

**DESIGN, SUPPLY, INSTALLATION AND
COMMISSIONING OF SOLAR-
POWERED LEVEL II POTABLE
WATER SYSTEM FACILITY IN LEBAK
SULTAN KUDARAT**

(Revised)

**Under the
Integration of Productive Uses of Renewable Energy for
Sustainable and Inclusive Energization in Mindanao
(IPURE MINDANAO Project)**

TERM OF REFERENCE

1. INFORMATION ON TENDER AND PROJECT AREA

1.1 Background

The Integration of Productive Uses of Renewable Energy for Inclusive and Sustainable Energization in Mindanao or I-PURE Mindanao Project is a cooperation between the National Electrification Administration (NEA) and the Mindanao Development Authority (MinDA) with grant funding from the European Union through the Access to Sustainable Energy Programme (EU-ASEP).

The overall objective of the Action is to bring about inclusive and sustainable social and economic development to the sites through improved livelihood activities and sustainable access to energy through renewable energy solutions. Aligned to this objective, the central precept to the selection of the activities and sites for the proposed Action is the shift from the traditional practices of deploying renewable energy technologies for stand-alone household energy applications (lighting, radio, others) to a solution that combines renewable energy solutions for livelihood activities and household energization.

I-PURE Mindanao Project has two major component

Component 1: Productive Uses of Renewable Energy (PURE)

Component 1 of the Project will introduce and implement PURE technologies in 10 Municipalities that will be used to produce high value AF&F products that will demand higher prices in the market thereby improving the income of the target families.

Component 2: Sustainable Energization

The key implementing partners are National Electrification Administration (NEA) as lead applicant, Mindanao Development Authority (MinDA) as co-applicant, and electric cooperatives which includes COTELCO, SOCOTECO II, SUKELCO, TAWELCO, and local government units (LGUs), community based organizations (CBOs) and academes in North Cotabato, Sarangani, Sultan Kudarat, Lanao Del Sur and Tawi-Tawi as associates.

1.2 Objective

This Terms of Reference is developed to identify a contracting partner for the ***DESIGN, SUPPLY, INSTALLATION AND COMMISSIONING OF SOLAR-POWERED LEVEL II POTABLE WATER SYSTEM FACILITY LEBAK, SULTAN KUDARAT***


These installations will be a showcase set-up whereby aesthetic value and quality have to be aligned to the overall project objectives. The project shall serve as a model for other remote, un-electrified areas in the Philippines and a model for other electric cooperatives and private entities in the country to implement electrification projects integrated with productive uses, delivery of social welfare and water supply. The sustainability and replicability of the project will be given due consideration. This implementation exercise will provide the framework for linking energy supply programmes with operational programmes for agriculture and rural development and provide data for national level resource allocations and policy guidelines for the rural energy sector.

