



BIDS AND AWARDS COMMITTEE

Bid Bulletin No. 1 for 5th Public Bidding CY2023

A. Procurement of Services for the Conduct of Third- Party Energy Audit of Building of Government Entities.

1. Clarification on the number of attendees in the conduct of seminar
 - a. Scope of Work Item 3.2 Conduct of Energy Audit Orientation:
 1. **The number of attendees is for a maximum of five (5) person per Government Entity.**
2. Clarification on percentage of cash deduction as warranty retention:
 - a. **The cash deduction as warranty retention is reduced from 5% to 2%**

B. Procurement of Services for Assessment and Review of IAEECC Resolutions to Optimize and Further Accelerate the Implementation of the Government Energy Management Program (GEMP)

1. Clarification on percentage of cash deduction as warranty retention:
 - a. **The cash deduction as warranty retention is reduced from 5% to 2%**

C. Demonstration Project on Promoting Solar **Photovoltaic (PV) Technology for Offices Covered under the Government Energy Management Program**

1. Clarification on percentage of cash deduction as warranty retention:
 - a. **The cash deduction as warranty retention is reduced from 5% to 2%.**
2. Clarification on the TOR/Specifications as per attached revised TOR/Specifications.

**Demonstration Project on Promoting Solar Photovoltaic (PV) Technology for
Offices Covered under the Government Energy Management Program as
Provided by the EE&C Act**

Approved Budget Cost: PhP 30,000,000.00

TERMS OF REFERENCE

1. BACKGROUND

Republic Act No. 11285 otherwise known as the Energy Efficiency and Conservation Act of 2019 and its governing Implementing Rules and Regulations (EEC IRR) provide among others the establishment of the framework for introducing and institutionalizing fundamental policies on energy efficiency and conservation and promotion.

Under Section 35 of the EEC IRR, the Inter-Agency Energy Efficiency and Conservation Committee (IAEECC) was created to evaluate and approve government energy efficiency projects (GEEPs), and to provide strategic direction in the implementation of the Government Energy Management Program (GEMP).

IAEECC Resolution No. 1, s. 2020 directs all government entities, including the LGUs and foreign service posts to comply with the GEMP, orders the DOE to conduct energy audits and spot-checks, and submit proposed improvements to the GEMP

The GEMP covers all Government Entities (GEs) which includes National Government Agencies (NGAs), Government-Owned and Controlled Corporation (GOCCs), Local Government Units (LGUs) and State Universities and Colleges (SUCs), Government Financing Institutions and Foreign Service Posts, among others.

Section 5.1 of the IAEECC Resolution No. 5 s. 2022 provides details for the Implementation of the Energy Efficiency and Conservation Program (EECP) which consist of the implementation of GEEPs wherein solar rooftop power generation and solar heating systems are listed among the proven energy efficient technology.

Further, Section 5 of the Department Order (DO) No. 2022-04-0006, also known as the Guidelines on the Endorsement of GEEPs to the IAEECC Pursuant to the GEMP Guidelines, states that preferential evaluation and implementation shall be provided to priority GEEPs, such as GEEPs with initiatives promoting the development and utilization of efficient renewable energy technologies and systems, and GEEPs that are pilot and demonstration initiatives for energy security, to ensure the unhampered delivery of public services.

2. OBJECTIVE

The objective of the **Project** is to conduct demonstration projects on the viability and effectiveness of Solar PV technology to promote the utilization of renewable sources of energy in government buildings, offices, and/or facilities as provided under the EE&C Act.

2.1 To promote and encourage the accelerated development and utilization of efficient renewable energy technologies such as Solar PV as one of the effective EE&C solutions to lower electricity costs by reducing dependence on use of fossil fuels and contribute to the mitigation of greenhouse gas emission.

2.2 To install Solar PV technology in government buildings, offices, and/or facilities;

- 2.3 To serve as a model for government buildings/offices to showcase the viability of RE technologies, particularly the Solar PV technology as one important solution that may contribute to cushioning the impact of increasing electricity costs of GEs.
- 2.4 To improve the capabilities of the EUMB on Solar PV technology through technology transfer.

3. SERVICE PROVIDER ELIGIBILITY

- 3.1 Should be a DOE registered/certified Energy Service Company (ESCO);
- 3.2 With relevant experience in supply, installation, testing, commissioning, and handing over of at least 30 kWp solar PV system in a single order;
- 3.3 Safety construction solutions and overall aesthetics consideration in the design and implementation.
- 3.4 With certified technicians/ technical staff that will be engaged for the project.

4. SCOPE OF WORK

4.1 Solar PV Technology Installation

4.1.1. Pre-Installation Activities

- 4.1.1.1. Initial Coordination with the target GEs as determined by the EUMB;
- 4.1.1.2. Conduct structural integrity and site assessment of rooftop/ ground installations for designing the suitable modules;
- 4.1.1.3. Present the proposed technical specifications of the Solar PV to EUMB for approval;
- 4.1.1.4. Provide an assessment report of the potential savings and benefits on a per-site basis and perform necessary analysis and estimate of annual power generation;
- 4.1.1.5. Conduct of Solar PV Technology Orientation/Workshop on Maintenance , Replacement, and disposal;
- 4.1.1.6. Coordinate signing of relevant government requirements/contracts such as memoranda of understanding/agreement and/or deed of donation;
- 4.1.1.7. Provide the relevant manual/document for the operation/maintenance of the solar PV installation and its relevant software;
- 4.1.1.8. Ensure proper compliance of beneficiaries for applicable net-metering agreements and other government requirements;
- 4.1.1.9. Request for pre-installation documents;
- 4.1.1.10. Scheduling of the Solar PV technology Installation.

4.1.2. Delivery and Installation of Solar PV technology to qualified government buildings, offices, and/or facilities

- 4.1.1.1 Install Solar PV technology with a DC capacity of 30-40 kWp;

- 4.1.1.2 Ensure that the Solar PV installed conforms with the technical specifications approved by the DOE (***Please see attached detailed specs***).
- 4.1.1.3 Ensure that all installations function correctly in accordance with specified designs. The contractor shall be responsible for any systems that do not function correctly as a result of improper design and/or improper workmanship;
- 4.1.1.4 Apply the approved DOE label sticker/tag on the installed solar PV.
- 4.1.1.5 Provide spare parts for the Solar PV System (i.e. solar pv module, other parts, etc.)

4.1.3 Testing and commissioning (including warranty period)

- 4.1.3.1 The Service Provider shall conduct testing and commissioning for a minimum of seven (7) days upon completion of the installation of PV System to be witnessed by the DOE and representatives of the beneficiaries. The schedule and duration of the testing and commissioning shall be mutually agreed by the Service Provider and the beneficiaries. However, the testing and commissioning activities shall be satisfactorily completed within the time required under the contract. Any corrections resulted from the error in the workmanship or design made by the Service Provider which were found during the conduct of testing and commissioning or prior to Solar PV System operation thereon, with the resulting expenses due to repair or cost for the replacement for damaged equipment/materials shall be solely charged to the account of the Service Provider.

Testing and commissioning shall be performed in a systematic process whereby all systems and equipment are tested and brought into operation and performed interactively according to the design intent and in accordance with the performance criteria set upon. Equipment and appurtenances shall be inspected to determine the completeness of the PV system and conformance in accordance to specifications. All testing instruments including consumables, temporary structures, and manpower required for the testing and commissioning activities shall be provided and at the account of the Service Provider.

Testing and Commissioning Plan (TCP)

The Service Provider shall submit a TCP prior to the conduct of testing and commissioning for DOE's review and approval

The TCP shall include the following information:

- Itinerary (date) of the testing and commissioning;
- Detailed methodology and step-by-step procedures;
- List of tools and equipment, including PPE, to be used;
- Manpower requirement;
- Hazards and safety protocol; and
- Target results

Testing and Commissioning Works

The minimum testing and commissioning shall include the following:

- a. Inspection and calibration of tools and testing instruments;
- b. Visual and physical (quality and quantity) inspection of the installed equipment and appurtenances;
- c. Torque test of all terminations and mounting;
- d. Continuity test (open circuit and close circuit) of all breakers, fuses, switches, protection devices and other equipment with circuitry;
- e. Insulation test of all DC and AC wire including grounding (line-to-line and line-to-ground)
- f. Open circuit voltage/short circuit current string test;
- g. Polarity test;
- h. Phase sequence test;
- i. AC operating voltage test;
- j. Inverter synchronization test;
- k. Inverter frequency test;
- l. Inverter power generation test; and
- m. Operating voltage and operating current string test; and
- n. Thermal scanning
- o. Rapid shutdown device functionality

The minimum tools and test instruments to be used shall include the following:

- a. Torque wrench
- b. Current meter
- c. Voltage meter
- d. Phase sequencer
- e. Irradiance meter
- f. Solar PV temperature meter
- g. Thermal scanner
- h. Camera
- i. 2-way radios
- j. Lock-out/tag-out; and
- k. Fire extinguishers

The contractor may use a multi-function instrument that is capable of performing the testing and commissioning such as a Solar PV installation tester.

Personnel who will conduct the testing and commissioning shall be equipped with the minimum PPE:

- a. Safety shoes (electrical)
- b. Safety jacket
- c. Safety pants
- d. Electrical gloves (1kV and 480kV); and
- e. Protective eye glass

The Service Provider shall also provide first-aid kit

Testing and Commissioning Report (TCR)

The Service Provider shall submit the TCR after the completion of the testing and commissioning to be signed by the DOE and building owner representative(s)

- 4.1.3.2 Assume liability for the manufacturer warranties of the respective system components/parts which shall have no less than a minimum warranty period of 5 years for each component

except for the solar panels which shall have a minimum warranty period of 10 years.

4.2 Capacity Building for Personnel in Charge

- 4.2.1 Conduct training for personnel in charge of maintenance of buildings and facilities on proper use and maintenance of the technology to ensure optimum efficiency;
- 4.2.2 Provide training to the assigned group of EUMB and the beneficiaries concerning the project process such as but not limited to the proper use and maintenance of technology to ensure optimum efficiency and shall not withhold any information, tasks, and steps;
- 4.2.3 Handover of operations manual to personnel in charge;
- 4.2.4 Establish coordination mechanisms (i.e. focal persons) to facilitate on-site and remote assistance in the operation and troubleshooting of the technology after installation and testing period.
- 4.2.5 The Service Provider shall conduct operation and maintenance trouble shooting and management trainings during and/or after the commissioning stage of the facility. The training shall include but not limited to lectures and hands-on onsite strategy covering the methods of operation, maintenance, basic trouble shooting, and management of the facility.

