure the reliability and safety of the interconnection of the RE system and the Distribution System. There will be no additional charges that will be imposed on the QE for the conduct of the DIS.

Section 7. Billing Charges. - The net amount payable by or creditable to the QE shall be obtained by subtracting from the subtotal amount for import energy, the following: (a) the subtotal peso amount for export energy, and (b) the peso amount credited in

the previous month, if any. If the resulting peso amount is positive, the QE shall pay this positive peso amount to the DU. If the resulting peso amount is negative, the DU shall credit the negative peso amount to the QE's electric bill in the immediately succeeding billing period.

Section 8. RE Certificate. - The DU shall be entitled to an RE Certificate resulting from Net-Metering arrangements with the QE who is using an RE Resource to provide energy. Such RE Certificate shall be based on gross generation and shall be credited as compliance of the DU's obligations under the RPS.

Section 9. Modification to the RE System. - Any modification to an existing RE system shall require the QE to undergo the same process as that of a new customer including the execution of a new Net-Metering Agreement.

Section 10. Severability. - The unenforceability or invalidity of any provision or part of this Agreement shall not affect the enforceability or validity of the other provision or part of this Agreement.

Section 11. Amendments. - No changes or modifications of this Agreement shall be effective unless in writing signed by both Parties.

Section 12. Notices. - Each communication to be made hereunder shall be made in writing and, unless otherwise stated, may be sent through personal delivery, facsimile, or first class mail at the following address or facsimile number:

For the Qualified End User:
Address: _____
Fax: _____
Email: _____

For the Distribution Utility:
Address: _____
Fax: _____
Email: _____

Section 13. Non-waiver/exercise of rights. - Failure by a Party to exercise or delay in exercising a right, power or remedy does not prevent its exercise or is a waiver of such right, power or remedy. No waiver by either party of any of its rights, power or remedy under this Agreement shall be deemed to have been made unless expressed in writing and signed by both parties.

Section 14. Termination Date. – The agreement shall be co-terminus with the service contract of the QE with the DU under Customer Account No. _____. Either party may however pre-terminate this net-metering agreement for just cause.

Section 9. Dispute Resolution. – In case of dispute over the application of certain provisions of this agreement, the parties shall exert best efforts to resolve the dispute among themselves within thirty (30) calendar days from when the dispute arose. If the dispute remains unresolved after this thirty (30) day period, either party may file a petition for dispute resolution with the Energy Regulatory Commission (ERC), who shall have original and exclusive jurisdiction over such dispute.

While these are pending with the ERC, the status quo of cases involving violation of contract shall be maintained. The maintenance of the status quo shall only be applicable to the subject matter of the case and will not extend to any other right/s and obligation/s between the parties.

IN WITNESS WHEREOF, the parties execute this Net-Metering Agreement this (date) at (place).

ABC Electric Company/Cooperative
(DU)

By:
President/General Manager

Juan Dela Cruz
Qualified End-User

Witnesses:

_____ _____

Acknowledgment

Republic of the Philippines)
) S.S.

BEFORE ME, this _____, the following persons appeared before me,

NAME	Identification Documents (TIN/Driver's License/SSS)	Date/Place of Issue

known to me to be same persons who personally appeared before me and acknowledged to me that the foregoing agreement is the result of the free act and deed and that of the corporation/cooperative which they represent.

Doc. No. _____;
Page No. _____;
Book No. _____;
Series of _____.

LOGO

Annex A-3

Distribution Utility
DU
CY: 20__
As of ()

Count	Qualified End-User			Processing Timline		Renewable Energy Facility			MONTHLY MONITORING (Billing Cycle)																								Remarks
									JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC		
	Name	Account Number	Address	Date Applied	Date of Successful Testing and Commissioning	Technology	Rated Capacity (kW)	Meter Serial Number	Exported Energy (kWh)	Blended Generation Rate (Php/kWh)	Exported Energy (kWh)	Blended Generation Rate (Php/kWh)	Exported Energy (kWh)	Blended Generation Rate (Php/kWh)	Exported Energy (kWh)	Blended Generation Rate (Php/kWh)	Exported Energy (kWh)	Blended Generation Rate (Php/kWh)	Exported Energy (kWh)	Blended Generation Rate (Php/kWh)	Exported Energy (kWh)	Blended Generation Rate (Php/kWh)	Exported Energy (kWh)	Blended Generation Rate (Php/kWh)	Exported Energy (kWh)	Blended Generation Rate (Php/kWh)	Exported Energy (kWh)	Blended Generation Rate (Php/kWh)	Exported Energy (kWh)	Blended Generation Rate (Php/kWh)	Exported Energy (kWh)	Blended Generation Rate (Php/kWh)	

Prepared by: ____________________

Reviewd by: ____________________

Approved by: ____________________

Annex 3:
ERC Resolution No. 05
Series of 2020

Republic of the Philippines
ENERGY REGULATORY COMMISSION
San Miguel Avenue, Pasig City

ERC Resolution No. 05, Series of 2020

A RESOLUTION CLARIFYING ERC RESOLUTION NO. 6, SERIES OF 2019, ENTITLED "A RESOLUTION ADOPTING THE AMENDMENTS TO THE RULES ENABLING THE NET-METERING PROGRAM FOR RENEWABLE ENERGY"

WHEREAS, it is the policy of the state to accelerate the exploration and development of renewable energy resources, increase its utilization, and establish the necessary infrastructure and mechanisms;

WHEREAS, Section 10 of Republic Act No. 9513 (R.A. 9513), entitled "An Act Promoting the Development, Utilization and Commercialization of Renewable Energy Resources and for Other Purposes," and Section 7 of its Implementing Rules and Regulations (IRR), mandate the Energy Regulatory Commission (ERC), in consultation with the National Renewable Energy Board (NREB), to establish, within one (1) year from effectivity of the Act, the net-metering interconnection standards and pricing methodology and other commercial arrangements necessary to ensure the success of the Net-Metering Program for renewable energy;

WHEREAS, Section 10 of R.A. 9513 further provides that the Department of Energy (DOE), the ERC, the National Transmission Corporation (TRANSCO) or its successors-in-interest, Distribution Utilities (DUs), the Philippine Electricity Market Corporation (PEMC) and all relevant parties shall provide the mechanism for the physical connection and commercial arrangements necessary to ensure the

success of the Program, consistent with the Philippine Grid Code (PGC) and the Philippine Distribution Code (PDC);

WHEREAS, on 27 May 2013, the ERC issued Resolution No. 9, Series of 2013, A Resolution Adopting the Rules Enabling the Net-Metering Program. It was published in the Daily Tribune on 09 July 2013, and became effective on 24 July 2013.

WHEREAS, due to a rapidly evolving nature of RE technologies and to increase participation, on 16 August 2019, the ERC issued Resolution No. 6, Series of 2019, entitled "*A Resolution Adopting the Amendments to the Rules Enabling the Net-Metering Program for Renewable Energy*" (Amended Net-Metering Rules). It was published in the Daily Tribune on 11 October 2019, and became effective on 26 October 2019.

WHEREAS, after the effectivity of the Amended Net-Metering Rules, the following issues were raised by several stakeholders:

1. Definition of good credit standing;
2. Whether or not the DU will shoulder the cost of installation of an REC meter as its compliance with the Renewable Portfolio Standards;
3. The DU personnel cannot inspect, maintain and read the REC meters which were installed not in the Connection Point or close to the Connection Point; and
4. Whether or not the QE who paid for the bi-directional meter will own the meter.

NOW THEREFORE, the Commission, after thorough and due deliberation, hereby **RESOLVES**, as it is hereby **RESOLVED**, to **APPROVE** and **ADOPT**, the **Clarifications on the Amended Net-Metering Rules,** hereto attached as **Annex "A"** and made an integral part hereof.

This Resolution shall take effect fifteen (15) days after its publication in a newspaper of general circulation in the country.

Let copies of this Resolution be furnished the University of the Philippines Law Center – Office of the National Administrative Register (UPLC-ONAR) and all parties concerned.

Pasig City, 27 February 2020.

ERC
Office of the Chairperson
AVSTD-2020-04-570-0001

AGNES VST DEVANADERA
Chairperson and CEO

(ON LEAVE)
JOSEFINA PATRICIA A. MAGPALE-ASIRIT
Commissioner

ALEXIS M. LUMBATAN
Commissioner

CATHERINE P. MACEDA
Commissioner

PAUL CHRISTIAN M. CERVANTES
Commissioner

jmc/clb/som

Annex 3 A:
ERC Resolution No. 05
Series of 2020

Annex A

AREAS FOR CLARIFICATION

1. Definition of Good Credit Standing

Amended Net Metering Provision

Section 5. Qualifications. *All end-users who are in good credit standing in the payment of their electric bills to the DU; and new customers are qualified to participate in the Net-Metering program for Renewable Energy.*

This is to clarify that for purposes of Net-Metering applications, the definition of "**good credit standing**" shall be **an end-user with no unsettled or outstanding obligation with the Distribution Utility at the time of application.**

2. Cost of installation and location of the Renewable Energy Certificate (REC) meter

Amended Net Metering Provision

Section 10. Interconnection Set-Up. *The RE system shall be embedded in the QE's premises and shall be equipped with appropriate metering equipment. The DU shall furnish and install a bi-directional meter at the QE's premises, without prejudice to the DU's compliance with Section 34 of the "Rules to Govern the Implementation of Advanced Metering Infrastructure (AMI) by Distribution Utilities and Other ERC-Authorized Entities," promulgated on 18 May 2016, and other relevant Rules as may be promulgated by the Commission.*

All bi-directional meters and its installation shall be at the expense of the QE, except in the case of new customers, and QEs with existing separate meters required to be replaced with a bi-directional meter under "Rules to Govern the Implementation of Advanced Metering Infrastructure (AMI) by Distribution Utilities and other ERC - Authorized Entities," the cost thereof shall be on the account of the DU.