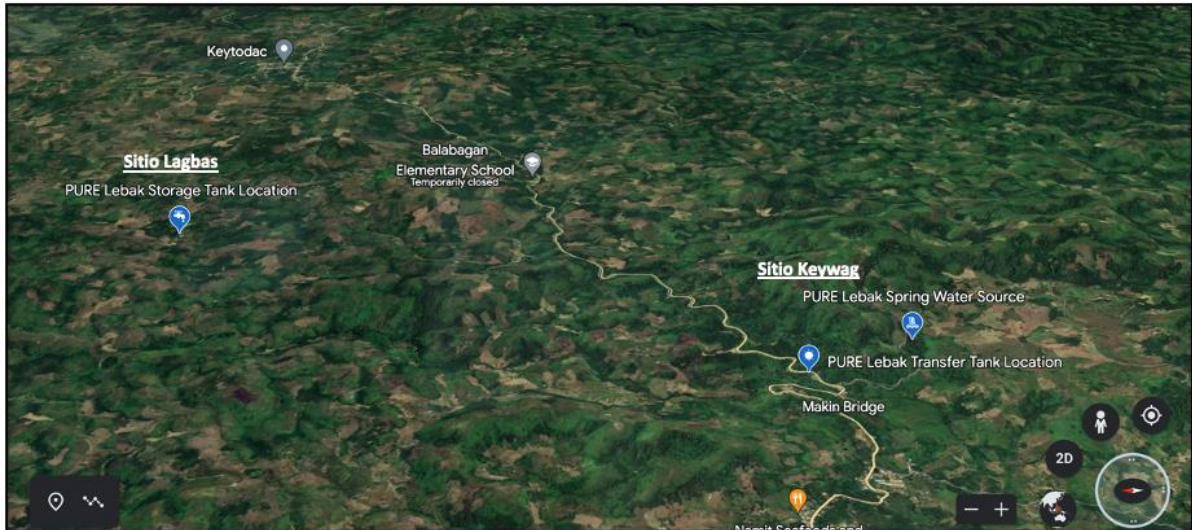
1.3 Project Duration

The overall time schedule for the activities to be undertaken is included in Annex 1 of this document. This unit establishment is expected to be commissioned and operational by September 2023. Training for the local operating team will be implemented for the subsequent 30 days during and after the testing and commissioning. Upon completion of training, project handover is scheduled on or before 05 October 2023.

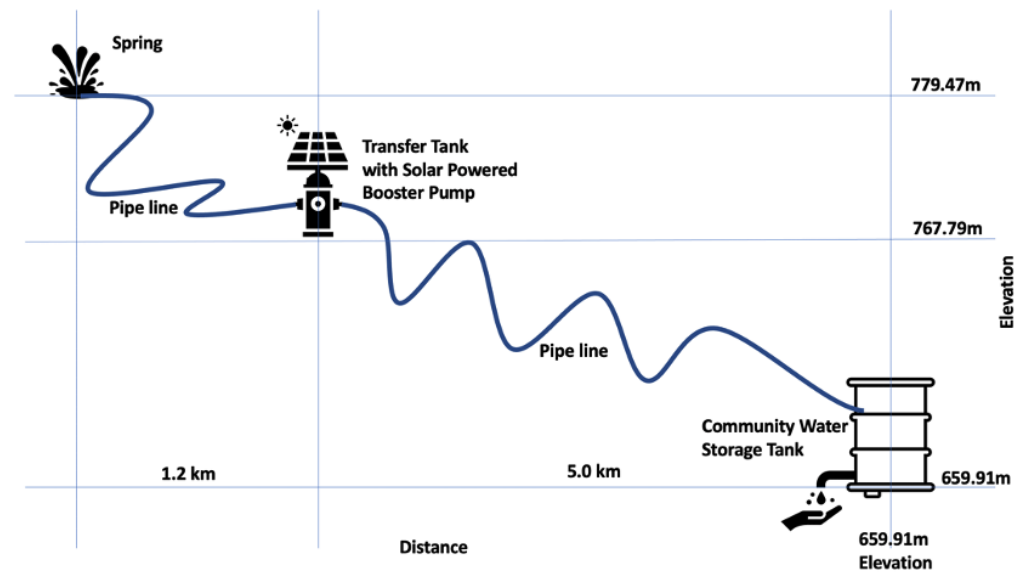
The liquidated damages shall be imposed for the inability of the CONTRACTOR to comply with the Approved Delivery Schedule, unless a written request for time extension been approved in writing by NEA.

1.4 Location of the Project

Project Site:	Lebak, Sultan Kudarat
Water Source:	<p>Spring</p> <p><i>Spring assessment:</i></p> <ul style="list-style-type: none"> - Consistent during summer and rainy season. - Flow rate: 20 Liters per minute. - Potable, used to be the community drinking water source. - Elevated, 120 m altitude difference from the receiving community. (based on google earth altitude data). - 5 to 6 kilometers away from the receiving community. 
Water Source Location:	<p>Sitio Keywag, Barangay Keytodac</p> <p>Latitude: 6°37'22.07"N Longitude: 124°12'54.11"E</p>
Service Area:	<p>Sitio Lagbas, Barangay Keytodac</p> <p>Transfer Tank and Solar-Powered Pump Location Latitude: 6°37'44.17"N Longitude: 124°12'46.02"E</p> <p>Water Storage Tank Location Latitude: 6°40'0.96"N Longitude: 124°13'49.55"E</p>