4.3. Other functions to ensure continuity and implementation of the Project

- 4.3.1. Assign a project manager and staff to handle reportorial requirements, monitoring, and presentations of project performance regarding the projects as requested by EUMB;
- 4.3.2. Submit all reports, models and software used in assessing facilities and operating the solar PV installations to EUMB;
- 4.3.3. Arrange the conduct of joint site assessment, ceremonial switch-on of the projects, turn-over of installations to beneficiaries and other activities.

5. POTENTIAL PROJECT SITES

Area	No. of Project Sites	Project Beneficiary	Target Buildings
Luzon	2	DOE Main office-Taguig City; LGU-Candon City , Ilocos Sur	City/ Municipal hall; Multi- purpose Bldg; Admin Bldg.; MRF Bldg; Annex or Extension Bldg.
Visayas	2	LGU-Municipality of Guimbal, Iloilo; LGU-Mandaue City, Cebu	
Mindanao	2	LGU-Kidapawan City; LGU-Davao City	

6. EXPECTED OUTPUT OR DELIVERABLES

	DELIVERABLES	TARGET SCHEDULE
A.	Approved and accepted Inception Report	Within 20 calendar days after receipt of the Notice to Proceed
B.	Assessment Report for the 6 sites and Approved Technical Specifications	Within 60 calendar days after receipt of the Notice to Proceed
C.	Delivery, Installation, Testing and Commissioning of 6 Solar Rooftop Projects	Within 150 calendar days receipt of the Notice to Proceed
D.	Approved and Accepted Completion Report with Final as Built Design Documentation	Within 180 calendar days receipt of the Notice to Proceed

7. PROJECT COMPLETION

The project should be completed in **six (6) months** upon receipt of the Notice of Proceed.

No.	Activities	Duration in Calendar Days	M1	M2	M3	M4	M5	M6
1	Coordination meetings, conduct of inception meeetin and submission of report	20						
2	Site assessment of 6 projects	20						
3	Preparation and submission of site assessment report (6 Projects) and technical specification of the Solar Rooftop Project	20						
4	Delivery, instaaalion, testing and commissioning of Solar Rooftop Project	90						
5	Prepartion and submission of completion report for the six (6) projects	25						
6	Issuance of Certificate of Completion and Acceptance	5						
		180						

8. APPROVED BUDGET FOR THE CONTRACT

The approved budget cost (ABC) for the Demonstration Project is **Thirty Million Pesos (PhP 30,000,000.00)** under LFP-NEECP.

9. SCHEDULE OF PAYMENT

	DELIVERABLES	Requirement	Percentage of Total Contract Amount	Delivery Schedule
A.	Approved and accepted Inception Report	Billing/invoice with end-user acceptance certificate	10%	20 Calendar days after receipt of Notice to Proceed
B.	Site Assessment Report for 6 Projects and Approved Technical Specifications		30%	60 calendar days after receipt of Notice to Proceed
C.	Delivery, Installation, Testing and Commissioning of 6 Solar Rooftop Projects		50%	150 Calendar days after receipt of Notice to Proceed
D.	Approved and Accepted Completion Report with Final as Built Design Documentation and upon completion of net metering application and grid interconnection		10%	180 Calendar Days after the receipt of Notice to Proceed
<p><i>10% retention shall be deducted for every progress billing</i></p> <p><i>2% of the total contract cost shall be retain as warranty which will released upon completion of the warranty period</i></p>				

For every deliverable, there should be an Approval and Certificate of Acceptance

10. Warranty for Goods and Workmanship

- For major components: Standard supplier's warranty as indicated in Annex A
- For other parts and workmanship two years with free labor parts and supplies

11. TERMS

- a. Prices quoted shall be firm and irrevocable and not subject to any change whatsoever, even due to increase in cost of components and fluctuations in foreign exchange rates and excise duties.
- b. Progress payments will be released only upon the issuance of the Certificate of Acceptance from the end-user.
- c. In reference to GPPB Resolution No. 30-2017, the service provider shall provide performance security to the DOE.

12. PARTICIPATION OF WOMEN, SENIOR CITIZENS, AND PERSONS WITH DISABILITIES (PWDs)

The participation of women, senior citizens, and PWDs in every aspect of this research study implementation is encouraged. The purpose of gender and development is to ensure that both men and women including senior citizens and PWDs can participate in, and benefit from, the development in a way that is equitable. Likewise, the gender and development approach focus on the socially constructed differences between men and women, the need to challenge existing gender roles and relations, and the creation and effects of class differences on development.

**Demonstration Project on Promoting Solar
Photovoltaic (PV) Technology for Offices
Covered under the Government Energy
Management Program as Provided by the EE&C
Act**

I. GENERAL SPECIFICATIONS

GENERAL SPECIFICATIONS

1.	General Description of the Project	<p>The Department of Energy (DOE) through the Energy Utilization Management Bureau (EUMB) aims to conduct a study on the viability and effectiveness of Solar PV technology as one among EE&C Solutions for Government Buildings/Offices under the Project for the Implementation of Rooftop Solar PV System with Energy Storage</p> <p>The contract will involve the Design and Build Scheme for the installation of Solar PV Systems an alternative hybrid solar power supply for the six (6) government buildings as identified by the EUMB.</p> <p>The DOE-EUMB hereby intends to engage the services of a qualified and experienced local Service Provider Firm, through Competitive Public Bidding, to provide the required services for the needs of the six (6) government buildings as identified by the EUMB.</p> <p>The plans and designs shall be in accordance with the existing laws and standards, and as conceptualized by the Service Provider, and approved by DOE-EUMB and the beneficiaries.</p>
OC UL	Approved Budget for the Contract (ABC)	₱ 30,000,000.00
3. Scope of Works		
	3.1 Information to be Verified	<p>The Service Provider shall be deemed to have visited the DOE-EUMB and have a clear understanding of the requirements for the scope of works and the Technical Specifications prior to the bid tender.</p> <p>In case the Service Provider intends to conduct a site visit to the LGU beneficiaries, the DOE-EUMB will issue the necessary referral endorsement to the Service Provider</p> <p>A Certification duly signed by the DOE-EUMB and the beneficiaries shall be issued upon the conduct of an ocular inspection by the Service Provider.</p>
	3.2 Information Security and Non-Disclosure Agreement	<p>The Service Provider must agree and adhere to all DOE-EUMB information security protocols, regulations, and policies at all times while inside the DOE-EUMB premises, and must sign, including all its personnel assigned to the job site, the confidentiality and non-disclosure agreement with the DOE-EUMB.</p>

<p>3.3 General Requirements</p>	<p>The Service Provider shall design, supply, install, and commission the Solar PV System that meets the following criteria:</p> <ul style="list-style-type: none"> • The electricity generated by the Solar PV System shall be supplied to the designated building of the beneficiaries; • The Solar PV System shall be equipped with energy management system capable for remote monitoring and data acquisition via web-based platform; • The Solar PV System shall be equipped with CCTV Camera system capable for remote viewing via web-based platform; <p>“stand-alone/off-line (inaccessible through the internet)” Facility “Facilities”, including all necessary works and functions to complete the project.</p> <p>The said Facility “Facilities” includes the following “components on each site location”, but not limited to:</p> <p>(1) Grid-connected Facility</p> <ol style="list-style-type: none"> a) PV Array <ol style="list-style-type: none"> i. PV Modules ii. Junction Boxes iii. Connection Boxes iv. Inverters b) Power Conditioner with closed loop/stand-alone data gathering, monitoring, processing, and transmission capability
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- c) Control System: Energy/Power Management System
- d) Support Structures for PV Modules to achieve optimum tilt angle
- e) Metal-enclosed Switchgear and Power Cables, if not integrated
 - i. Metal-enclosed Switchgear
 - ii. Power Cables
- f) Low Voltage Distribution Board, if not integrated
- g) Power Transformer, if not integrated
- h) Control and Low Voltage Cables
- i) Installation Work
 - a. Building and Civil Work
 - b. Electrical Work
- j) Other necessary equipment, apparatus, appurtenances, and materials needed to complete the project.

(2) Operation Training Work

The Service Provider shall conduct the training for the beneficiaries and other concerned parties for the operation, maintenance, and troubleshooting of the Facility.

(3) Building Permits

Shall apply, in coordination with the project beneficiaries, for the necessary Building Permits. Generally, all Local Government Units (LGUs) include the application for electrical permits in the procedure for application in accordance with the National Building Code of the Philippines. The processing of building permits falls under the overall control and supervision of the Office of the Building Official (OBO) of the LGU.

(4) PV-Net Metering Application and Grid Interconnection

The PV-Net Metering application and grid interconnection shall be required between the beneficiaries and the “concerned” Distribution Utility (DU), which shall be processed by the Service Provider on behalf of the beneficiaries, for the Facility “Facilities” to be connected with the existing distribution/service line of the concerned DU.

The distribution impact study (DIS) and the distribution assets study (DAS) are carried out by the (“concerned DU”) ~~electric cooperative~~ for the “its” DU’s interfaces with the Facility based on the Service Provider application for the grid interconnection containing detailed designs of the Project.

The Service Provider shall coordinate with the “concerned DU” ~~distribution utility (DU)~~ and shall apply, in coordination with the beneficiaries, for the DIS and the DAS during the implementation stage.