The DU shall also furnish and install, an REC meter in proximity to the RE System. *This is to measure the total RE generated for compliance with the Renewable Portfolio Standards (RPS) and to measure the actual energy consumption for the determination of the following:*

(a) *non-exemption from payment of the lifeline subsidy rate;*
(b) *payment of senior citizen subsidy rate; and*
(c) *other relevant subsidies mandated by law.*

The location of the above-mentioned meters shall be in accordance with Section 7.2.2 of the 2017 Philippine

Distribution Code, and any subsequent amendment thereto. (Emphasis supplied)

This is to clarify that the cost of an REC meter and its installation **shall be shouldered by the DU; while the wiring cost from the facility to the REC meter shall be shouldered by the QE.**

3. Location of the REC Meter

Amended Net Metering Provision

Section 10. Interconnection Set-Up.

xxx

The location of the above-mentioned meters shall be in accordance with Section 7.2.2 of the 2017 Philippine Distribution Code, and any subsequent amendment thereto. (Emphasis supplied)

Section 7.2.2 of the 2017 Philippine Distribution Code (2017 PDC) provides that:

7.2.2 Metering Point Location

7.2.2.1 The Metering Point shall be located at the Connection Point, unless the installation of the Metering Equipment is physically difficult, uneconomical or not practical.

7.2.2.2. If the Metering Point cannot be located in the Connection Point for justifiable reasons, Meters may be located in other locations or in accordance with relevant ERC issuances or guidelines.

7.2.2.3 If the Metering Point is not located at the Connection Point, an agreed procedure shall be established to account for the Energy loss between the Connection point and Metering Point.

Section 7.2.4.2 of the same Code further provides that:

Active and Demand metering shall be provided for each User ***at each Connection Point*** *and shall be* ***accessible for inspection and reading.*** (Emphasis supplied)

Likewise, Section 2.11.1 of the Amended Distribution Services and Open Access Rules (DSOAR) states that:

> ***Billing meters shall be provided for each User at each Connection Point*** *or at the primary side of a dedicated transformer and shall be accessible for inspection and reading****. If the meter cannot be installed at the Connection Point*** *or at the primary side of a dedicated transformer due to the Distribution System's design construction or for other reasons, the* ***meter shall be installed as close as possible to the Connection Point.*** *xxx*
>
> *xxx* ***Meters shall be located on the outside wall of the building*** *xxx* (Emphasis supplied)

Thus, section 10 of the Amended NM Rules is consistent with the 2017 PDC and the DSOAR, which clearly provides that Meters should be located at the Connection Point **or at least near it**.

Considering that Section 7.2.2.2 of the 2017 PDC allows for a metering location other than the Connection Point subject to justifiable reasons, it is further clarified that, to ensure ease in the installation and reading of meters, the REC meter shall be located at the connection point or at least near the connection point.

4. Meter Ownership

> **Amended Net Metering Provision**
>
> *Section 10. Interconnection Set-Up.*
>
> ***xxx***
>
> ***All bi-directional meters and its installation shall be at the expense of the QE, except in the case of new customers, and QEs with existing separate meters required to be replaced with a bi-directional meter under "Rules to Govern the Implementation of Advanced Metering Infrastructure (AMI) by Distribution Utilities and other ERC - Authorized Entities," the cost thereof shall be on the account of the DU.*** (Emphasis supplied)

Under Section 10 of the Amended Rules, the ERC identified three (3) types of customers, depending on who shall be bear the cost of the meter and its installation, to wit:

1. End users who wish to install an RE facility in their premises – QE to shoulder;

2. New Customers as defined in the Amended Net-Metering Rules – DU to shoulder; and

3. Existing QEs with two (2) separate uni-directional meters in their premises and required by Section 34 of the Rules to Govern the Implementation of Advanced Metering Infrastructure (AMI) by Distribution Utilities and Other ERC-Authorized Entities to replace its two (2) uni-directional meters with a bi-directional meter – DU to shoulder.

To clarify, all meters shall be charged to the DU except for the type 1 customers, where the difference between the old meter and the new bi-directional meter shall be borne by the End-User.

jpc/clb/som

ERC
Office of the Chairperson
AVSTD-2020-04-570-0001

Annex 4:
DOE Department Circular No. 2020-10-0022

Republic of the Philippines
DEPARTMENT OF ENERGY
(Kagawaran ng Enerhiya)

DEPARTMENT CIRCULAR NO. DC 2020-10-0022

PRESCRIBING THE POLICIES TO ENHANCE THE NET-METERING PROGRAM FOR RENEWABLE ENERGY SYSTEMS

WHEREAS, Republic Act (RA) No. 7638, otherwise known as the "Department of Energy (DOE) Act of 1992," declares as a policy of the State to, among others, ensure a continuous, adequate and economic supply of energy through the integrated and intensive exploration, production, management and development of the country's indigenous energy resources;

WHEREAS, RA No. 9136, otherwise known as the "Electric Power Industry Reform Act of 2001" or "EPIRA," declares the policy of the State to, among others: (a) assure socially and environmentally compatible energy sources and infrastructure; and (b) promote the utilization of indigenous and new and renewable energy (RE) resources in power generation in order to reduce dependence on imported energy;

WHEREAS, Section 37 of the EPIRA mandates the DOE to encourage private sector investments in the electricity sector and promote the development of indigenous and RE resources;

WHEREAS, RA No. 9513, otherwise known as the "Renewable Energy Act of 2008" or the "RE Act," declares the policy of the State to accelerate the exploration and development of RE resources including hybrid systems, to achieve self-reliance, strategies to reduce the country's dependence on fossil fuels and thereby minimize the country's exposure to price fluctuations in the international markets, the effects of which spiral down to almost all sectors of the economy;

WHEREAS, the RE Act further declares the policy of the State to increase the utilization of RE by institutionalizing the development of national and local capabilities in the use of RE Systems, and promoting their efficient and cost-effective commercial application by providing fiscal and non-fiscal incentives;

WHEREAS, on 27 May 2013, the Energy Regulatory Commission (ERC) issued Resolution No. 9, Series of 2013 entitled "*A Resolution Adopting the Rules Enabling the Net-Metering Program for Renewable Energy*" or the "Net-Metering Rules" pursuant to Section 10 of the RE Act and Section 7 of its Implementing Rules and Regulations;

WHEREAS, from 01 July 2013 to 31 December 2019, the Net-Metering Program recorded a cumulative total of 25 MW of Net-Metering facilities (from 3,132 Qualified End-Users) have been installed in the Philippines, wherein 62.6% of it are

located within the franchised area of one Distribution Utility (DU), equivalent to only 0.16% of the 2019 total non-coincident peak demand of 15,581 MW;

WHEREAS, despite the high potential of RE resources in the country, numerous economic and non-economic barriers under the current design of the Net-Metering Program have contributed to low level of participation from the electricity End-Users;

WHEREAS, on 22 December 2017, the DOE issued the Department Circular No. DC2017-12-0015 entitled, *"Promulgating the Rules and Guidelines Governing the Establishment of the Renewable Portfolio Standards for On-Grid Areas,"* or the "RPS On-Grid Rules" where energy produced or generated by Eligible RE Facilities under the Net-Metering Program are eligible to earn RE Certificates, which shall be credited as one of the mechanisms that the DUs may apply as part of their compliance with their obligations as Mandated Participants under the RPS On-Grid Rules;

WHEREAS, the DOE, in partnership with the United States Agency for International Development through the Clean Power Asia Program with expertise from the National Renewable Energy Laboratory, Lawrence Berkeley National Laboratory and Chulalongkorn University, conducted a study on the Net-Metering Program, composed of data-driven analysis on three key impacts, namely: customer economics; utility revenue and retail rate; and technical impact on the distribution grid;

WHEREAS, after the conduct of focus group discussions with various stakeholders, the study resulted in the publication of the *"Distributed Photovoltaic Economic and Technical Impact Analysis in Philippines,"* covering potential policy and regulatory revisions;

WHEREAS, on 16 August 2019, the ERC issued Resolution No. 06, Series of 2019 entitled *"Adopting the Amendments to the Rules Enabling the Net-Metering Program for Renewable Energy"* or the "Amended Net-Metering Rules" to address the issues on the applicability of the lifeline rates to Qualified End-Users and whether the mechanism of accumulating the credits of net exports on the customer bill is reasonable;

WHEREAS, while the Amended Net-Metering Rules addressed most of the economic and technical barriers of the current Net-Metering Program, the DOE deems it necessary to further enhance the current Net-Metering policies and commercial arrangements in order to increase the utilization of RE thru the Net-Metering Program;

WHEREAS, as part of securing the views, comments, and suggestions from the stakeholders on the draft Department Circular, entitled as *"Policies to Enhance the Net-Metering Program for Renewable Energy Systems and Other Mechanisms to Ensure Energy Security," the* DOE conducted a series of public consultations on 08 October 2019 in Taguig City, Metro Manila, 10 October 2019 in Cebu City, and

24 October 2019 in Davao City, a dialogue with the ERC on 02 March 2020, and recently through the National Renewable Energy Board (NREB);

NOW, THEREFORE, after due consideration of the above, the DOE hereby adopts the following rules and regulations:

Section 1. Title. This Department Circular shall be known as "*Prescribing the Policies to Enhance the Net-Metering Program for Renewable Energy Systems.*"

Section 2. Purpose. This Circular aims to encourage and further promote electricity End-Users' participation in the Net-Metering Program by enhancing the current policies and commercial arrangements, while ensuring the economic and technical viability of the DU.