**Barangay Keytodac, Lebak, Sultan Kudarat – IPURE Solar Powered
Level II Potable Water Facility Project Location**



Project Design Concept

Project Site Contact
Person:

FLORENCIO APANG
Municipal IPMR
0909-454-8383

JAYBEE BERNALES
Municipal Planning & Development Officer
0912-189-7936

DATU VINANCIO/ JOEY APANG
IP Community
0909-454-5326

1.5 Approved Budget for the Contract (ABC)

For and in consideration of the performance and accomplishment of the **DESIGN, SUPPLY, INSTALLATION AND COMMISSIONING** of the following items:

DESIGN, SUPPLY, INSTALLATION AND COMMISSIONING OF SOLAR-POWERED LEVEL II WATER SYSTEM FACILITY IN LEBAK, SULTAN KUDARAT

NEA shall pay the CONTRACTOR the total amount of *Six Million Four Hundred Sixty-five Thousand Three Hundred Fifty-eight Pesos and Ninety cents only (Php 6,465,358.90) per Lot* subject to pertinent laws on government contracts and auditing procedures.

<i>Lot 1</i>	<i>Design, Supply, Installation and Commissioning of Solar-Powered Level II Potable Water System Facility in Lebak, Sultan Kudarat</i>	<i>Php6,465,358.90</i>
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The contract price is inclusive of all duties and taxes. No changes shall be made on the Contract Price by reason of escalation in currency.

1.6 General Considerations

1.6.1 Storage, warehousing and Operational community facilities

Before the delivery and installation of the equipment/goods in the project site/s (on-site), it is suggested that the Contractor must coordinate closely with the Contracting Authority and Beneficiary Organization/s for the transport and storage of equipment/goods.

It is also imperative that the Contractor have already secured on-site storage/warehousing facility prior to the delivery of goods or has already coordinated with the Beneficiary Organization for the storage of the supplied equipment/goods in the existing processing facility of the Beneficiary Organization/s.

Once the goods/equipment have securely reached the project sites, the overall responsibility for the security of all inventory/goods will lie with the Supplier.

The Contractor will also be responsible for arrangement of sleeping and other facilities for their installation technicians on the project site. The Contractor shall ensure that all staff respect the local customs of affected communities and comply with local government laws when interacting with stakeholders.

1.6.2 Vehicles and transportation

The Contractor will be responsible for the supply and provision of all transportation needs for transferring the equipment/goods from the area of origin or port to the project site/s (on-site). This may require different modes of transport including 2WD, 4WD, trucks and/or all-terrain vehicles (ATVs).

1.6.3 Health and Safety Requirements

The Contractor shall take note where all local clinics and hospitals are located in case of an emergency. The Contractor shall send/inform the Project, the details of any accident as soon as practicable within three (3) days after its occurrence. The Contractor shall maintain records and reports concerning health, safety and welfare of persons, and damage to property.

The Contractor is required to include a Safety Plan meeting the following requirements:

- Compliance with all applicable safety regulations;
- Safety of all persons authorized to be on Installing within the Project Areas; and
- Use reasonable efforts to keep the Site and Works clear of unnecessary obstruction to avoid danger to these persons

A Safety Engineer or Officer shall be present at all time during the project execution.

The Contractor shall at all times take the necessary precautions to protect its Personnel employed on Site from insect and pest nuisance, and to reduce the danger to their health. The Supplier shall comply with all the regulations of the local health authorities, including use of appropriate insecticide.

The Contractor is responsible for the prevention of the spread of Covid-19 at the Project Sites. It is recommended that all workers are tested before and leaving the project sites. All covid test costs shall be shouldered by the Contractor.

1.6.4 Labor Laws

The Contractor shall comply with all the relevant Labor Laws applicable to the Contractor's Personnel, including Laws relating to their employment, health, safety, welfare, immigration and emigration, and shall grant them all their legal rights. The Supplier shall require his employees to obey all applicable Laws, including those concerning safety at work.