		<p>Detailed interfaces between the Facility and the existing distribution lines shall be based on the results of the DIS and the DAS. The DU's interface requirements shall be included in the Scope of Works. The cost of the DU's interface shall be paid by the Service Provider to the DU.</p> <p>As a Qualified End-user or Entity with Self-Generation Facilities, the Service Provider shall secure a Certificate of Compliance (COC) from the Energy Regulatory Commission before the Commercial Operation of the Solar PV Net-Metering Facility. The application for COC shall be in the name of the beneficiary "beneficiaries" as owners of the Solar PV Net-metering Facility "Facilities" used in the Generation of Electricity.</p> <p>The Service Provider shall undertake the detailed engineering design (DED) of the Facility "Facilities", including all items to be required for the interphase of the Facility to the beneficiary "beneficiaries" Building Management System (BMS). Although not expressly described in the General Specifications and Technical Specifications, the interphase is necessary to ensure trouble-free operation, ease in the maintenance of the Facility, and to avoid dangerous or faulty operations.</p> <p>The Facility "Facilities" shall be installed with all the equipment completely connected and interconnected with operating switches, interlocks, signalization, alarms, and metering instruments.</p> <p>Should there be any ambiguity or conflict between the Terms of Reference and existing laws and regulations of the country, such as the Philippine Electrical Code, Philippine Distribution Code, National Building Code of the Philippines, National Structural Code of the Philippines, DU's Standards and Regulations for Grid-Interconnection and net metering, and related issuances, the latter shall prevail and govern.</p>
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4. General Information on the Site

<p>4.1</p>		<p>Unless otherwise specified, the Facility "Facilities" shall be suitable for and where necessary specifically treated and protected for delivery, storage, and operations under tropical climatic conditions of high temperature, high humidity, heavy rainfall, mildew, white ants, and fungus-conducive environment for the following potential project sites:</p> <table border="1" data-bbox="667 1563 1473 2000"> <thead> <tr> <th data-bbox="667 1563 826 1659">Area</th> <th data-bbox="826 1563 962 1659">No. of Project Sites</th> <th data-bbox="962 1563 1302 1659">Project Beneficiary</th> <th data-bbox="1302 1563 1473 1659">Target Buildings</th> </tr> </thead> <tbody> <tr> <td data-bbox="667 1659 826 1756">Luzon</td> <td data-bbox="826 1659 962 1756">2</td> <td data-bbox="962 1659 1302 1756">DOE Main office-Taguig City; LGU-Candon City , Ilocos Sur</td> <td data-bbox="1302 1659 1473 2000" rowspan="3">City/ Municipal hall; Multi-purpose Bldg; Admin Bldg.; MRF Bldg; Annex or Extension Bldg.</td> </tr> <tr> <td data-bbox="667 1756 826 1877">Visayas</td> <td data-bbox="826 1756 962 1877">2</td> <td data-bbox="962 1756 1302 1877">LGU-Municipality of Guimbal, Iloilo; LGU-Mandaue City, Cebu</td> </tr> <tr> <td data-bbox="667 1877 826 2000">Mindanao</td> <td data-bbox="826 1877 962 2000">2</td> <td data-bbox="962 1877 1302 2000">LGU-Kidapawan City; LGU-Davao City</td> </tr> </tbody> </table> <p><i>Note: The DOE-EUMB shall identify the final site locations</i></p>	Area	No. of Project Sites	Project Beneficiary	Target Buildings	Luzon	2	DOE Main office-Taguig City; LGU-Candon City , Ilocos Sur	City/ Municipal hall; Multi-purpose Bldg; Admin Bldg.; MRF Bldg; Annex or Extension Bldg.	Visayas	2	LGU-Municipality of Guimbal, Iloilo; LGU-Mandaue City, Cebu	Mindanao	2	LGU-Kidapawan City; LGU-Davao City
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		<p>(4) Relative Humidity</p> <p>a) Annual average maximum relative humidity (2021) : 75%</p> <p>b) Maximum relative humidity for design : 95%</p> <p>(5) Rainfall (maximum monthly average) (2021) : 163mm</p> <p>(6) Basic Wind Velocity for Design : 230km/hr</p> <p>(7) Seismic Zone Factor (Z) : 0.4 (National Structural Code of the Philippines)</p>
	4.2 Existing Electrical System	<p>Specifics per site</p> <p>(1) Medium System Voltage : 34.5 kV</p> <p>(2) Low Voltage System Voltage : 440/240V</p> <p>(3) System Frequency : 60 Hz</p> <p>(4) Phase : 3-phase</p>
	4.4 Working Area (if necessary)	<p>(1) The Service Provider shall be responsible for its working area and accommodation for its employees at its own expense, including all necessary preparatory work, maintenance, security, and safety.</p> <p>(2) The Service Provider shall, at its own expense, provide itself with all necessary facilities for the efficient use of the areas designated by the beneficiaries</p> <p>(3) The Service Provider shall be, at its own expense, responsible for the maintenance and security of its work areas until the completion of the Facility "Facilities" and restore to its original state the same after completion of the Facility "Facilities".</p>
	4.5 Electricity and Water Supply and Telephone Connection	<p>The beneficiaries may grant the Service Provider permission to use the existing electric and water supply facilities, and telephone for the installation of the Facility "Facilities".</p> <p>(1) The Service Provider shall, at its own expense, provide its own internet connection, and all related equipment and materials, which are necessary to perform its task.</p> <p>(2) The Service Provider shall pay for the electricity, water, and telephone it consumed relative to the installation and commissioning of the Facility or any other purpose to beneficiaries at the actual rate.</p> <p>(3) In any case, beneficiaries will not be liable for any failure in the provision of electricity, water supply, and telephone to the Service Provider for the said purpose. The Service Provider, therefore, shall not be entitled to claim against loss of time or any damage against the beneficiaries.</p>

		<p>(4) The Service Provider shall be responsible for maintenance and security until the completion of the Facility "Facilities" and removal of the electricity, water supply, telephone, and internet connection which it has brought in.</p>
<p>5.</p>	<p>General Provisions for the Installation of the Facility</p>	<p>The Service Provider shall be responsible for any injury to persons and damage to property of the beneficiaries caused by the Designer- Builder or by its workers and shall be liable for any claims of the beneficiaries on account of such injury and/or damage.</p> <p>The Service Provider shall likewise take necessary precaution to protect the property of the Beneficiaries against rain or other inclemency of the weather or theft due to the performance of its work. The Service Provider shall be liable for any such damage or loss.</p> <p>The Service Provider shall check the availability of sufficient space for the installation of the Facility "Facilities" before the commencement of the works. The Service Provider shall have exclusive occupancy of the affected locations at the Facility site, as designated by the beneficiaries. The Service Provider shall also coordinate and cooperate with beneficiaries for the smooth execution and progress of the installation of the Facility "Facilities" as a whole.</p> <p>The Service Provider shall coordinate with the beneficiaries on the installation work such as foundation work, cable routes, and methods of the conduit pipe and steel cable tray installations, and shall obtain the consent of beneficiaries before the commencement of each activity of the installation work.</p> <p>During the installation work, the Service Provider shall undertake the following:</p> <ol style="list-style-type: none"> 1. Provide representative(s) to supervise and monitor the progress of the works. 2. Provide its own security in its working and storage areas at and around the Facility site to protect its personnel (including personnel with any contract relations) and the Facility. 3. Provide sufficient safety measures such as temporary partitions, temporary guardrails, and related installations.
<p>6.</p>	<p>Standards</p>	<p>The design, engineering, materials, manufacture, installation, and test of the Facility "Facilities" shall comply with the latest revision or edition of the following standards and/or the regulations:</p> <ul style="list-style-type: none"> • IEC International Electrotechnical Commission; • ISO International Standards Organization; • Philippine Electrical Code; • Philippine Distribution Code; • Philippine Distribution Services and Open Access Rules; • National Building Code of the Philippines; • National Structural Code of the Philippines; • DU's Standards and Regulations for Grid-interconnection; • Energy Regulation Commission's Rules and Regulations for Net-metering Scheme; • Bureau of Philippine Standards;

		<ul style="list-style-type: none"> • Distribution Service Open Access Rule; and • Other standards equivalent to the above and/or recognized international standards, subject to the DOE's approval. 															
7. Environmental Consideration, Health and Safety																	
	7.1 Environmental Consideration	<p>(1) Basic Rules for Environmental Consideration</p> <ol style="list-style-type: none"> 1) The Service Provider shall comply with the Rules and Regulations stipulated in the laws of the Philippines. 2) Environmental pollution In principle, the Service Provider shall comply with the regulatory standards, such as emission standards of the Philippines under the Clean Air Act and wastewater effusion under the Clean Water Act. <p>(2) Ambient Noise</p> <p>Noise abatement measures shall achieve either the following levels or the maximum increase in background levels of 3dB. Measurements shall be taken at noise receptors located outside the Facility site property boundary.</p> <table border="1" data-bbox="719 902 1425 1122"> <thead> <tr> <th></th> <th colspan="2">Maximum Allowable Level (hourly), in dB (A)</th> </tr> <tr> <th>Receptor</th> <th>Daytime 07:00 – 22:00</th> <th>Nighttime 22:00 – 07:00</th> </tr> </thead> <tbody> <tr> <td>Residential</td> <td>50</td> <td>35</td> </tr> <tr> <td>Commercial</td> <td>65</td> <td>50</td> </tr> <tr> <td>Industrial</td> <td>70</td> <td>60</td> </tr> </tbody> </table> <p>(3) Solid and Liquid Wastes</p> <ol style="list-style-type: none"> a) Solid and liquid wastes shall be recycled or reclaimed whenever possible. b) If recycling or reclaim is neither possible nor practical, wastes shall be disposed of in the environmentally acceptable manner and in compliance with the related local laws and regulations. c) All hazardous materials, process residues, solvents, oils, and sludge from raw water, process wastewater and domestic sewage treatment systems shall be disposed of in a safe manner to prevent the contamination of soil, groundwater, and surface waters. <p>(4) Other General Environmental Requirements</p> <ol style="list-style-type: none"> a) Transformers or equipment containing polychlorinated biphenyls (PCBs), or PCB-contaminated oil shall not be installed or allowed. b) Processes, equipment, and central cooling systems involving the use or potential release to the environment of chlorofluorocarbons (CFCs), including halogen, shall not be installed, or allowed. c) Storage and liquid impoundment areas for fuels, raw and in-process materials, solvents, wastes during the installation of the Facility shall be designed with secondary 		Maximum Allowable Level (hourly), in dB (A)		Receptor	Daytime 07:00 – 22:00	Nighttime 22:00 – 07:00	Residential	50	35	Commercial	65	50	Industrial	70	60
	Maximum Allowable Level (hourly), in dB (A)																
Receptor	Daytime 07:00 – 22:00	Nighttime 22:00 – 07:00															
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containment (e.g., dikes, berms) to prevent spills and the contamination of soil, groundwater, and surface waters.