Section 3. Scope. This Circular prescribes the following policies and guidelines to provide complementary enhancements to the Net-Metering Program in support of ERC Resolution No. 06, Series of 2019:

(a) Implementation of the period of one (1) year for the banking of Net-Metering credits for existing and new applications;

(b) Application to Off-Grid or Island Grid Systems;

(c) Publication of the DUs Net-Metering Program including their respective hosting capacities of Distribution Systems for Net-Metering purposes; and

(d) Development of a Net-Metering Guidebook that aims to prescribe the guidelines and procedures for Net-Metering arrangements from offer to after-sales services by the Net-Metering installers and practitioners as well as prescribing the minimum standards for all Net-Metering installations, in collaboration with all concerned government agencies.

Section 4. Definition of Terms. This Circular hereby adopts, by reference, the terms defined in the EPIRA, RE Act, their respective implementing rules and regulations, the RPS On-Grid Rules, as well as the relevant DOE Department Circulars.

(a) ***"Banking Period"*** refers to a period of time that a Qualified End-User may store the excess Net-Metering Credits it has accumulated over a certain period of time;

(b) ***"Net-Metering Credit"*** refers to an amount of energy exported into the Distribution System by a Qualified End-User in excess, subject to the prescribed valuation of the exported energy;

(c) **"*Qualified End-User*"** refers to electricity End-Users that produce electric power generated from an eligible on-site RE generating facility, such as, but not limited to, house or office building with a photovoltaic system that can be

connected to the Distribution System, for the purposes of entering into a Net-Metering agreement, as defined in Section 7 of the RE Act-IRR; and

(d) **"*Renewable Energy Certificate*" or "*RE Certificate*"** refers to a certificate issued by the RE Registrar to Mandated Participants of the RPS showing the energy sourced, produced, and sold or used from the Eligible RE Systems. The definition of RE Certificate as defined under Section 3(tt) of the RE Act-IRR is hereby amended accordingly.

Section 5. Threshold Capacity for Net-Metering Installations. Any Qualified End-User under the Net-Metering arrangement, under normal circumstances, shall not be a net generator or producer at the end of each calendar year. This is to avoid oversizing of the Net-Metering facility, where the annual electricity generation of the facility has exceeded the Qualified End-User's annual energy consumption.

Section 6. Banking of Net-Metering Credits. Upon effectivity of this Circular, all Net-Metering Credits shall be banked for a maximum of one (1) calendar year. Any excess or balance Net-Metering Credits at the end of each calendar year shall be forfeited. As to the Net-Metering Credits generated prior to the effectivity of this Circular, the ERC, in consultation with the DUs, shall issue the necessary rules on the disbursements of all outstanding peso credits to their respective Qualified End-Users within ninety (90) days from the effectivity of this Circular.

Section 7. Application to Off-Grids or Isolated Grid Systems. Subject to technical considerations in accordance with the Philippine Electrical Code, the Philippine Distribution Code, Distribution Services Open Access Rules, the Philippine Small Grid Guidelines, and the Amended Net-Metering Rules and its Interconnection Standards, the Net-Metering Program for End-User shall be allowed even in areas not connected to the three major national electrical transmission grids, namely: Luzon, Visayas and Mindanao.

The ERC, in consultation with the DOE, DUs, National Electrification Administration, and National Power Corporation, may issue the necessary amendments to the Net-Metering Interconnection Standards to facilitate the efficient and effective implementation of the Net-Metering Program to Off-Grid areas.

Section 8. Publication of Hosting Capacities for Net-Metering. The DUs shall publish in their website (or on any official social media platform), their respective Net-Metering programs, processes, and procedures, including hosting capacities on a per feeder or sector basis.

Section 9. Responsibility of the Local Government Units (LGUs). All LGUs are enjoined to strictly comply with the provisions of RA No. 11234 or the "Energy Virtual One Stop Shop Act" and RA No. 11032 or the "Ease of Doing Business and Efficient Government Service Delivery Act of 2018" in processing permits and licenses related to applications for Net-Metering arrangements such as, but not limited to Building Permit applications, Certification of Final Electrical Inspections, among others.

Section 10. Responsibilities of the National Electrification Administration (NEA). The NEA shall provide the necessary assistance in promoting the Net-Metering Program to all electric cooperatives (EC) nationwide, as well as other capacity building program such as technical assistance on Distribution Impact and Asset Studies and determination of the hosting capacity. Toward this end, the NEA and ECs shall include in their orientation/briefing for new applicant member-consumers the Net-Metering Program as well as other RE policies and programs under the RE Act.

Section 11. Development of Net-Metering Guidebook. To help electricity end-users in considering Net-Metering for RE, as well as ensuring safety and protection on any potential market abuses, a guidebook on procedures and standards (i.e. service offers, product standards, proper sizing, installation manual, after-sales requirements, etc.) shall be developed by the DOE which will be used by all stakeholders including suppliers, customers, Local Government Units, and financing institutions. Towards this end, the Renewable Energy Management Bureau shall prepare the Net Metering Guidebook, within six (6) months from the affectivity of this Circular.

Section 12. Prohibited Act. Pursuant to Section 35(b) of the RE Act, the willful refusal of a DU to undertake Net-Metering arrangements with Qualified End-Users without justifiable cause shall be subject to the administrative penalties therein provided.

Section 13. Other Provisions. Pursuant to Section 10 of the RE Act, the DOE, among others, is mandated to provide the mechanisms for the physical connection and commercial arrangements necessary to ensure the success of the Net-Metering program.

(a) The ERC may adopt the Classical Net-Metering as described under Section 7 of the Implementing Rules and Regulations of the RE Act, whereby the electric power generated by a Qualified End-User from an eligible on-site RE generating facility and delivered to the local distribution grid may be used to offset the electricity consumed by the End-User during the applicable period.

(b) All cost incurred by the host DU including metering, supply, and storage, shall be charged only to Qualified End-Users as Net-Metering charge, which amount shall be subject to determination and approval of the ERC;

(c) The DOE and ERC shall review and evaluate the implementation of the Enhanced Net-Metering Program every two (2) years or as the need arises, from the effectivity of this Circular, to ensure that the Net-Metering Program redounds to the greater benefit of all electricity End-Users and the objectives of the RE Act are met.

Section 14. Separability Clause. If any provision of this Circular is declared invalid or unconstitutional, the other provisions not affected thereby shall remain valid and subsisting.

Section 15. Repealing Clause. Any prior issuances, orders or circulars inconsistent with this Circular are hereby repealed, amended or modified accordingly.

Section 16. Effectivity. This Circular shall take effect fifteen (15) days after its publication in at least two (2) newspapers of general circulation. Copies of this Circular shall be filed with the University of the Philippines Law Center – Office of the National Administrative Register.

ALFONSO G. CUSI
Secretary

Issued on _____ at the Department of Energy,
Fort Bonifacio, Taguig City, Metro Manila.

Republic of the Philippines
DEPARTMENT OF ENERGY
IN REPLYING PLS. CITE:
DOE-AGC-20004681

OCT 22 2020

Annex 5:
DOE-DILG Joint Memorandum Circular No. 2020-01

Republic of the Philippines
DEPARTMENT OF THE INTERIOR AND LOCAL GOVERNMENT
DEPARTMENT OF ENERGY

JOINT MEMORANDUM CIRCULAR NO.: 2020 - 01
Date: APR 30 2020

TO : **ALL PROVINCIAL GOVERNORS, CITY AND MUNICIPAL MAYORS, PUNONG BARANGAYS, DILG REGIONAL/ PROVINCIAL/ CITY DIRECTORS, DILG BANGSAMORO AUTONOMOUS REGION IN MUSLIM MINDANAO (BARMM) MINISTER, CLUSTER LEADERS, AND CITY/MUNICIPAL LOCAL GOVERNMENT OPERATION OFFICERS (C/MLGOOS)**

SUBJECT : **GUIDELINES FOR LGUs TO FACILITATE THE IMPLEMENTATION OF ENERGY PROJECTS**

1.0 BACKGROUND

1.1 The National Economic and Development Authority (NEDA) launched **AmBisyon 2040** which envisions *Filipinos to enjoy a strongly rooted comfortable and secure life in all aspects by 2040.*"

1.2 The Philippine Development Plan (PDP) 2017-2022 intends to accelerate all infrastructure development projects, including the energy sector.