1.6.5 Contractor's Personnel

The Contractor's Personnel, including its JV partner/s for the system installation or other related services, shall be appropriately qualified, skilled and experienced in their respective trades or occupations. The Contracting Authority (NEA) may require the Contractor to remove (or cause to be removed) any person employed on the Site or Works, including the Contractor's Representative if applicable, who:

- 1) persists in any misconduct or lack of care,
- 2) carries out their duties incompetently or negligently,
- 3) fails to conform with any provisions of the Contract, or
- 4) persists in any conduct which is prejudicial to the safety, health or the protection of the environment.

If appropriate, the Contractor shall then appoint a suitable replacement.

1.6.6 Foreign personnel

The Contractor may bring in to the Country any foreign personnel who are necessary for the execution of the installation to the extent allowed by the applicable Laws. The Contractor shall ensure that these personnel are provided with the required visas and work permits.

The Contractor shall be responsible for the return of these personnel to the place where they were recruited or to their domicile. In the event of the death in the Country of any of these

personnel or members of their families, the Contractor shall similarly be responsible for making the appropriate arrangements for their return or burial.

1.6.7 Supplier Safeguards Obligations

The contractor shall ensure that all staff comply with associated safeguards procedures outlined in the project's Environmental and Social Safeguards Framework (ESSF) in accordance with EU Policy guidance on Environmental Assessment, Involuntary Resettlement, and Indigenous Peoples and Philippine National laws (PD 1586) or the EIS System, (DAO No. 2003-30) Implementing the IRR for the Philippines EIS System and its Procedural Manual, RA 6969 and 9003, as prepared by DENR. In line with the ASEP environmental and social safeguards, the project should meet the following:

- 1) The Contractor/Supplier should follow the Environmental Management Plan (EMP) during construction and operation of the project. The EMP consists of mitigation measures to solve possible adverse impacts and monitoring compliance. Mitigation measures to follow include:
 - a) Setting up of temporary disposal units within the construction area and properly dispose generated wastes.
 - b) Contractor and workers observe proper housekeeping, sanitation and waste minimization.
 - c) Activities should only be done during the day to avoid noise.
 - d) Refer to RA 6969 for accidental release of pollutants to soil and/or groundwater.
 - e) Preparation and conduct of decommissioning plans, including proposed disposal methods, recycling opportunities and collection.
 - f) Properly dispose used chemicals.

- 2) The Contractor should observe the Environmental Codes of Practice (ECoP) for solar energy development by due diligence during procurement, and construction / installation of facilities.
- 3) In procuring, consider type of PV cells manufactured. Take note of toxicity and health hazards posed by chemical substances used in the PV manufacturing process (e.g. phosphine used in amorphous silicon cells is very toxic and poses a severe fire hazard through spontaneous chemical reaction.).
- 4) In sourcing out the PV cells and other solar components, consider manufacturer's experience and its compliance with local, national/and or international laws and regulations concerning toxic and hazardous substances
- 5) The Contractor shall avoid any damage to properties such as lands, structures, crops, and trees. Should any private assets or public properties be affected, the contractor shall restore or replace such assets/properties or compensate the owners in accordance with the ESSF.
- 6) The Contractor shall conduct its activities with full respect and consideration of Indigenous Peoples' unique culture and practices. Before entering IP areas, the Contractor is expected to coordinate with relevant local authorities, i.e., representatives of the National Commission on Indigenous Peoples (NCIP) or leaders of ethnic groups, etc. Indigenous Peoples are mixed within the general populations of the areas targeted, and their rights and cultures must always be respected even though they will be indirect recipients of the installed system.

1.6.8 Electricity and water

No electricity supply is available on site and Contractor is required to take care of own energy needs. Contractor may not assume to use any existing diesel generators used for water pumping on site, without prior arrangement with the LGUs, in writing.