(5) Workplace Air Quality

- a) Periodic monitoring of workplace air quality shall be conducted for air contamination relevant to Designer-Builder's tasks.
- b) Ventilation, air contamination control equipment, protective respiratory equipment, and air quality monitoring equipment shall be well maintained.
- c) In any case, protective respiratory equipment shall be imposed in the area when the exposure levels for welding fumes, solvents, and other materials present in the workplace exceed local or internationally accepted standards.

(6) Workplace Noise

- a) Feasible administrative and engineering control, including sound-insulated equipment and control rooms, shall be employed to reduce the average noise level in normal work areas.
- b) Equipment shall be well maintained to minimize noise levels.
- c) The Service Provider shall use hearing protection when exposed to noise levels above 85dB.

(7) Other Physical Agents

- a) The equipment shall be designed and maintained for accepted safe working levels of physical factors that may have adverse health effects (e.g., ionizing, and non-ionizing radiation, magnetic fields).
- b) Work areas shall be monitored regularly for radiation and field levels, and equipment integrity (e.g., protective shields, lockouts).

(8) Electrocution

- a) Strict procedures for de-energizing and checking of electrical equipment shall be in place before any electrical work or maintenance work is conducted.
- b) In cases where electrical work or maintenance work is performed on an energized equipment, a strict safety procedure shall be in place and the work shall be performed under the constant supervision.
- c) A safety personnel shall be assigned to undertake revival techniques in case of worker electrocution.

(9) Work in Confined Spaces

- a) Prior to entry and occupancy, all confined spaces (e.g., tanks, sumps, vessels, sewers, excavations) shall be tested for the presence of toxic, flammable, and explosive gases or vapors, and for the lack of oxygen.
- b) Adequate ventilation shall be provided before entry and

		<p>during occupancy of these spaces.</p> <ul style="list-style-type: none"> c) Personnel shall use air-supplied respirators when working in confined spaces, which may become contaminated or deficient in oxygen during the period of occupancy. d) Observers/assistants shall be stationed outside of confined spaces to provide emergency assistance, if necessary, to personnel working inside these areas. <p>(10) Hazardous Material Handling and Storage</p> <ul style="list-style-type: none"> a) All hazardous (reactive, flammable, radioactive, corrosive, and toxic) materials shall be stored in clearly labeled containers or vessels. b) Storage and handling of hazardous materials shall be in accordance with the local regulations and appropriate to their hazard characteristics. c) Fire prevention systems and secondary containment shall be provided for storage facilities, where necessary or required by regulation, to prevent fires or the release of hazardous materials to the environment.
	<p>7.2 General Health</p>	<ul style="list-style-type: none"> (1) Personnel and workers of the Service Provider shall adhere to beneficiaries safety protocols, e.g., undergo temperature checks and antigen testing prior to entry to the building. (2) Sanitary facilities shall be well equipped with supplies (e.g., protective creams) and personnel shall be encouraged to wash frequently, particularly those exposed to dust, chemicals, or pathogens. (3) Ventilation systems shall be provided to control the temperature and humidity of the work areas. (4) Personnel required working in the areas of high temperature and/or high humidity shall be allowed to take frequent breaks away from these areas. (5) Pre-employment and periodic medical examinations and specific surveillance plan shall be instituted for personnel potentially exposed to toxic or radioactive substances.
	<p>7.3 General Safety</p>	<p>In addition to Clause 4. "General Provisions for the Installation Work", the Service Provider shall hire and deploy a Construction Occupational Safety and Health (COSH)-certified Safety Officer to implement and monitor the following safety procedures, among others:</p> <ul style="list-style-type: none"> (1) Shield guards or guard railings shall be installed at all belts, pulleys, gears, and other moving parts. (2) Elevated platforms and walkways, and stairways and ramps shall be equipped with handrails, toe boards, and non-slip surfaces. (3) Electrical equipment shall be grounded, well insulated, and conform to the applicable codes. (4) Personnel shall use special safety footwear, masks, and clothing for works in the areas with high dust levels or contaminated with hazardous materials.

		<p>(5) Personnel involved in climbing roofs, walls, and similar structures shall be provided with full-body harness, non-slip/safety footwear, gloves, helmets, face protection, leggings and other necessary protective equipment.</p> <p>(6) Appropriate eye protection shall be worn by personnel when in areas where there is a risk of flying chips, sparks, intense light, and similar situations.</p> <p>(7) A safety and evacuation plan shall be established for the construction and operation and maintenance works.</p> <p>(6) A fire prevention and fire safety plan shall be implemented during the construction, operation, and maintenance of the Facility.</p>
	7.4 Action Plan of Environmental Consideration, Health, and Safety	<p>(1) The action plans for environmental consideration, health, and safety shall be submitted for approval.</p> <p>(2) The records of environmental consideration, health, and safety shall be submitted with the monthly status report.</p>
8.	Preparation for Shipping and Storage	<p>The Service Provider shall ensure that the Facility components are protected from any damage during shipment and subsequent storage.</p> <p>The outside of all containers, cases, etc. shall be clearly marked with the total weight, point of maximum weight, and correct position for the attachment of lifting hooks and cables and shall bear identification marks relating to the appropriate dispatch documents. Where appropriate, the cases or boxes shall bear special instruction such as "top", "handle with care", and "keep dry".</p> <p>The storage will be in an environment similar to the installed location, i.e., indoor equipment will be stored indoors (without heating and ventilation), and outdoor equipment will be stored outdoors. Where required to protect against condensation and humidity, a desiccant shall be provided and its presence, with the need of periodic removal and dry out, shall be so marked. When electric space heaters are provided for that purpose, these should be wired to the outside of the equipment so that energizing immediately upon receipt is possible without disassembly of crates, etc. This also requires that no combustible materials be left in the inside of the equipment.</p> <p>Any Facility components and materials, which may be openly stored for several weeks at the beneficiaries building, shall be adequately packed and protected from the elements and weather.</p> <p>The Service Provider shall provide storage and handling instructions, including descriptions for periodic inspection and/or storage maintenance, to ascertain that no deterioration will occur during storage. One set of these instructions shall be fastened securely to the outside of the shipping container.</p> <p>All the Facility "Facilities" components shall be shipped from the factory completely assembled as far as practicable, subject to the limitations of length, height, depth, and weight, among others.</p>
9.	Transportation	<p>The responsibility shall lie on the Service Provider whether the dimensions of its supplied equipment and materials in crate or in</p>

		<p>box will be appropriate for loading, unloading, and transporting to the Facility sites.</p> <p>The Service Provider shall at its own expense, conduct an ocular route survey of all roads, bridges, and overpasses, from the port of entry to the Facility sites and examine for itself the conditions of all roads and bridges.</p> <p>The Service Provider shall check the capacity and availability of loading and unloading facilities, which will be utilized in connection with its transport operation, as well as its characteristics, taking appropriate measures to avoid damaging the same. All costs related to the reinforcement of roads, bridges, and the like, if any, shall be borne by the Service Provider.</p> <p>The Service Provider shall coordinate its own transport plan and shall advise proper authorities for the transit of the heaviest equipment to be transported and shall comply with the instructions given by the authorities.</p> <p>All damages caused to public roads, streets, or public structures shall be compensated by the Service Provider at its own expense.</p>
10. Coordination		
	10.1 Coordination of the Works	<p>The Service Provider shall be responsible for the prompt and punctual delivery and smooth installation of the project components to ensure satisfactory completion of the Facility "Facilities" within the scheduled time. The Service Provider shall also coordinate closely with concerned work groups in relation to the work schedules and safety precautions for efficient and safe execution of the installation of the Facility.</p>
11. Work Plan and Progress		
	11.1 Work Plan	<p>The Service Provider shall submit for approval, the work plan within five (5) days after the issuance of the Notice of Award (NOA). Among others, it shall include overall and site organizations, work criteria, temporary facilities, installation methods, list of equipment to be used, and outline of temporary office.</p> <p>Three (3) copies and electronic file (PDF format) of the work plan shall be submitted to the DOE.</p>

11.2 Detailed Time Schedule	<p>The form of the detailed time schedule to be prepared by the Service Provider shall be in the form of CPM, PERT network, S-Curve, or other internationally used process. The detailed time schedule shall be submitted for the approval within five (5) days after the issuance of the NOA.</p> <p>Three (3) copies and electronic file (PDF Format) of the detailed time schedule shall be submitted to the DOE.</p> <ol style="list-style-type: none">(1) Supporting documents, such as general descriptions of the methods of working, which the Service Provider intends to adopt during the execution and details showing the Service Provider's reasonable estimate of the number of each class of personnel and of each type of equipment shall be incorporated with the detailed time schedule.(2) The detailed time schedule shall show the commencement and completion dates for at least the following activities and "milestones".
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		<ul style="list-style-type: none"> • Placement of orders for materials and major equipment items; • Delivery of materials; • Civil Work; • Electrical Work; • Site training; • Inspections; • Pre-commissioning tests; • Commissioning tests; and • Start of operation. • Permitting (LGU, DU, ERC, etc.) <p>(3) The detailed time schedule shall meet the completion dates of the various phases of the Facility "Facilities" works and shall clearly demonstrate the manner in which the various phases of the same are completed.</p> <p>(4) All activities required for the execution of the Facility works shall be carried out in accordance with the sequences and timelines and completion dates shown on the detailed time schedule.</p> <p>(5) As the need arises, the Service Provider shall update and revise the detailed time schedule, subject to approval.</p>
	<p>11.3 Monthly Report</p>	<p>A monthly report shall be submitted by the Service Provider not later than the seventh day of the following month.</p> <p>The monthly reports shall include but not be limited to the following:</p> <ol style="list-style-type: none"> (1) Comparative accomplishment rate for each activity of previous and current month; (2) Issues and concerns and identified options, if any; (3) Photographs (date and title of the photo taken) and detailed descriptions of progress, including each stage of design, procurement, manufacture, delivery to the Facility site, construction, installation, testing, pre-commissioning and commissioning, and interim inspection; (4) A tabulation of manufacturers, vendors, or subcontractor used by the Service Provider for each major equipment and works; (5) A tabulation of site supervisory staffs and other personnel, the Service Provider's equipment in the Facility site; (6) Weather and climatologic data (for installation work); and (7) Records of near misses, incident, accident, and related safety and health issues. <p>Three (3) copies and electronic file (PDF Format) of the monthly report shall be submitted to the DOE.</p>
<p>12. Technical Documents to be Prepared by the Service Provider</p>		