1.3 The Philippine Energy Plan (PEP) seeks to unify with government partners and the private sector to meet the country's electricity and fuel requirements through improvements in the energy market, simplification of government procedures, promotion of resiliency in energy systems and infrastructures, and the enhancements of the consumers' power of choice.

1.4 The Philippine Power Development Plan forecasts that the country will need 43,765 megawatts (MW) additional capacity by 2040. With an average annual growth rate of 5.7%, power demand will continue to move in an upward trend.

1.5 President Rodrigo R. Duterte, in adopting a whole-of-government approach for the needs of the energy sector, issued Executive Order No. 30 (EO 30) to streamline regulatory procedures affecting Energy Projects of National Significance.

1.6 The Congress of the Philippines passed Republic Act (RA) 11032 entitled, "Ease of

11234 entitled, "Energy Virtual One-Stop Shop (EVOSS) Act" to establish the inter-operability of government processes through an online system that streamlines the permitting processes of power generation, transmission, and distribution projects.

1.7 The Department of Energy (DOE), in implementing the pertinent energy laws, sees the Local Government Units (LGUs) as indispensable stakeholders and reiterates the existing and potential benefits for host communities of energy projects, such as Energy Regulation 1-94, national wealth tax or government share, job creations, and other social and economic development programs.

1.8 The Department of the Interior and Local Government (DILG), in support of the DOE, enjoins all LGUs to implement the directive of the President Duterte on the implementation of energy projects through the issuance of this policy.

1.9 The DILG herein prescribes the draft ordinance for the consideration of LGUs in order for them to comply with the provisions of the EVOSS Act including the fees and other charges imposed on the power generation, transmission, and distribution projects attached as Annex A.

2.0 PURPOSE

2.1 To establish, strengthen and integrate the national energy plans, programs, policies and mechanisms into the local development plans, with respect to:

i. Energy safety practices
ii. Energy efficiency and conservation
iii. Energy resiliency
iv. Energy planning which includes energy access and resource development

2.2 To harmonize and fast-track the implementation of the EVOSS Act, EODB Act, EO 30 and AO 23 with the establishment of unified and streamlined permitting process.

2.3 To maximize benefits from energy projects to the host communities.

2.4 To implement the other necessary energy programs and projects to spur the total development of the LGUs.

3.0 LEGAL BASES

3.1 DILG LAWS

3.1.1 Executive Order No. 292, series of 1987 (Reorganization Act of the Department of Local Government and for Other Purposes)

3.1.2 Republic Act No. 6975, An Act Establishing the Philippine National Police Under a Reorganized Department of the Interior and Local Government, and for Other Purposes (Department of the Interior and Local Government of 1990)

3.1.3 Republic Act No. 7160, An Act Providing for a Local Government Code of 1991 (Local Government Code of 1991)

3.2 ENERGY-RELATED LAWS

3.2.1 Presidential Decree No. 87, Amending Presidential Decree No. 8 Issued on October 2, 1972 and Promulgation of an Amended Act to Promote the Discovery and Production of Indigenous Petroleum and Appropriate Funds Therefor (The Oil Exploration and Development Act of 1972)

3.2.2 Presidential Decree No. 972, Promulgating an Act to Promote an Accelerated Exploration, Development, Exploitation, Production and Utilization of Coal (The Coal Development Act of 1976)

3.2.3 Republic Act No. 7638, An Act Creating the Department of Energy, Rationalizing the Organization and Functions of Government Agencies Related to Energy, and for Other Purposes (Department of Energy Act of 1992)

3.2.4 Republic Act No. 8479, An Act Deregulating the Downstream Oil Industry and for Other Purposes (Downstream Oil Industry Deregulation Act of 1998)

3.2.5 Republic Act No. 9136, An Act Ordaining Reforms in the Electric Power Industry, Amending for the Purpose Certain Laws and for Other Purposes (Electric Power Industry Reform Act of 2001)

3.2.6 Republic Act No. 9367, An Act to Direct the Use of Biofuels, Establishing for this Purpose the Biofuel Program, Appropriating Funds Therefor, and for Other Purposes (Biofuels Act of 2006)

3.2.7 Republic Act No. 9513, An Act Promoting the Development, Utilization and Commercialization of Renewable Energy Resources and for Other Purposes (Renewable Energy Act of 2008)

3.2.8 Republic Act No. 10623, An Act Amending Certain Provisions of Republic Act No. 7581 (An Act Providing Protection to Consumers by Stabilizing the Prices of Basic Necessities and Prime Commodities and by Prescribing Measures Against Undue Price Increases During Emergency Situations and like Occasions and for Other Purposes)

3.2.9 Republic Act No. 11285, An Act Institutionalizing Energy Efficiency and Conservation, Enhancing the Efficient Use of Energy, and Granting Incentives to Energy Efficiency and Conservation Project (Energy Efficiency and Conservation Act)

3.2.10 Republic Act No. 11361, An Act Ensuring the Continuous and Uninterrupted Transmission and Distribution of Electricity and the Protection of the Integrity and Reliability of Power Lines, and Providing Penalties for Violations Thereof (Anti-Obstruction of Power Lines Act)

3.3 PRIVATE SECTOR PARTICIPATION LAWS

Republic Act No. 7718, An Act Amending Certain Sections of Republic Act No. 6957 (An Act Authorizing the Financing, Construction, Operation, and Maintenance of

3.4 REGULATORY REFORM LAWS/ORDERS ISSUED

3.4.1 Republic Act No. 11234, An Act Establishing the Energy Virtual One-Stop Shop for the Purpose of Streamlining the Permitting Process of Power Generation, Transmission, and Distribution Projects (Energy Virtual One-Stop Shop Act)

3.4.2 Republic Act No. 11032, Ease of Doing Business and Efficient Government Service Delivery Act of 2018 (Ease of Doing Business Act of 2018)

3.4.3 Executive Order No. 30, Creating the Energy Investment Coordinating Council (EICC) in order to Streamline the Regulatory Procedures Affecting Energy Projects (EO 30)

3.4.4 Administrative Order No. 23 Series of 2020, Eliminating Overregulation to Promote Efficiency of Government Processes (AO 23)

3.5 SUPPORTING POLICIES ISSUED

3.5.1 DILG-DOE Joint Circular 95-01 dated 31 October 1995 entitled, "*Utilization of Shares from National Wealth*"

3.5.2 DOE Department Circular No. DC2003-11-010 entitled, "*Rules and Regulations Governing the Business of Retailing Liquid Petroleum Products*"

3.5.3 DOE Department Circular No. DC2007-02-0002 entitled, "*Providing for the Rules and Regulations Governing the Business of Supplying, Hauling, Storage, Handling, Marketing and Distribution of Liquefied Petroleum Gas (LPG) for Automotive Use*"

3.5.4 DOE Department Circular No. DC2014-01-0001 entitled, "*Providing for the Rules and Regulations Governing the LPG Industry*"

3.5.5 DOE Department Circular No. DC2017-11-0011 entitled, "*Promulgating a Revised Rules and Regulations Governing the Business of Retailing Liquid Fuels*"

3.5.6 DOE Department Circular No. DC2019-05-0007 entitled, "*Rules and Regulations Implementing Republic Act No. 11234 (Energy Virtual One-Stop Shop Act)*"

3.5.7 DOE Department Circular No. DC2019-11-0014 entitled, "*Implementing Rules and Regulations of Republic Act No. 11285 (Energy Efficiency and Conservation Act)*"

3.5.8 DOE Department Circular No. DC2020-02-0002 entitled, "*The Implementing Rules and Regulations of Republic Act No. 11361, Otherwise Known as the "Anti-Obstruction of Power Lines Act"*"

3.5.9 DILG-DPWH-DICT-DTI Joint Memorandum Circular No. 2018-01 entitled, "*Guidelines in Streamlining the Processes for the Issuance of Building Permits*

3.5.10 DILG-DOF Joint Memorandum Circular No. 2019-01 entitled, "*Guidelines for the Review, Adjustment, Setting and/or Adoption of Reasonable Regulatory Fees and Charges of Local Government Units*"

3.5.11 DILG Memorandum Circular No. 2019-117 entitled, "*Guidelines in the Integration of the Issuance of Barangay Clearance in the Permitting Processes of Cities and Municipalities*"

3.5.12 DILG-ARTA Joint Memorandum Circular No. 2019-01 entitled, "*Guidelines on the Regulatory Reform for LGUs pursuant to the Ease of Doing Business and Efficient Government Service Delivery (EODB-EGSD) Act of 2018*"

3.5.13 PPPC-DILG Joint Memorandum Circular No. 2019-01 entitled "*Supplemental Guidelines for the Implementation of Public-Private Partnership for the People Initiative for Local Government (LGU P4)*"

4.0 COVERAGE

This Joint Memorandum Circular covers:

4.1 All Provincial Governors, Vice Governors, City and Municipal Mayors, Vice Mayors, Punong Barangays, and Members of the Sangguniang Panlalawigan/ Panlungsod/ Bayan/ Barangay, and Local Development Councils (LDCs);

4.2 DILG Regional/ Provincial/ City Directors, DILG BARMM Minister, Cluster Leaders, and C/MLGOOs; and

5.0 POLICY CONTENT

5.1 The LGU, through its LDC, shall activate the Energy Sector Committee to implement this Joint Memorandum Circular which incorporates the energy programs, policies, and projects into the spatial plan (Physical Framework Plan or Comprehensive Land Use Plan, whichever is applicable) and its comprehensive development plan.