2. SCOPE OF WORK AND DELIVERABLES

2.1 Scope of Contract

The scope under this Terms of Reference is the **DESIGN, SUPPLY, INSTALLATION, AND COMMISSIONING, ON A TURNKEY BASIS**, of Lebak, Sultan Kudarat Solar-Powered Level II Potable Water System Facility

2.2 Project Components

Design, Supply, Installation, and Commissioning with the following components:

A. Lebak, Sultan Kudarat Solar-Powered Level II Potable Water System Facility
Water Pump System and Storage <ul style="list-style-type: none">• 4.0 kW Submersible Solar Water Pump and Controller• Well/Spring Development (including Collection/Intake Boxes)• Transmission Pipe• 20-100m³ Elevated Water Tanks (concrete or steel) with 3 tap stand
5.5 KWp Solar Array and Power House <ul style="list-style-type: none">• Ground-mounted PV Module /Solar Panel• Power House• Perimeter fence
Tools and Toolbox
Spare Parts
Related Services <ul style="list-style-type: none">• Factory Testing and Pre-Shipment/Delivery Inspection• Installation, site inspection/monitoring and documentation• Training for Technical Staff of the Project & Beneficiary Organization/s for the operation, management and maintenance (OM&M) of PURE system/s• Equipment and component product warranties• Detailed OM&M Manuals for each appropriate unit of the supplied Goods;

2.3 Project Deliverables

The tasks to be covered and the expected results are summarized in the following table:

Task List	Expected Results	Venue
System Concept	i. Bill of Quantities (BOQ) Form 1.2 ii. (Form No.2. Detailed Explanation on Technical Proposal) Technical proposal of approach and method statement that will include: <ul style="list-style-type: none">• Work Organization	Part of Technical Submission during bidding

	<ul style="list-style-type: none"> • Method Statement • Mobilization Schedule • Installation Schedule • Personnel • Equipment • Training Experience & Method <p>iii. Technical Data Sheets containing specifications of the components of the system to be installed: solar pv modules, water pump system, irrigation system, filtration system for potable water</p> <p>iv. Manufacturer's general data and illustrated catalogues and brochures</p> <p>v. Manufacturer's Sample Test Certificates of the solar PV modules, motor pumps, and inverters to be supplied, among others, the guaranteed capacity (output) and efficiency.</p> <p>vi. Manufacturer's Certificate on the Average Service Life of the solar PV modules and motor pumps to be supplied</p> <p>vii. Construction Plan and Cash Flow Requirement</p> <p>viii. Detailed Gantt Chart for construction in line with the general time schedule found in Annex 1.</p> <p>ix. Visual Mock-up of the Proposed Facility</p>	
System Design	<p>i. Detailed System Configuration</p> <p>ii. Schematic Diagram of the proposed solar PV and water pumps system</p> <p>iii. Engineering Drawings including Electrical and Mechanical Systems, Civil/Structural Design; Instrumentation & Control / Communication Design</p> <p>iv. Design and detailed layout of the SPV modules and their mounting in the array structures</p> <p>v. Creative works</p> <p>vi. Facility layout</p> <p>vii. Management, communication and controls of the system</p>	Submitted to and approved by the I-PURE Technical Working Group
System Installation	<p>i. Fully functional establishment complied with all safety and regulatory standards.</p> <p>ii. Installation follows the approved layout and visual mock up.</p>	On-site
Testing and Commissioning	<p>i. Testing and commissioning protocol and report</p> <p>ii. Test and Inspection Certificates and Report</p>	Report On site and Document Handover

	iii. Project Completion	
Handover	<ul style="list-style-type: none"> i. Certificate of acceptance signed by the NEA and MinDA, the beneficiary and the Contractor ii. Training provided to local operators for one (1) month with certification. Trainers should be TESDA Accredited. iii. 5 sets of Complete as-built documents transferred: As-built Plan (e.g. AutoCAD drawings, actual layout, equipment specification), User Manual, Operation and Maintenance Manuals, Troubleshooting Manual, Specification Sheets, Parts List (indicating serial numbers of installed parts), Inventory of fast-moving spare parts iv. Local Service Center, point person and contact details v. List of suppliers and contact details for the tools and spare parts; vi. Documentation of the implementation of the project (audio visual presentation and written documentation) 	On-site or LGU/Office
Periodical Reporting	<p>Written Progress Report to the I-PURE Project Steering Committee on a weekly basis and consolidated monthly, which include:</p> <ul style="list-style-type: none"> a) Progress versus timeline b) Milestone reports c) Highlighting issues that potentially affect the project delivery and mitigation plan d) Financial report – interim and final 	Meeting and/or Audio conference with visual aid and soft-copy document submission to NEA and MinDA.