	12.1 General	<p>The winning Service Provider shall understand that the issuance of NOA does not mean the approval of drawings and documents.</p> <p>(1) Service Provider's Responsibility</p> <p>1) The Service Provider shall prepare necessary technical documents for the Facility "Facilities" and the installation work</p>
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		<p>including drawings, diagrams, design calculations, specifications, and instruction manuals, which show full details of the Facility to be used as well as all arrangement and civil and building works/drawings related to the Facility works.</p> <ol style="list-style-type: none"> (2) Undertake DEDs using the given data such as beneficiaries Roofing Detail and initial schematic design or design concept provided, which conforms with the Minimum Performance Specifications and Standards (MPSS). 3) If the Service Provider fails to submit such documents in time, the resulting additional costs and/or delays shall be the Service Provider's responsibility. 4) The DOE- beneficiaries reserves the right to request the Service Provider additional documents as may be required for proper understanding. 5) Approval of the documents shall in no way relieve the Service Provider from any obligation to satisfy the requirements of the Technical Specifications or any responsibility of making modifications in its documents. 6) All costs and expenses for preparation and submission of the documents shall be borne by the Service Provider including revision and resubmission of the same. <p>(2) Right to Copy and Reproduce Documents</p> <p>During and after the cooperation period, the DOE and beneficiaries shall have the right without further authorization from the Service Provider to use, copy, reproduce, and forward to a third party the Service Provider's documents if in case it is reasonably required for completing, operating, maintaining, adjusting, and repairing the Facility. Neither statements nor stamps shall appear in the documents that may bind or seem to limit the right of the DOE with respect to this sub-clause. The Service Provider shall delete or add a note waiving the restriction imposed by all such marking appearing on drawings and other documents, and witness such deletions or waivers with its signature.</p> <p>(3) Sizes and Identification of Documents</p> <ol style="list-style-type: none"> 1) The size of drawings shall be as follows: <ul style="list-style-type: none"> A1 - 594 mm x 841 mm A2 - 420 mm x 594 mm A3 - 297 mm x 420 mm A4 - 210 mm x 297 mm <p>Design calculations, specifications, lists, manuals, and other documents shall preferably be prepared in A4 size.</p> 2) All drawings shall have a uniform title block as agreed by the DOE at the bottom right-hand corner, irrespective of the origin of the drawings. The title block shall show the drawing title, drawing number, revision (number, description, and date of revision), date prepared, name of the Service Provider and/or manufacturer, and the
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		signature of the Service Provider's representative. 3) Sufficient blank space above the title block of each drawing shall be provided for the beneficiaries' comments.
	12.2 Master List of Drawings, Documents, and Energy Yield Estimate	Within five (5) days upon the issuance of NOA, the Service Provider shall submit a master list of drawings, documents, and energy yield estimate using industry accepted solar PV assessment software (i.e., PVsyst) for approval of the DOE and beneficiaries, clearly indicating title (to always contain the Project name), numbering method, size and quantity of drawings, dimensions and form of title block, among others.
	12.3 Specifications	The Service Provider shall prepare the specifications and drawings for the Facility "Facilities". The specifications and drawings shall describe the type, ratings, design, construction, materials, dimensions, corrosion protection and other related information of the Facility "Facilities".
	12.4 Drawings and Documents	<p>(1) Arrangement and Layout Drawings</p> <p>The arrangement drawings of the Project, which clearly indicate the location of the Facility and auxiliaries including principal dimensions, clearance, heights and other details (power cabling, etc.), shall be provided. The drawings for the Project shall show full details of the foundation, architectural, structural, building, mechanical and electrical works.</p> <p>(2) Foundation Drawings</p> <p>The foundation drawings shall show the arrangement of openings, box-outs, embedded parts, anchor bolts for the foundation, if necessary. If conduits or pipes are to be installed in the foundations, the relevant information such as diameter, length, and purpose shall be indicated in the drawings as well.</p> <p>(3) Drawings of Civil and Electrical Works</p> <p>The drawings of the civil and electrical works shall show all detailed information related to installation of the Facility "Facilities".</p> <p>(4) Electrical Diagrams</p> <p>For electrical diagrams, symbols shall comply with IEC 60617.</p> <p>The electrical diagrams shall be simplified to include but not limited to the PV Modules, junction boxes, connection boxes, power conditioners (controller, insulation transformer and inverter, etc.), low voltage distribution board, switchgear, protective relay devices and their interconnections. A single line diagram shall represent all circuits. It shall contain all required technical information of the represented Facility components such as type, major ratings, quantity, among others.</p>
	12.5 Calculation Sheets	The Service Provider shall submit the design calculation sheets with all formulas, standards, test results, basic assumptions and design criteria used for the calculations, including technical simulation test results.

	12.6 Manuals	<p>The manuals shall be concise and complete with infographics and/or graphically prepared and shall be written in the English language.</p> <p>The Service Provider shall submit to the DOE and beneficiaries' approval the manuals concerning the operation, maintenance and troubleshooting of the Facility with special references to any</p>
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		<p>recently developed features.</p> <p>Operation, Maintenance and Troubleshooting Manual</p> <p>(5) The manual shall describe in details the recommended periodical inspections and maintenance of the Facility "Facilities". It shall also include easily readable block diagrams of the Facility "Facilities". The manual shall also include a complete set of all related drawings, which have been approved by the DOE and beneficiaries, and parts list for each component of the Facility "Facilities", among others. The drawings shall be reduced in size to A3. The parts list shall include manufacturer's code, serial numbers and ordering instructions and shall be as detailed as possible.</p>
	12.7 Approval of Documents	<p>Prior to the commencement of the fabrication and/or the installation works at the Facility site, the Service Provider shall submit the required technical documents for the DOE's approval.</p>
	12.8 Approved Documents	<p>All approved documents shall be stamped "APPROVED", and a copy shall be returned to the Service Provider's perusal.</p> <p>Only approved drawings can be used for installation purposes.</p> <p>It shall be understood that approval by the DOE and beneficiaries of the documents will not relieve the Service Provider from any responsibility in connection with the Facility works.</p> <p>If an error is found in the Service Provider's drawing during the fabrication/manufacturing process, civil work and/or installation of the Facility, the drawing shall be revised accordingly and re-submitted for the DOE's approval.</p>
	12.9 Reference Drawings and Documents	<p>If additional drawings or documents or information are required for proper understanding, operation, coordination, or other matters, in the opinion of the DOE, the Service Provider shall submit such reference documents to the DOE without extra charge. Should any modification be required on such reference documents, the DOE may instruct the Service Provider to do so, and the revised documents shall be submitted for the DOE's approval.</p>
	12.10 As-Built Drawings	<p>After all components of the Facility "Facilities" have been completed, the Service Provider shall prepare as-built drawings based on the approved drawings for the Facility "Facilities". The as-built drawings shall show all changes and modifications, which have been made during the fabrication/manufacture and installations of the Facility component. All the as-built drawings shall be reduced and bound properly into books of A3 size and format. Such bound books of the as-built drawings shall be submitted to the DOE within thirty (30) days after completion of the Facility "Facilities".</p> <p>The Service Provider shall submit the abovementioned documents to the DOE. Additional copies of particular drawings are to be submitted at the Service Provider's expense, if necessary.</p>

	12.11 Photographs	The Service Provider shall keep records of digital photographs of the chronological progress of the installation of the Facility. Upon completion, the Service Provider shall submit three (3) copies of the same to the DOE.
	12.12 Required Number of Documents	In summary, the documents to be submitted to the DOE and beneficiaries shall be as follows: (1) Design and Installation Works

		<p>Complete sets of the documents</p> <ol style="list-style-type: none"> 1) Drawings and Documents for approval as stipulated in Sub-Clauses 12.2 to 12.6: <ul style="list-style-type: none"> - three (3) sets hard copy and one (1) set of electronic files (PDF and auto-cad). 2) Approved Drawings and Documents as stipulated in Sub-Clause 12.8 “Approved Documents for the Works”: <ul style="list-style-type: none"> - three (3) sets hard copy and one (1) set of electronic files (PDF and auto-cad)). 3) Reference Drawings and Documents as stipulated in Sub-Clause 12.9 “Reference Drawings and Documents”: <ul style="list-style-type: none"> - three (3) sets hard copy and one (1) set of electronic files (PDF and auto-cad). <p>(2) After Completion of the Works</p> <ol style="list-style-type: none"> 1) Complete sets of bound print of the as-built drawings as stipulated in Sub-Clause 12.10 “As-Built Drawings”: <ul style="list-style-type: none"> - three (3) sets hard copy and one (1) set of electronic files (PDF and auto-cad). 2) Photographs as stipulated in Sub-Clause 12.11 “Photographs”: <ul style="list-style-type: none"> - three (3) sets hard copy and one (1) set of electronic files (PDF and auto-cad).
13. Tests and Inspections		
	13.1 Tests of the Facility	<ol style="list-style-type: none"> (1) General <p>Tests of the Facility “Facilities” shall be carried out by the Service Provider in the presence of the DOE and beneficiaries.</p> (2) Commissioning Tests <p>After the Facility “Facilities” has been fully assembled and installed, the Service Provider shall carry out the commissioning tests in the presence of the DOE and beneficiaries to ascertain its compliance with the TOR.</p> (3) Test Personnel and Equipment <p>The Service Provider shall provide all manpower, tools and equipment and materials required to perform the abovementioned tests.</p> <p>Prior to the commencement of the tests, the Service Provider shall ensure that each tool and equipment are properly calibrated and shall submit a certificate that calibration check has already been made by an authorized laboratory or inspector and such calibration will not be affected by transportation or weather condition.</p> <p>The expenses associated with the test shall be borne by the</p>