5.2 SPATIAL PLAN. The Cities and Municipalities, in consultation with concerned stakeholders, shall identify upstream conventional (coal, oil, or natural gas) and/or renewable (biomass, geothermal, solar, hydropower, ocean, and wind) energy resources within its area of jurisdiction which shall be posted on its website, if available.

5.2.1 The Cities and Municipalities, in consultation with concerned stakeholders, shall plot existing upstream and downstream energy facilities with coordinates in accordance with the Philippine Reference System 1992 (PRS 92).

5.2.2 The Cities and Municipalities shall coordinate with existing private sector stakeholders on the expansion plans of the existing upstream and downstream energy facilities.

5.2.3 The Component Cities and Municipalities shall submit the data under 5.2.1 and 5.2.2 to their respective Provinces for consolidation and submission to the concerned DILG Regional Office. The Independent Component Cities and

Highly Urbanized Cities shall submit the data under 5.2.1 and 5.2.2 directly to the concerned DILG Regional Office.

5.2.4 All data under 5.2.3 shall be submitted to the DILG - Bureau of Local Government Development and DOE - Investment Promotion Office.

5.2.5 The Cities and Municipalities may coordinate with the Public-Private Partnership (PPP) Center for investment opportunities and potential private-public partnerships.

5.3 DEVELOPMENT PLANS. The Province, City, Municipality and Barangay shall monitor and collect the benefits of energy projects and incorporate these benefits in its comprehensive development plan. The benefits to host communities for energy projects may include among others, funds from the Energy Regulation 1-94 (ER1-94), and the National Wealth Tax.

The development plan of the Province, City, Municipality and Barangay shall include all local energy policies, plans, and programs covering energy safety and best practices, energy efficiency and conservation, and energy resiliency in its comprehensive development plan which shall be submitted to its respective Regional Development Council and integrated to its respective Regional Development Plan.

5.4 ENERGY REGULATORY REFORMS. The LGU shall streamline the processes in issuing the necessary permits on energy-related projects in accordance with Section 14 of RA 11234.

5.4.1 The LGU shall prepare, submit and implement a unified streamlined and transparent permitting process and corresponding fees.

Said permitting process and corresponding fees shall be submitted by the LGU to the EVOSS Steering Committee through the Secretariat, the DOE - Investment Promotion Office and DILG Regional Office.

5.4.2 The LGU shall process permits within the prescribed time frame as stated in the EVOSS Act to fast track processing of necessary permits to expedite their completion.

5.4.3 The LGU shall designate a focal person, office or unit in charge of managing the EVOSS account in the EVOSS System to ensure proper monitoring and updating of electronic documents and implementation of the EVOSS Act and its IRR.

5.4.4 Upon the submission of the complete documents by the energy project applicant, as indicated in the corresponding requisites in Section 5.4.1, the concerned LGU (province, city or municipality) shall issue the corresponding permit within fifteen (15) calendar days for the proposed generation, transmission and/or distribution project. *Provided*, That this shall not preclude the EVOSS Steering Committee from imposing a shorter time frame for resolution of applications should it see the expediency and feasibility of doing so.

Failure of an LGU to act on applications duly submitted with complete supporting electronic documents within the time frame shall be deemed an approval of such application by the LGU without need of further action on the part of the concerned energy project applicant.

The duly received/stamped as received application form of the energy project applicant by the concerned LGU shall serve as the relevant permit if the LGU fails to act on the application within the provided time frame.

In case of denial of application, the LGU shall notify the energy project applicant in writing stating the reason/s for disapproval.

5.4.5 Penalties under the EVOSS Act

Any person found guilty of committing the acts stated in Section 17 (a) and (b) shall be penalized as follows:

(a) First offense - Thirty (30) days suspension without pay;
(b) Second offense - Three (3) months suspension without pay; and
(c) Third offense - Dismissal and perpetual disqualification from public service.

Any person found guilty of committing the act stated in Section 17 (c) shall be penalized as follows:

(a) First offense - Thirty (30) days suspension without pay and mandatory attendance in Values Orientation Program;
(b) Second offense - Three (3) months suspension without pay; and
(c) Third offense - Dismissal and perpetual disqualification from public service, and forfeiture of retirement benefits.

Any person found guilty of committing the act stated in Section 17 (d) shall suffer the penalty of dismissal and perpetual disqualification from public service.

Any person found guilty of violating Section 18 shall suffer the penalty of dismissal and perpetual disqualification from public service.

In cases of violation by the system operator and market operator of Section 17 (a), (b), and (c), the ERC shall impose a fine of One hundred thousand pesos (P100,000.00) for every day of delay."

5.5 The LGUs shall encourage the consumers' participation to ensure energy security.

5.6 INFORMATION EDUCATION COMMUNICATION CAMPAIGN. The LGU, in coordination with the DILG and the DOE, shall disseminate and capacitate its concerned stakeholders and constituents on energy safety practices, energy efficiency and conservation, energy resiliency, energy planning which includes energy access and resource development, energy programs, policies, and projects.

5.7 The DILG and the DOE shall provide technical support to the LGUs which includes among others, the conduct of information education campaigns, investment fora, dialogues, and consultations.

5.8 All DILG Regional Directors are hereby directed to cause the widest dissemination of this Joint Memorandum Circular and extend the necessary assistance.

6.0 TIME FRAME

Within ninety (90) calendar days from the lifting of Proclamation No. 922 declaring a State of Public Health Emergency throughout the Philippines, the DILG Regional Offices shall report the compliance of all LGUs under their jurisdiction and quarterly reporting thereafter.

7.0 PENALTIES

The LGU personnel who failed to act on the application in accordance with Section 5.4.4 of this Joint Circular Memorandum shall be subjected to the penalties provided in Section 5.4.5 and Section 19 of RA 11234.

8.0 FEEDBACK

Queries and clarifications regarding this policy should be directed to:

Bureau of Local Government Development
Department of the Interior and Local Government
Telephone Numbers: (02) 8927-7852; (02) 8925-0356;
e-mail address: odblgd@gmail.com

Investment Promotion Office
Department of Energy
Energy Center
BGC, Taguig City
Telephone Numbers: (02) 8840-2255; (02) 8479-2900 locals 389/371
e-mail address: evoss.ph@gmail.com

9.0 SEPARABILITY CLAUSE

If for any reason, any provision of this Joint Memorandum Circular is declared unconstitutional or invalid, the other provisions not affected thereby shall remain valid and subsisting.

10.0 REPEALING CLAUSE

Any provision of DILG and DOE Administrative Orders, Memorandum Circulars or other issuances not consistent herewith are hereby repealed or modified accordingly.

11.0 EFFECTIVITY

This Joint Memorandum Circular shall take effect fifteen (15) days after its publication in a newspaper of general circulation. Copies will be filed with the University of the Philippines Law Center – Office of the National Administrative Register (ONAR).

EDUARDO M. AÑO
Secretary
Department of the Interior and Local Government

ALFONSO G. CUSI
Secretary
Department of Energy

DILG-DSEC 05222020-005

ANNEX A Draft Ordinance

Ordinance No. __ Series of ___

AN ORDINANCE ADOPTING THE GUIDELINES TO FACILITATE THE IMPLEMENTATION OF ENERGY PROJECTS

WHEREAS, The National Economic and Development Authority (NEDA) launched **AmBisyon 2040** which envisions *Filipinos to enjoy a strongly rooted comfortable and secure life in all aspects by 2040.*

WHEREAS, The Philippine Development Plan (PDP) 2017-2022 intends to accelerate all infrastructure development projects, including the energy sector.

WHEREAS, The Philippine Energy Plan (PEP) seeks to unify with government partners and the private sector to meet the country's electricity and fuel requirements through improvements in the energy market, simplification of government procedures, promotion of resiliency in energy systems and infrastructures, and the enhancements of the consumers' power of choice.

WHEREAS, The Philippine Power Development Plan forecasts that the country will need 43,765 megawatts (MW) additional capacity by 2040. With an average annual growth rate of 5.7%, power demand will continue to move in an upward trend.

WHEREAS, President Rodrigo R. Duterte, in adopting a whole-of-government approach for the needs of the energy sector, issued Executive Order No. 30 (EO 30) to streamline regulatory procedures affecting Energy Projects of National Significance.

WHEREAS, The Congress of the Philippines passed Republic Act (RA) 11032 "Ease of Doing Business and Efficient Government Service Delivery (EODB) Act of 2018" and RA 11234 "Energy Virtual One-Stop Shop (EVOSS) Act" to establish the inter-operability of government processes through an online system that streamlines the permitting processes of power generation, transmission, and distribution projects.

WHEREAS, The Department of Energy (DOE), in implementing the pertinent energy laws, sees the Local Government Units (LGUs) as indispensable stakeholders and reiterates the existing and potential benefits for host communities of energy projects, such as Energy Regulation 1-94, national wealth tax or government share, job creations, and other social and economic development programs.

WHEREAS, The Department of the Interior and Local Government (DILG), in support of the DOE, enjoins all LGUs to implement the directive of the President on the implementation of energy projects.

WHEREAS, Section 3 of Administrative Order No. 23 Series of 2020, for processes applicable to energy-related projects, the timelines provided by RA 11234 shall be complied with.

WHEREAS, The DILG and the DOE issued Joint Memorandum Circular _____ providing for the Guidelines for LGUs to Facilitate the Implementation of Energy Projects.

NOW, THEREFORE, in order to establish, strengthen and integrate the energy policies and mechanisms, with respect to energy safety practices, energy efficiency and conservation, energy resiliency, energy planning which includes energy access and resource development, to harmonize and fast-track the implementation of the EODB Act, EVOSS Act, EO 30 and AO 23, to maximize benefits from energy projects to the host communities, to implement the necessary energy programs and projects, Be it Ordained that:

ARTICLE I. GENERAL PROVISIONS

Section 1. Title. This ordinance shall be known as the Guidelines to Facilitate the Implementation of Energy Projects, otherwise known as the "LGU Energy Code".

Section 2. Creation of the Energy Sector Committee under the Local Development Council. The Energy Sector Committee is hereby created under the Local Development Council to facilitate the implementation of energy programs, policies, and projects, in accordance with the following pertinent energy and other regulatory laws, and issuances:

Republic Act No. 7160, An Act Providing for a Local Government Code of 1991 (Local Government Code of 1991)

Republic Act No. 7638, An Act Creating the Department of Energy, Rationalizing the Organization and Functions of Government Agencies Related to Energy, and for Other Purposes (Department of Energy Act of 1992)

ENERGY-RELATED LAWS

Presidential Decree No. 87, Amending Presidential Decree No. 8 Issued on October 2, 1972 and Promulgation of an Amended Act to Promote the Discovery and Production of Indigenous Petroleum and Appropriate Funds Therefor (The Oil Exploration and Development Act of 1972)

Presidential Decree No. 972, Promulgating an Act to Promote an Accelerated Exploration, Development, Exploitation, Production and Utilization of Coal (The Coal Development Act of 1976)

Republic Act No. 7638, An Act Creating the Department of Energy, Rationalizing the Organization and Functions of Government Agencies Related to Energy, and for Other Purposes (Department of Energy Act of 1992)

Republic Act No. 8479, An Act Deregulating the Downstream Oil Industry and for Other Purposes (Downstream Oil Industry Deregulation Act of 1998)

Republic Act No. 9136, An Act Ordaining Reforms in the Electric Power Industry, Amending for the Purpose Certain Laws and for Other Purposes (Electric Power Industry Reform Act of 2001)

Republic Act No. 9367, An Act to Direct the Use of Biofuels, Establishing for this Purpose the Biofuel Program, Appropriating Funds Therefor, and for Other Purposes (Biofuels Act of 2006)

Republic Act No. 9513, An Act Promoting the Development, Utilization and Commercialization

Republic Act No. 10623, An Act Amending Certain Provisions of Republic Act No. 7581 (An Act Providing Protection to Consumers by Stabilizing the Prices of Basic Necessities and Prime Commodities and by Prescribing Measures Against Undue Price Increases During Emergency Situations and like Occasions and for Other Purposes)

Republic Act No. 11285, An Act Institutionalizing Energy Efficiency and Conservation, Enhancing the Efficient Use of Energy, and Granting Incentives to Energy Efficiency and Conservation Project (Energy Efficiency and Conservation Act)

Republic Act No. 11361, An Act Ensuring the Continuous and Uninterrupted Transmission and Distribution of Electricity and the Protection of the Integrity and Reliability of Power Lines, and Providing Penalties for Violations Thereof (Anti-Obstruction of Power Lines Act)

PRIVATE SECTOR PARTICIPATION LAWS

Republic Act No. 7718, An Act Amending Certain Sections of Republic Act No. 6957 (An Act Authorizing the Financing, Construction, Operation, and Maintenance of Infrastructure Projects by the Private Sector, and for Other Purposes)

REGULATORY REFORM LAWS

Republic Act No. 11234, An Act Establishing the Energy Virtual One-Stop Shop for the Purpose of Streamlining the Permitting Process of Power Generation, Transmission, and Distribution Projects (Energy Virtual One-Stop Shop Act)

Republic Act No. 11032, Ease of Doing Business and Efficient Government Service Delivery Act of 2018 (Ease of Doing Business Act of 2018)

Executive No. 30 entitled, "*Creating the Energy Investment Coordinating Council (EICC) in order to Streamline the Regulatory Procedures Affecting Energy Projects (EO 30)*"

Administrative Order No. 23 Series of 2020, Eliminating Overregulation to Promote Efficiency of Government Processes

SUPPORTING POLICIES

DILG-DOE Joint Circular 95-01 dated 31 October 1995 entitled, "*Utilization of Shares from National Wealth*"

DOE Department Circular No. DC2003-11-010 entitled, "*Rules and Regulations Governing the Business of Retailing Liquid Petroleum Products*"

DOE Department Circular No. DC2007-02-0002 entitled, "*Providing for the Rules and Regulations Governing the Business of Supplying, Hauling, Storage, Handling, Marketing and Distribution of Liquefied Petroleum Gas (LPG) for Automotive Use*"

DOE Department Circular No. DC2014-01-0001 entitled, "*Providing for the Rules and Regulations Governing the LPG Industry*"

DOE Department Circular No. DC2017-11-0011 entitled, "*Promulgating a Revised Rules and Regulations Governing the Business of Retailing Liquid Fuels*"

DOE Department Circular No. DC2019-05-0007 entitled, "*Rules and Regulations Implementing Republic Act No. 11234 (Energy Virtual One-Stop Shop Act)*"

DOE Department Circular No. DC2019-11-0014 entitled, "*Implementing Rules and Regulations of Republic Act No. 11285 (Energy Efficiency and Conservation Act)*"

DOE Department Circular No. DC2020-02-0002 entitled, "*The Implementing Rules and Regulations of Republic Act No. 11361, Otherwise Known as the "Anti-Obstruction of Power Lines Act"*"

DILG-DPWH-DICT-DTI Joint Memorandum Circular No. 2018-01 entitled, "*Guidelines in Streamlining the Processes for the Issuance of Building Permits and Certificate of Occupancy*"

DILG-DOF Joint Memorandum Circular No. 2019-01 entitled, "*Guidelines for the Review, Adjustment, Setting and/or Adoption of Reasonable Regulatory Fees and Charges of Local Government Units*"

DILG Memorandum Circular No. 2019-117 entitled, "*Guidelines in the Integration of the Issuance of Barangay Clearance in the Permitting Processes of Cities and Municipalities*"

DILG-ARTA Joint Memorandum Circular No. 2019-01 entitled, "*Guidelines on the Regulatory Reform for LGUs pursuant to the Ease of Doing Business and Efficient Government Service Delivery (EODB-EGSD) Act of 2018*"

PPPC-DILG Joint Memorandum Circular No. 2019-01 entitled "*Supplemental Guidelines for the Implementation of Public-Private Partnership for the People Initiative for Local Government (LGU P4)*"

ARTICLE II. INCORPORATION OF ENERGY PROJECTS INTO THE LGU SPATIAL PLAN AND COMPREHENSIVE DEVELOPMENT PLAN

Section 3. Incorporation to the LGU Plans. The LGU shall incorporate the energy programs, policies, and projects into the spatial plan (Physical Framework Plan or Comprehensive Land Use Plan, whichever is applicable) and its comprehensive development plan.

SPATIAL PLAN

Section 4. The Cities, and Municipalities, in consultation with concerned stakeholders, shall identify upstream conventional (coal, oil, or natural gas) and/or renewable (biomass, geothermal, solar, hydropower, ocean, and wind) energy resources within its area of jurisdiction which shall be posted on its website, if available.

The Cities and Municipalities, in consultation with concerned stakeholders, shall plot existing upstream and downstream energy facilities with coordinates in accordance with the Philippine Reference System 1992 (PRS 92).

The Cities and Municipalities shall coordinate with existing private sector stakeholders on the expansion plans of the existing upstream and downstream energy facilities.

The Component Cities and Municipalities shall submit the data under Section 4 to their respective Provinces for consolidation and submission to the, to the concerned DILG Regional Office. The Independent Component Cities and Highly Urbanized Cities shall submit the data to the concerned Regional Office.

All data under Section 4 shall be submitted to the DILG - Bureau of Local Government Development and DOE - Investment Promotion Office.