		<p>Service Provider.</p> <p>(4) Test Reports</p> <p>All test and inspection records shall be countersigned by representatives of the DOE and beneficiaries.</p> <p>Two (2) hard copies of all the test records shall be submitted to the DOE and beneficiaries within seven (7) days after completion of each test.</p> <p>(5) Rectification of Deficiencies</p> <p>All deficiencies found during the tests shall be rectified by the Service Provider at its own expense. Rectified components shall be subject to re-testing.</p> <p>All costs and expenses for the re-testing shall be borne by the Service Provider.</p>
	13.2 Acceptance Inspection	After the successful completion of the abovementioned tests, the Service Provider shall immediately start the operation of the Facility "Facilities".
	13.3 Performance Inspection	The Service Provider shall carry out the performance inspection at the end of the two-year post construction Warranty Period.
	13.4 Monitoring	<p>The Service Provider shall install the closed-loop, offline, and real-time monitoring equipment for the solar PV facilities to be integrated in the existing BMS of the beneficiaries. At the minimum, the data to be monitored shall include following:</p> <ul style="list-style-type: none"> • Current Power Generation, • Meter readings at the beginning and end of the month • Total electricity generated for the month • Amount equivalent to electricity generated for the month multiplied with the agreed fixed rate per kWh and cumulative electricity generated since the beginning of the operation • Irradiance • Weather • Temperature • Power Factor • Other power management parameters.
14.	Spare Parts and Consumables	The Service Provider shall ensure the regular supply of spare parts and consumables and shall cover the cost of the same for the sustainable operation of the Facility "Facilities" as part of its operation and maintenance responsibility during the two-year cooperation and post-construction warranty period.

<p>15. Trainings</p>	<ol style="list-style-type: none"> (1) The Service Provider shall conduct operation, maintenance, troubleshooting and management trainings during and/or after the commissioning stage of the Facility "Facilities". (2) The Service Provider shall give notice to the DOE and beneficiaries at least ten (10) working days prior to the commencement date of the trainings. (3) The Trainings shall include, but not limited to lectures and hands-on on-site strategy covering the methods of operation, maintenance, basic trouble shooting and management of the Facility (4) The operation and maintenance manuals shall be prepared as stipulated in Sub-Clause 12.6. (5) All costs and expenses for the Trainings, except those incurred by the DOE and beneficiaries' personnel, which include, but not limited to their own transportation and accommodation expenses, shall be borne by the Service Provider. (6) The Trainings shall be conducted in bi-lingual (i.e., Filipino and
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		<p>English languages).</p> <p>(7) Completion Certificate</p> <p>A corresponding Certificate of Completion shall be issued to the Participants of the Trainings.</p>
16.	Temporary Facilities	
	16.1 General	<p>On completion of the Facility "Facilities", all temporary facilities constructed by the Service Provider, unless otherwise specified or directed by the DOE or beneficiaries, shall be removed from the Facility sites. The Service Provider shall restore the site of the temporary facilities to its original state.</p>
17.	Site Supervision	<p>The Service Provider shall employ minimum of two (2) competent representatives to supervise the Facility works throughout the installation, pre-commissioning, and commissioning.</p>

II. TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS

1.	PROCUREMENT OF PRODUCTS	
	1.1 PV Modules	
	1.1.1 PV Modules	<p>The PV Modules shall be of the monocrystalline high transmission tempered anti-reflective material with at least 21% panel efficiency.</p> <p>The criteria of selection will be based on the highest DC output for PV modules, which are available in the local and international market.</p> <p>A copy of the type of qualification certificate of the PV Module issued by the internationally authorized organization in accordance with the abovementioned standard shall be submitted to the DOE.</p> <p>The <i>PV Module output power and product warranty</i> shall be included in the proposal. It shall be warranted that the output power of the PV Module shall not be less than ninety percent (90%) of the minimum output power of the module during the first ten (10) years of operation and eighty percent (80%) during the following ten (10) years and the manufacturer's warranty shall not be less than twenty (25) years.</p> <p>Each string of the PV Modules shall be connected to a junction box with a dedicated cable. The Service Provider shall prepare the detailed plans and methods of connection of cables. The requirements of the cabling work shall be referred to Sub-Clause 3.1.3. "Cabling Work" in this document.</p> <p>The output voltage of each string shall be consistent with the input of the power conditioner.</p> <p>The layout of the PV Modules shall be designed as follows:</p> <ul style="list-style-type: none"> • The tilting angle of the solar panel should be 11° to 17° and should be facing south (preferably) for optimal performance. • Shade of the front side sub-arrays/string shall not interfere with the rear side sub-arrays/string between 9:00 am and 3:00 pm. • The layout of the sub-arrays/string shall be determined in consideration of the space for any maintenance and replacement works. <p>The maximum power of the PV Modules for the Facility sites shall be as follows:</p> <ul style="list-style-type: none"> • The installed DC capacity should be 30kWp to 40kWp • All the PV modules shall be installed within the allocated area in the beneficiaries building (Rooftop).
	1.1.2 Junction Box	Each sub-arrays/string shall be wired to both positive and negative terminals in a junction box.

		<p>One junction box shall be provided for one sub-arrays/string. Each junction box shall be furnished with a circuit breaker, an anti-reverse flow diode and surge protective devices for each input. Output terminal of the junction box shall be fitted with a circuit breaker and surge protective devices.</p> <p>The ports for cabling shall be placed in the underside.</p> <p>The surge protective devices shall have the minimum specifications below;</p> <table data-bbox="719 533 1390 745"> <tr> <td>Type:</td> <td>Surge arrester</td> </tr> <tr> <td>Class:</td> <td>Class II</td> </tr> <tr> <td>Rated voltage:</td> <td>500VDC or higher</td> </tr> <tr> <td>Nominal Discharge Current I_{max} (8/20 micro sec.):</td> <td>20kA or higher</td> </tr> <tr> <td>Voltage protection level:</td> <td>2.5kV or lower</td> </tr> </table> <p>The junction box shall be designed as of outside type with the protection level of IP65.</p>	Type:	Surge arrester	Class:	Class II	Rated voltage:	500VDC or higher	Nominal Discharge Current I _{max} (8/20 micro sec.):	20kA or higher	Voltage protection level:	2.5kV or lower
Type:	Surge arrester											
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Nominal Discharge Current I _{max} (8/20 micro sec.):	20kA or higher											
Voltage protection level:	2.5kV or lower											
	<p>1.1.3 Connection Box</p>	<p>Each connection box shall be furnished with a circuit breaker for each input. Output terminal of the connection box shall be fitted with a circuit breaker and surge protective devices.</p> <p>The ports for cabling shall be placed in the underside.</p> <p>The surge protective devices shall conform with the specifications below:</p> <table data-bbox="719 1144 1390 1357"> <tr> <td>Type:</td> <td>Surge arrester</td> </tr> <tr> <td>Class:</td> <td>Class II</td> </tr> <tr> <td>Rated voltage:</td> <td>500VDC or higher</td> </tr> <tr> <td>Nominal Discharge Current I_{max} (8/20 micro sec.):</td> <td>20kA or higher</td> </tr> <tr> <td>Voltage protection level:</td> <td>2.5kV or lower</td> </tr> </table> <p>The connection box shall be designed as of outside type with the protection level of IP65.</p>	Type:	Surge arrester	Class:	Class II	Rated voltage:	500VDC or higher	Nominal Discharge Current I _{max} (8/20 micro sec.):	20kA or higher	Voltage protection level:	2.5kV or lower
Type:	Surge arrester											
Class:	Class II											
Rated voltage:	500VDC or higher											
Nominal Discharge Current I _{max} (8/20 micro sec.):	20kA or higher											
Voltage protection level:	2.5kV or lower											
	<p>1.1.4 Inverter</p>	<p>The inverter shall have a minimum of 98% efficiency, with at least ten (10) years product warranty, and must comply with the AS4777/ AS3100 / IEC 62109 - 1/2, CE compliance / EN 61000-6-2 / PEC / PDC, and other technical requirements required by the Distribution Utility.</p> <p>A copy of the type qualification certificate of the Inverter issued by the internationally-authorized organization in accordance with the abovementioned standard shall be submitted to the DOE.</p> <p>The inverter shall function as on-grid and off-grid solar inverter. In case of power cut or the grid becomes unstable the inverter shall automatically switch to battery supply and continues to operate independently from the electricity grid.</p> <p>The inverter shall have a DC Switch with a communication port of RS458/Dry Contact.</p> <p>It shall be designed with the protection level of IP65.</p>										

	<p>1.1.5 Energy Storage System</p>	<p>The energy storage system shall have a minimum of 98% depth of discharge, with at least ten (10) years warranty, which must be of Li-Ion and Prismatic Cells.</p> <p>The energy storage system should be capable of supplying the reserve energy requirements of the DOE building's 7th and 12th floor and Roof deck for at least one (1) day and shall comply with UL1741, UL 1741 SA, IEEE1547, Rule 21, FCC part 15 class A and other applicable standards.</p> <p>The energy storage system should be fully charged upon delivery.</p> <p>A copy of the type of qualification certificate of the energy storage system issued by the internationally authorized organization in accordance with the abovementioned standard shall be submitted to the DOE.</p>
	<p>1.2 Support Structures for PV Modules</p>	<p>The support structures for the PV Modules shall set up the sub-arrays/strings of the PV Modules arranged in series and in parallel to attain the required input voltage at the junction box. The support structures shall be furnished with fittings for the insulation and the air temperature observation devices, and the junction and the connection boxes to be attached to the support structures.</p> <p>The minimum thickness of main structure members of the support structures shall be six (6) mm.</p> <p>For the fastenings used in the structures, a countermeasure against larceny shall be considered.</p> <p>The support structures shall be designed and constructed in accordance with the National Building Code, the National Structural Code, and the regulations in the Philippines as well as the environment conditions specified in Sub-clause 4.1 "Climate and Environmental Conditions" of the GENERAL SPECIFICATIONS and the Service Provider shall submit the results of the design with related drawings and calculations to the DOE for approval.</p>
	<p>1.3 Power Conditioner</p>	
	<p>1.3.1 General</p>	<p>The power conditioner shall be capable to efficiently convert DC power generated by the Facility "Facilities" into AC power and to interconnect it to the grid. It shall have a built-in isolation transformer which electrically isolates the Facility "Facilities" from the grid, with no risk of leakage current, among others, due to switching operations. Its surge protective devices shall be installed at DC and AC circuits.</p> <p>The power conditioner shall have adequate interfaces with the Control System as specified in Sub-clause 3.3 "Control System" under the Document I - GENERAL SPECIFICATIONS.</p>
	<p>1.3.2 Functions</p>	<p>The power conditioner shall have the following functions.</p> <p>(1) Manual Switch-On/Off</p> <p>Individual power conditioner shall be able to be manually switch-on/off to increase or reduce total output power of the Facility "Facilities".</p>

(2) Automatic Switch-On/Off

The output voltage (open-circuit voltage) of PV Arrays/Strings shall be monitored and the power conditioner shall be automatically switch-on when the voltage reaches the setting value or higher. The output power of the PV Arrays/Strings during operation shall also be monitored and the power conditioner shall be automatically switch-off when the voltage is less than the setting value for a certain period of time.