The Cities and Municipalities may coordinate with the Public-Private Partnership (PPP) Center for investment opportunities and potential private-public partnerships.

COMPREHENSIVE DEVELOPMENT PLAN

Section 5. Benefits OF Energy Projects Incorporation into the Comprehensive Development Plan. The Province, City, Municipality, and Barangay shall monitor and collect the benefits of energy projects and incorporate these benefits in its comprehensive development plan. The benefits to host communities from energy projects may include among others, funds from the Energy Regulation 1-94 (ER1-94), and the National Wealth Tax.

The development plan of the Province, City, Municipality, and Barangay shall include all local energy policies, plans, and programs covering energy safety and best practices, energy efficiency and conservation, and energy resiliency in its comprehensive development plan which shall be submitted to its respective Regional Development Council and integrated to each of its respective Regional Development Plan.

ARTICLE III. ENERGY PERMITS REGULATORY REFORMS

Section 6. Implementation of the EVOSS Act. The LGU shall streamline the processes in issuing the necessary permits on energy-related projects in accordance with Section 14 of the EVOSS Act.

The LGU shall prepare, submit and implement a unified streamlined and transparent permitting process and corresponding fees.

Said permitting process and corresponding fees shall be submitted by the LGU to the EVOSS Steering Committee through the Secretariat, the DOE-Investment Promotion Office and DILG Regional Office.

The LGU shall process permits within the prescribed time frame as stated in the EVOSS Act to fast track processing of necessary permits to expedite their completion.

The LGU shall designate a focal person, office or unit in charge to managing the EVOSS account in the EVOSS System to ensure proper monitoring and updating of electronic documents and implementation of the EVOSS Act and its IRR.

Upon the submission of the complete documents by the energy project applicant, the concerned LGU (province, city or municipality) shall issue the corresponding permit within

project. Provided, That this shall not preclude the EVOSS Steering Committee from imposing a shorter time frame for resolution of applications should it see the expediency and feasibility of doing so.

Section 7. Deemed Approved. Failure of an LGU to act on applications duly submitted with complete supporting electronic documents within the time frame shall be deemed an approval of such application by the LGU without need of further action on the part of the concerned energy project applicant.

The duly received /stamped as received application form of the energy project applicant by the concerned LGU shall serve as the relevant permit if the LGU fails to act on the application within the provided time frame.

Section 8. Denial of Application. In case of denial of application, the LGU shall notify the energy project applicant in writing stating the reason/s for disapproval.

Section 9. Penalties. Section 19 of the EVOSS Act states:

> *"Any person found guilty of committing the acts stated in Section 17 (a) and (b) shall be penalized as follows:*
> *(a) First offense - Thirty (30) days suspension without pay;*
> *(b) Second offense - Three (3) months suspension without pay; and*
> *(c) Third offense - Dismissal and perpetual disqualification from public service.*
>
> *Any person found guilty of committing the act stated in Section 17 (c) shall be penalized as follows:*
> *(a) First offense - Thirty (30) days suspension without pay and mandatory attendance in Values Orientation Program;*
> *(b) Second offense - Three (3) months suspension without pay; and*
> *(c) Third offense - Dismissal and perpetual disqualification from public service, and forfeiture of retirement benefits.*
>
> *Any person found guilty of committing the act stated in Section 17 (d) shall suffer the penalty of dismissal and perpetual disqualification from public service.*
>
> *Any person found guilty of violating Section 18 shall suffer the penalty of dismissal and perpetual disqualification from public service.*
>
> *In cases of violation by the system operator and market operator of Section 17 (a), (b), and (c), the ERC shall impose a fine of One hundred thousand pesos (P100,000.00) for every day of delay."*

ARTICLE IV. DOWNSTREAM OIL

Section 10. The LGUs shall assist the DOE through the LGUs' suspension of Mayor's/Business Permit and stop the actual operation of Liquefied Fuel (LF) Retail Outlets or Gasoline Stations, Household Liquefied Petroleum Gas (LPG) Establishments (i.e. Refiller, Dealer, and/or Retailer), and Auto LPG Dispensing Stations which do not have the DOE Certificate of Compliance (COC) and Standards Compliance Certificate (SCC).

The LGUs shall enforce its mandate to calibrate instruments of weights and measures of dispensing pump meters in LF Retail Outlets and weighing devices in LPG Establishments.

The LGU shall implement price freeze of household LPG and kerosene upon the declaration of state of calamity in the locality. The price freeze will be implemented for a maximum of fifteen (15) days, starting from the day of the official declaration and conduct regular price monitoring of LPG and kerosene that will serve as basis for the price freeze.

ARTICLE V. POWER DISTRIBUTION DEVELOPMENT

Section 11. For all applications for Building Permits, the LGUs shall inform or coordinate with the Distribution Utilities for the inclusion of the additional supply and demand of energy in the Distribution Development Plan (DDP). Furthermore, the LGUs shall ensure compliance with RA 11361 (Anti-Obstruction of Power Lines Act).

ARTICLE VI. ENERGY EFFICIENCY AND CONSERVATION

Section 12. Energy Efficiency and Conservation Office (EECO). The LGUs, except the barangays, shall establish their respective EECOs, which may be part of the planning and development office, using appropriations from their General Funds established under the Local Government Code.

The DOE, in coordination with the DILG, shall issue the necessary guidelines and templates for the reports and updates to assist the LGUs in the development and implementation of their respective Local Energy Efficiency and Conservation Plans.

Within three (3) years from the effectivity of the EEC-IRR, the respective planning and development offices of the covered LGUs shall be considered as the EECO of such LGU.

Section 13. Energy Efficiency and Conservation Officer

Section 13.1 Appointment/Designation of the EEC Officer. The EEC Officer, who shall head the EECO, must be at least a college graduate and may be designated by the local chief executive from the existing personnel of the LGU or hired through external recruitment. The EEC Officer shall ensure the LGU's compliance with the EEC Act and its IRR, the Local EEC Plan and all energy conservation issuances. Within three (3) years from the effectivity of the EEC-IRR, the head of the respective planning and development offices of the covered LGUs shall be considered as the EEC Officer of such LGU.

Section 13.2 Funding for Remuneration of the EEC Officer. Funding requirements for the remuneration of the EEC Officer's services shall be charged from the existing fund of the respective LGUs.

Section 14. National Energy Efficiency and Conservation Office (NEE&C Office). To support the National Energy Efficiency and Conservation Coordinating Officer (NEECCO), the NEE&C Office is hereby established. The NEE&C Office shall support the NEECCO designated in the integration of all Local EE&C Plans and assist the NEECCO in participating on matters pertaining to the Government Energy Management Program (GEMP) for the LGUs in the Inter-Agency Energy Efficiency and Conservation Committee (IAEECC).

Section 15. Local Energy Efficiency and Conservation Plan. LGUs, except barangays, through their respective EECOs and planning development offices, with the assistance of the DOE and in coordination with the DILG, shall develop and implement their respective Local EE&C Plans and incorporate these in their local development plans. The DOE, in coordination with the DILG, shall issue the necessary guidelines and templates for reports and updates to assist the LGUs in the development and implementation of their respective Local EE&C Plans.

ARTICLE VII. PRIVATE SECTOR PARTICIPATION

Section 16. Local Investment Incentives Plan (LIIP). In coordination with the PPP Center, the LGU shall explore energy development projects with the private sector.

Pursuant to Section 109 of RA 7160 and in the interest of promoting energy efficiency in the local setting, the LGUs, through their Local Development Councils, may include energy efficiency projects in their respective Investment Priority Areas (IPA) and shall grant applicable incentives, including assistance or fast-tracking of permits and licenses indicated in the LIIP to establishments with energy efficiency projects upon registration and compliance with the requirements of the LGU.

Furthermore, the LGUs shall encourage the participation of the private sector on opportunities provided by the upstream and downstream laws enumerated in this Ordinance.

ARTICLE VIII. FINAL PROVISIONS

Section 17. Information Education Communication Campaign. The LGU, in coordination with the DILG and the DOE, shall disseminate and capacitate its concerned stakeholders and constituents on energy safety practices, energy efficiency and conservation, energy resiliency, energy planning which includes energy access and resource development, energy programs, policies, and projects.

Section 18. Funding Support. The (name of LGU) shall allocate_____ .

Section 19. Separability Clause. If for any reason, any section of provision of this Ordinance is declared illegal or unconstitutional other sections or provisions hereof which are not affected thereby shall continue to be in full force and effect.

Section 20. Repealing Clause. All previous issuances, ordinances, rules and regulations or parts thereof which are inconsistent or in conflict with the provisions of this Ordinance are hereby repealed or modified accordingly.

Section 21. Effectivity Clause. This Ordinance shall take effect fifteen (15) days after its approval and _____.

ENACTED BY THE SANGGUNIANG _____ AT ITS _____ SESSION HELD ON _____, 2020.

Signed.