(3) Synchronization

The power conditioner shall synchronize the output voltage and frequency of the inverter with the grid for interconnection when the inverter is switch-on.

(4) Maximum Power Point Tracking (MPPT) Control

The power conditioner shall be equipped with the maximum power point tracking (MPPT) control function.

(5) Voltage Fault Ride-through Capability

The power conditioner shall have voltage fault ride-through capability.

(6) Automatic Voltage Rise Suppression

The power conditioner shall have reactive power control and output power limit function as grid voltage rise suppression measures.

(7) Grid Interconnection Protection

The following protective relays and functions shall be provided for grid interconnection protection functions.

- Over voltage relay (59)
- Under voltage relay (27)
- Over frequency relay (81H)
- Under frequency relay (81L)
- 34.5kV side over voltage ground relay (59G) input
- Islanding operation detections (Passive and Active types)
- Voltage rise suppression function

The islanding operation detection (active type) of each power conditioner shall be synchronized in order to keep detection sensitivity of each islanding operation detection (active type).

(8) System Status Indication

The following system statuses shall be indicated.

- 1) Operation, standby and stop
- 2) Alarm status (heavy fault and light fault)
Heavy fault

		<ul style="list-style-type: none"> • Inverter error • Temperature rise in panel • DC overvoltage • Inverter trip • DC ground fault (high-resistance grounding) • Synchronous communication error <p>Light fault</p> <ul style="list-style-type: none"> • AC over voltage • AC under voltage • Over frequency • Under frequency • Islanding operation active type • Islanding operation passive type • Instantaneous AC over voltage • Instantaneous AC under voltage • DC under voltage <p>(9) Measurement System</p> <p>The following values shall be measured and recorded.</p> <ul style="list-style-type: none"> • DC input voltage • DC input current • AC output voltage • Output power <p>(10) Monitoring and Display</p> <ul style="list-style-type: none"> • Local Monitoring <p>Local monitoring of at least the following parameters (i.e., Daily Energy Generation, Lifetime Energy Generation and Real-time System AC Power, Irradiance, Temperature) shall be made available at an integrated LCD / LED of the inverter and shall be recorded on an integrated data logging unit and can be downloaded via Ethernet (RS232) connection.</p> <ul style="list-style-type: none"> • Remote Monitoring <p>For remote monitoring, at least the following parameters (i.e., Daily Energy Generation, Lifetime Energy Generation and Real-time System AC Power, Irradiance, Temperature) shall be securely accessed.</p> <p>(11) Surge Protective Device</p> <p>The surge protective devices shall be installed at DC and AC circuits. The Service Provider shall propose the best type and rating of the surge protective devices.</p>
	<p>1.4 Switchgear Room</p>	<p>Metal-enclosed switchgear and power transformer shall be installed in one room of the switchgear room, if possible. Therefore, if necessary, the size of the switchgear room for them may be increased by the Service Provider based on his design.</p> <p>The switchgear room shall be equipped with appropriate lighting system and outlets for 240Vac power supply and with appropriate ventilations.</p>

		<p>The switchgear room shall be secured against theft and unauthorized access.</p> <p>The layout of the equipment installed in the switchgear room shall be designed in consideration of its dimensions as well as appropriate space for operation and maintenance.</p> <p>The Service Provider shall design the switchgear room and its foundation taking account of 34.5kV power cable connections and the Facility site conditions.</p> <p>Necessary accessories, cables and wiring and installation materials shall be provided.</p>
	<p>1.5 34.5kV Metal-enclosed Switchgear and Power Cable (Optional/ If necessary)</p>	
	<p>1.5.1 34.5kV Metal-enclosed Switchgear</p>	<p>(1) Each unit shall be of indoor, air-insulated, single-bus and metal-enclosed type, having front and rear hinged doors.</p> <p>(2) The degree of protection of enclosures shall be IP43.</p> <p>(3) The 34.5kV metal-enclosed switchgear shall be complete with all necessary equipment, devices, apparatus, protection systems including the 34.5kV power transformer protection system, wiring and all other equipment required to produce a complete working installation. The protection system for 34.5kV side shall be coordinated with the grid interconnection protection to be installed in the power conditioner as specified in (7) "Grid Interconnection Protection" of Sub-clause 1.3.2 "Function" of this document.</p> <p>(4) The circuit breaker shall be of vacuum, draw out, electrically and mechanically trip-free type, motor charged spring closing by 240Vac with draw out wheels, primary and secondary disconnecting devices, auxiliary switches and provision for manual operating devices. The circuit breaker (CB) shall not be closed unless the disconnect (DS) is fully closed. The circuit breaker shall be remotely switched on and off.</p> <p>(5) The protective relays shall be of electronic, semi-flush, back connected, panel-board mounting and rectangular draw out case type. The relay shall be provided with a built-in electrically operated indicator that can be manually reset from the outside without removing the cover.</p> <p>(6) The terminal blocks for control and metering wirings shall be of molded type, rated at 600V and shall be provided with white marking strip for circuit designation.</p> <p>(7) Power and Energy Meters The accuracy of the power and energy meters shall be Class 0.2S in accordance with IEC 62053-22 or in compliance with the requirement of MERALCO or concerned Distribution Utilities/Rural Electric Cooperatives.</p>

		<p>(8) The accuracy of the instrument transformers shall comply with the requirements of the power and energy meters.</p> <p>(9) "Grid Interconnection Protection" of Sub-Clause 1.3.2 "Function" of this document.</p>
	1.5.2 34.5kV Power Cable (Optional)	34.5kV, 3-phase and 3-core power cables shall be provided and installed by the Service Provider for interconnection between Distribution Utility switchgear and the Facility switchgear and the power transformer.
	1.6 Low Voltage Distribution Board	<p>The 240-400V low voltage distribution board shall be provided.</p> <p>The 240-400V low voltage distribution board shall be complete with all necessary voltmeter, over current protective relay (51), voltage and current transformers, surge protective devices, wiring and all other equipment to produce a complete working Facility. The protection system for 400V side shall be coordinated with the grid interconnection protection to be installed in the power conditioner as specified in (7) "Grid Interconnection Protection" of Sub-Clause 1.3.2 "Function" of this document.</p> <p>More than three (3) sets of each rating of MCCBs "Molded Case Circuit Breaker" shall be provided as spares for the low voltage distribution board.</p>
	1.7 34.5kV Power Transformer (Optional)	
	1.7.1 General	<p>The power transformer shall be designed to deliver its rated power in the ambient conditions specified and shall have the capability to withstand full through-fault conditions without damage.</p> <p>The power transformer shall be dry type, self-cooled and of indoor use type with no-load tap changing device.</p>
	1.7.2 No-Load Tap Changer	<p>The tap changer shall be mechanically and electrically rugged, arranged to provide for convenient inspection and maintenance without necessity for undertaking and provided with an external mechanism for manual operation.</p> <p>The tap changer, as well as the arrangement of lead and connection thereto, shall be designed for transient voltage conditions.</p> <p>The external mechanism shall be protected against unauthorized operation and provided with positive indication on the tap in use and so located that it may be observed without need for unlocking the mechanism.</p> <p>The operating handle, indicating pointer and dial and means for locking the tap changer in any desired position shall be integrated with the transformer.</p>
	1.8 Control and Low Voltage Cables	<p>The control and low voltage cables shall comply with the regulations in the Philippines such as the Philippine Electrical Code, Philippine Building Code, and fire protection law, among others.</p> <p>The cables which have two (2) cores, one core for positive circuit and other core for negative circuit, shall be used for DC circuits to avoid electromagnetic field and induction.</p> <p>Control and low voltage cables and underground grounding conductors based on requirements of the PV Modules, power</p>

		<p>conditioners, switchgear, distribution board, local control system, etc. shall be included in the proposal of the Designer-Builder.</p> <p>The voltage drop of the cables from the junction box to the power conditioner shall not be greater than two (2) percent. The cable selection study shall be submitted for the DOE's perusal and approval.</p> <p>Sub-clause 3.1 "Climate and Environmental Conditions" under the Document I - GENERAL SPECIFICATIONS and Sub-clause 2.1.4 "Grounding System" of this document shall be considered for the types and designs of the control and power cables.</p>
	<p>1.9 Pad Locks</p>	<p>Non-ferrous pad locks with different key changes and two keys for each lock and a master key for each site shall be provided for the doors of the related equipment and houses such as the junction boxes, the connection boxes, the control house, the switchgear house, etc.</p> <p>Cabinets for the accommodation of padlocks and keys, while not in use, shall be provided and suitably labelled so that keys will be readily identifiable.</p>
	<p>1.10 Anti-condensation Heaters (Optional)</p>	<p>Any major items of equipment which are susceptible to suffer from internal condensation due to atmospheric or load variations shall be fitted with heating devices suitable for electrical operation at 230Vac 60 Hz single phase of sufficient capacity to raise the internal ambient temperature by approximately 5°C.</p> <p>A suitable thermostat shall be included in the heater circuit. The electrical equipment protected shall be designed so that the maximum permitted rise in temperature is not exceeded if the heaters are energized while the apparatus is in operation.</p>
	<p>1.11 Identification System</p>	<p>All equipment and component documents including cables, control wires and terminals shall be designated with an alphanumeric code allowing clear identification of the equipment and components during design, installation and operation of the Facility. Equipment, cables, control wires and terminals shall be systematically marked, both on the drawings and documents and on the equipment, cables, wires and terminals.</p> <p>Equipment designation codes shall be indicated on all planning documents including bills of materials. The codes will later be used for easy identification of stored equipment documents and materials and shall be suitable for use with a computer supported registration system.</p> <p>Identification labels shall be provided for equipment and devices mounted on control boards, relay cabinets, desks and other places as required for proper identification, as well as for operational, function and safety reasons.</p> <p>Wherever necessary, cautionary and warning plates and signs shall be provided in English. Nameplates and identification labels shall be in English.</p>