Annex 6: Pag-IBIG Memo for Acquisition of Solar Panels

Pag-IBIG Fund
Corporate Headquarters
Petron MegaPlaza Bldg.
358 Sen. Gil Puyat Avenue
Makati City

MEMORANDUM

TO : **ALL CONCERNED**

FROM : **THE CHIEF EXECUTIVE OFFICER**

SUBJECT : **AVAILMENT OF Pag-IBIG HOUSING LOAN FOR THE ACQUISITION/INSTALLATION OF SOLAR PANELS**

In line with the Pag-IBIG Fund's support to mitigate the effects of climate change and to maximize and utilize renewable energy resources, the following policies on the availment of a Pag-IBIG housing loan for the acquisition/installation of solar panels are hereby issued:

1. A qualified Pag-IBIG Fund member may be allowed to avail of a housing loan for the acquisition/installation of solar panels as part of home improvement or as a component of the housing unit to be purchased subject to the prevailing Pag-IBIG Fund retail housing loan programs.

2. The loan shall be secured by a collateral that shall consist of the same residential property to which the loan proceeds are applied.

   Please be guided accordingly.

ATTY. DARLENE MARIE B. BERBERABE

Makati City,

MAY 19 2015

Annex 7:
Net-Metering Agreement template

Annex A-2

AMENDED NET-METERING AGREEMENT

This **Net-metering Agreement** is entered into by and between:

_____, of legal age, single/married, with postal address at _____, hereinafter referred to as the Qualified End-User (QE);

-and-

_____, an electric distribution utility duly organized and existing under Philippine laws, with principal office address at _____, franchised to construct, own, operate and maintain an electric distribution facility in the city/municipalities/barangays of _____, all in the Province of _____, represented herein by its President/General Manager _____, hereinafter referred to as the DU;

WITNESSETH THAT:

WHEREAS, QE intends to install within its premises for purposes of net-metering a Renewable Energy (RE) system, more particularly described as follows:

Technology Type: _____
Rated Capacity: _____
Location: _____

WHEREAS, DU has pre-qualified QE to be eligible to participate in the net-metering program;

NOW, THEREFORE, the parties enter into this net-metering agreement under the following terms and conditions:

Section 1. Compliance Standards. - The RE System to be installed within the QE's premises must be compliant with the standards set by Philippine Electrical Code (PEC), Philippine

Distribution Code (PDC), Distribution Service Open Access Rules (DSOAR) and the Net-Metering Interconnection Standards.

Section 2. Interconnection Set-Up. - The RE system shall be embedded in the QE's premises and shall be equipped with appropriate metering equipment.

a. The DU shall furnish and install a bi-directional meter at the QE's premises, without prejudice to the DU's compliance with Section 34 of the "Rules to Govern the Implementation of Advanced Metering Infrastructure (AMI) by Distribution Utilities and Other ERC-Authorized Entities," promulgated on 18 May 2016, and other relevant Rules as may be promulgated by the Commission.

b. All bi-directional meters and its installation shall be at the expense of the QE; except in the case of new customers; and QEs with existing separate meters required to be replaced with a bi-directional meter under "Rules to Govern the Implementation of Advanced Metering Infrastructure (AMI) by Distribution Utilities and other ERC - Authorized Entities," the cost thereof shall be on the account of the DU.

c. The DU shall also furnish and install, an REC meter in proximity to the RE System. This is to measure the total RE generated for compliance with the Renewable Portfolio Standards (RPS) and to measure the actual energy consumption for the determination of the following:

    i. non-exemption from payment of the lifeline subsidy rate;
    ii. payment of senior citizen subsidy rate; and
    iii. other relevant subsidies mandated by law.

d. The location of the above-mentioned meters shall be in accordance with Section 7.2.2 of the 2017 Philippine Distribution Code, and any subsequent amendments thereto.

A complete and more detailed plans and specifications of the interconnection set-up and facilities are attached as an integral part of this net-metering agreement.

Section 3. DU Inspection. - The QE shall allow the DU to access the QE's RE system to inspect, test, maintain and operate the protective devices and read or test the meters and other facilities,

provided that the QE was given a notice in writing at least three (3) days before the DU's intended date to enter the premises.

The DU, upon the same notice requirement as stated above, may limit the operation and/or disconnect, or require the disconnection of a QE's RE system from the DU's Distribution System under the following circumstances:

1. Routine maintenance, repairs or modification of the DU's Distribution System;

2. Upon determination by the DU that a QE's RE system is not compliant with the DSOAR and the PDC; and

3. Upon termination of the Agreement.

However, in cases of emergency where the DU reasonably believes that a hazardous condition exists which may warrant such limiting of the operations and/or disconnection to ensure public safety, only a reasonable notice to the QE is required.

Section 4. Meter Readings. - The DU shall be the Metering Service Provider and shall conduct the meter reading of the import and export meters every ____ day of the month for billing purposes. The DU shall immediately leave a copy of the results of its meter readings at the QE's premises, in accordance with Section 2.11.2 of the Distribution Services and Open Access Rules (DSOAR).

Section 5. Pricing of Exported Renewable Energy. - The price of export electricity shall be the DU's monthly generation charge, which is based on its blended generation cost, excluding other generation adjustments.

Section 6. Conduct of Distribution Impact Study (DIS). The DU shall determine, in a non-discriminatory basis, whether a specific DIS is necessary, to ensure the reliability and safety of the interconnection of the RE system and the Distribution System. There will be no additional charges that will be imposed on the QE for the conduct of the DIS.

Section 7. Billing Charges. - The net amount payable by or creditable to the QE shall be obtained by subtracting from the subtotal amount for import energy, the following: (a) the subtotal peso amount for export energy, and (b) the peso amount credited in

the previous month, if any. If the resulting peso amount is positive, the QE shall pay this positive peso amount to the DU. If the resulting peso amount is negative, the DU shall credit the negative peso amount to the QE's electric bill in the immediately succeeding billing period.

Section 8. RE Certificate. - The DU shall be entitled to an RE Certificate resulting from Net-Metering arrangements with the QE who is using an RE Resource to provide energy. Such RE Certificate shall be based on gross generation and shall be credited as compliance of the DU's obligations under the RPS.

Section 9. Modification to the RE System. - Any modification to an existing RE system shall require the QE to undergo the same process as that of a new customer including the execution of a new Net-Metering Agreement.

Section 10. Severability. - The unenforceability or invalidity of any provision or part of this Agreement shall not affect the enforceability or validity of the other provision or part of this Agreement.

Section 11. Amendments. - No changes or modifications of this Agreement shall be effective unless in writing signed by both Parties.

Section 12. Notices. - Each communication to be made hereunder shall be made in writing and, unless otherwise stated, may be sent through personal delivery, facsimile, or first class mail at the following address or facsimile number:

For the Qualified End User:
Address: _____
Fax: _____
Email: _____

For the Distribution Utility:
Address: _____
Fax: _____
Email: _____

Section 13. Non-waiver/exercise of rights. - Failure by a Party to exercise or delay in exercising a right, power or remedy does not prevent its exercise or is a waiver of such right, power or remedy. No waiver by either party of any of its rights, power or remedy under this Agreement shall be deemed to have been made unless expressed in writing and signed by both parties.

Section 14. Termination Date. – The agreement shall be co-terminus with the service contract of the QE with the DU under Customer Account No. _____. Either party may however pre-terminate this net-metering agreement for just cause.

Section 9. Dispute Resolution. – In case of dispute over the application of certain provisions of this agreement, the parties shall exert best efforts to resolve the dispute among themselves within thirty (30) calendar days from when the dispute arose. If the dispute remains unresolved after this thirty (30) day period, either party may file a petition for dispute resolution with the Energy Regulatory Commission (ERC), who shall have original and exclusive jurisdiction over such dispute.

While these are pending with the ERC, the status quo of cases involving violation of contract shall be maintained. The maintenance of the status quo shall only be applicable to the subject matter of the case and will not extend to any other right/s and obligation/s between the parties.

IN WITNESS WHEREOF, the parties execute this Net-Metering Agreement this (date) at (place).

ABC Electric Company/Cooperative
(DU)

By:
President/General Manager

Juan Dela Cruz
Qualified End-User

Witnesses:

_____ _____

Acknowledgment

Republic of the Philippines)
) S.S.

BEFORE ME, this _____, the following persons appeared before me,

NAME	Identification Documents (TIN/Driver's License/SSS)	Date/Place of Issue

known to me to be same persons who personally appeared before me and acknowledged to me that the foregoing agreement is the result of the free act and deed and that of the corporation/cooperative which they represent.

Doc. No. _____;
Page No. _____;
Book No. _____;
Series of _____.

Annex 8:
Draft Complaint/Grievance Form

COMPLAINT/GRIEVANCE FORM

NAME:

DATE FORM SUBMITTED:

MOBILE NUMBER:

EMAIL ADDRESS:

LANDLINE NUMBER:

DETAILS LEADING TO COMPLAINT/GRIEVANCE

DATE OF THE INCIDENT:

NAME OF PERSON BEING COMPLAINED (IF ANY):

ACCOUNT OF EVENT:

VIOLATION:

PROPOSED SOLUTION:

SIGNATURES

SIGNATURE OF COMPLAINANT/DATE:

RECEIVED BY/DATE (SIGNATURE OVER PRINTED NAME):