	1.12 Spare Documents	The Service Provider shall provide with appropriate spare documents for the Inverter, tools and test instruments to be required for the operation and maintenance of the Facility, the quantities of which shall be sufficient for the period up to the first full-scale overhaul of the PV System. They shall be delivered to the Facility site before the Tests on Completion of the Facility works.
2. FACILITY WORK		
	2.1 Electrical Work	
	2.1.1 Installation of Support Structures, If Any	<p>Assembling work of the support structures shall be carried out under the supervision of the Service Provider's supervisor. Utmost care shall be exercised for the precision of the alignment of finished structures.</p> <p>The tightening of all bolts shall be done with torque wrench and its results shall be recorded. The recorded list of tightening torque for all bolts shall be submitted to the DOE within two weeks after the completion of the electrical work.</p> <p>The existing sign boards shall be reinstalled on the support structures at the same locations. New sign boards as same types as the existing sign boards shall be provided and installed by the Service Provider, if necessary.</p>
	2.1.2 Installation of PV Modules	<p>Each PV Module shall be measured for its open generation voltage. Measured voltage and any anomalies shall be recorded and submitted to the DOE within two weeks after the completion of the measurement.</p> <p>The gaps between neighboring PV Modules shall be controlled to be uniform.</p> <p>The PV Modules shall be connected to junction boxes by the cables with steel conduit pipes.</p>
	2.1.3 Cabling Work	<p>The Service Provider shall prepare the detailed plans and methods of wiring of cables and shall submit them for the DOE's approval.</p> <p>All steel conduit pipes and steel cable racks with covers shall be grounded.</p> <p>(1) Installation of Cables</p> <p>All DC and AC power cables to be installed in the outdoor locations shall be laid in a steel conduit pipes which shall be covered and coated by the Exterior Insulation and Finish System (Class PB). The Exterior Insulation and Finish System (Class PB) is a "none load bearing, exterior wall cladding system that consists of an insulation board attached either adhesively, mechanically, or both to the substrate; an integrally reinforced base coat; and a textured protective finish coat," as defined by ASTM C 1397 "Standard Practice for Application of Class PB Exterior Insulation and Finish Systems (EIFS) and EIFS with Drainage". The covering materials and the coating color shall be subject to the DOE's approval.</p> <p>All DC and AC power cables to be installed in the indoor locations shall be laid in steel cable trays except inside pits.</p>

		<p>The measurement cables of the insolation and air temperature observation devices in the outdoor and the indoor locations shall be laid in steel conduit pipe.</p> <p>The power cables and control/measurement cables shall be laid in different conduit pipes or cable tray.</p> <p>The cable boxes and holes and cable connection points shall be covered with pastes and protected against the environment conditions.</p> <p>The power, control/measuring cables to be installed in underground shall be laid in PVC conduit pipes except inside pits.</p> <p>When the PVC conduit pipes shall be laid under asphalt or concrete pavement, the asphalt or concrete pavement is restored to the original state after the work.</p> <p>The cable boxes shall be of outdoor use. The handholds or cable boxes for the piping shall be constructed or installed in the places such as below;</p> <ul style="list-style-type: none">• Both ends of the segment crossing under paved roads,• Where cable joints are buried,• Appropriate places for cable installation, and• Other places for the Service Provider's convenience. <p>When two cables are joined, joint kit with resin injection shall be used.</p> <p>When cables are drawn into the existing buildings, wall piercing method shall be used only if there is no existing piping or cable duct. The number of walls piercing and its cross section shall be minimized. The segment of cables at the wall piercing shall be protected with pipes. The gap between cables, pipes and wall shall be filled with caulking materials. The details of the wall piercing shall be subject to the DOE's approval.</p> <p>(2) Safety Measures</p> <p>During the Facility works, the exterior and interior cables shall be surrounded with pegs, ropes or other warning signs.</p> <p>(3) Cable Tags</p> <p>All the cables shall be marked with cable tags. Each tag shall show information such as,</p> <ul style="list-style-type: none">• Cable ID• Type of cable• Size of cable• Origin and destination <p>(4) Confirmation of Cable Connection</p> <p>All the connections of cables shall be confirmed twice</p>
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		<p>during the course of the works.</p> <p>1st round:</p> <ul style="list-style-type: none"> • Continuity test for all connections, • Tightening of connections at terminals (with check list), • Confirmation of conformity of cable connections to the cable list (visual checking) <p>2nd round: during the pre-commissioning test</p> <p>(5) Cable Holes</p> <p>The cable holes shall be covered with an acid resistant paste.</p> <p>(6) Power Cable</p> <p>All necessary cable heads, terminals, accessories, conduit pipes, and similar parts shall be included for power cable installation.</p> <p>The installation and connection of power cables shall comply with the existing regulations in the Philippines as well as the regulations of the MERALCO.</p> <p>The Service Provider shall coordinate with the "concerned DU" MERALCO for the distribution switchgear and the metering cabinet.</p>
	<p>2.1.4 Grounding System</p>	<p>(1) General</p> <p>The design and installation of the grounding system shall be performed in accordance with the existing Philippines regulations taking into account the safety of the office personnel of DOE and beneficiaries.</p> <p>The Service Provider shall study the existing grounding system and if it is not available at required location, new grounding system shall be prepared in accordance with the Philippine Electrical Code.</p> <p>If any, the grounding system for the 34.5kV metal-enclosed switchgear, 34.5kV power transformer as well as the metering cabinet and 34.5kV distribution switchgear to be provided and installed by shall be coordinated with the "concerned DU" MERALCO. The requirements of the "DU" MERALCO shall be considered in the grounding system.</p> <p>The grounding report showing readings of resistivity of the existing grounding system and the grounding layout plan shall be submitted to the DOE.</p> <p>(2) Design</p> <p>The Service Provider shall prepare the drawings and the plan of the grounding system shall be submitted for the DOE's approval.</p> <p>(3) Installation</p> <p>The Service Provider shall prepare the Facility work plan</p>

		<p>which includes the scheduling of the works and shall submit it for the DOE's approval.</p> <p>The grounding of the PV Modules shall be well-balanced with that of the power conditioners.</p> <p>(4) Measurement of Grounding Resistance</p> <p>The Service Provider shall measure and record the distribution of grounding resistance witnessed by the DOE and beneficiaries</p>
	2.1.5 Cleaning	The Service Provider shall from time to time remove all dirt, rubbish and related objects caused by the installation of the Facility "Facilities". Upon completion of the Facility works, the Designer- Builder shall thoroughly clean the surfaces of the PV Modules
3.	TESTS AND INSPECTIONS	
	3.1 Tests of the Products (Factory Tests)	The Service Provider shall ensure that conduct of the factory tests of the Facility "Facilities" components are in accordance with the approved test procedure, the manufacturer's standards, and other related standards.
	3.2 Tests of the Facility Work (Tests on Completion)	<p>(1) The Commissioning Test of the Facility "Facilities" work shall include, but not limited to, the following:</p> <ul style="list-style-type: none"> • Checking voltage and polarity of all circuits in the junction and connection boxes; • Checking voltage at chief points in the switchgear and boards; • Checking phase of AC with the phase rotation meter; • Checking the reading of all monitors in the boards; • Checking insolation and air temperature observation devices; • Evaluation of insolation vs PV Module output relationship; • Checking of records and monitors of trial run in grid-connection for 48hrs or more; • Start-up and shut-down test; • Emergency shut-down test; • Safety shut-down and reset test under simulated malfunction signal issuance; • Test on automatic restart after utility grid blackout/recovery under simulated blackout/recovery; • Test on automatic restart with AC power (from utility grid) after prolonged utility grid blackout; • Test on operability with one power conditioner out of order (simulated break-down); • Test on automatic mode for a consecutive day, in grid-connection; and, • Other tests as the DOE, Beneficiaries and "DU" Electric Cooperative deem necessary.
	3.3 Initial Energization Procedures	The Service Provider shall submit its detailed plans and proposed initial energization procedures of the power supply switching works for the Tests on the Facility "Facilities" work, at least six weeks before the scheduled work for approval. The Service Provider shall organize and attend coordination meeting/s for the switching work.
	3.4 Interim Inspection	The interim inspection shall include, but not limited to, the following items:

		<ul style="list-style-type: none"> • The manufacturer's standard periodical inspection items; • Specific inspections directed by the DOE , if any; and • Setting and adjustment of parameters on the basis of the analysis of the records of operation for several months. <p>The Service Provider shall submit inspection criteria and check sheets for the DOE's approval.</p>
	<p>3.5 Performance Inspection</p>	<p>The Service Provider shall submit inspection criteria and check sheets on how to verify when the Facility has no defect or no deficiency for the DOE's approval.</p>

Considering the relaxation of restriction for COVID-19, the Opening of Bids can be witnessed personally or in case you have related constraint it could be witnessed through video conferencing via MS Teams platform. In preparation, you may download the app in advance to witness the proceedings. Bidders and observers may submit their intent to participate with the following information such as the nominated email address to bacsecretariat@doe.gov.ph

This Bid Bulletin forms part of the Terms of Reference. All other terms and conditions in the Bid Documents and other Bid Bulletin issued by the DOE-BAC not consistent with this Supplemental/Bid Bulletin shall remain valid and effective.

Approved for Issuance:

(sgd)

MARIO C. MARASIGAN, CESO III
Assistant Secretary and
Vice – Chairperson, BAC

FGD/marc/jjad