2.4 Permits and requirements

The acquisition of building and electrical construction permits from the local government shall be the responsibility of the Contractor and shall designate a liaison officer for this purpose. MinDA and the local government unit will provide assistance in this regard.

2.5 Shipment of Goods

Customs clearance, permits, inspection of good on arrival, temporary storage and insurance of equipment and materials shall be the responsibility of the Contractor given due support by MinDA as well as local government partners. MinDA or NEA and the Contractor shall undertake inspection of goods upon arrival at the project sites.

2.6 Testing & Commissioning Requirements

The Contractor shall prepare a commissioning protocol to be approved and signed by the Technical Working Group. Basic measurements and parameters required to analyse the performance of the system systems shall include

- (i) energy produced by all energy sources;
- (ii) frequency and voltage output of the facility; and
- (iii) energy consumed by the load, DC and/or AC
- (iv) performance of the equipment

Testing and commissioning will be undertaken in the presence of the Technical Working Group, the Electric Cooperatives and the local government unit.

2.7 Training Requirements

The Contractor is to coordinate closely with project partners to implement hands-on training for the owners/operators of the system on its operation and maintenance for four (4) weeks after conclusion of testing and commissioning. The Contractor should train at least six (6) technicians for the operation and maintenance of the system.

Training manuals and materials must be provided in English (and local language as necessary) and include trouble-shooting manuals, complete as-built drawings and, and manuals of specific parts and materials. The Contractor must also provide standard operating and safety/emergency procedures. The Contractor must also specify the qualifications and skill level requirements of operators of the system.

2.8 Warranty and After-Sales Service

The Contractor shall maintain a Service Center in the project area to serve the support needs of the solar PVP systems. Activities covered under after-installation services are:

- e) Warranty period on quality of workmanship in all parts
- f) Component warranty on key system components
- g) System performance guaranty
- h) Break-down repair services
- i) Spare parts support

The Contractor shall maintain the Service Center on its own or through business partners, at least at Regional level, and preferably within 3 hours travel (300km) from any site. Service Center shall provide adequately skilled and trained staff to perform any maintenance services, repair or component replacements likely to be necessary over the system lifetime, and should carry a stock of spares for any components which are likely to need replacing over the system lifetime.

2.9 Component warranties

The warranties on the individual components for installations shall meet the following requirements: The Contractor shall provide warranty certificates from the Manufacturers for the following equipment:

- (i) A one (1) year warranty on the Water Tank for leaks.

- (ii) A ten (10)-year warranty on the solar PV modules with at least eighty percent (80%) power output guaranteed at ten (10) years and 25 years expected useful life;
- (iii) A ten (10)-year warranty on the design and installation of solar module racking and mounting supports;
- (iv) A one (5) – year warranty on the pump and motor.
- (v) A five (5)-year warranty on the structure to withstand wind speed of 200kph

Specific Manufacturer Warranties shall be provided signed by an authorized official of the manufacturer with company seal, on the company’s letter with specific reference to this procurement.

Standard/nominal printed documentation without the signed warranty commitment is not acceptable.

Contractor must be able to guarantee the functioning of all parts and electricity production of the installation with a minimum of 3 years from the date of acceptance.

2.10 Spare Parts and Tools Requirements

The Contractor must include in the Bid Offer/Bill of Quantity spares for parts that may require replacement by normal ‘wear and tear’. Contractor must also provide a set of standard tools prescribed by the manufacturer for each equipment and solar system.

In addition, the Contractor shall submit a list of additional Recommended Spare parts, for all components. The Contractor should not obligate the system owner or other responsible party to order the spares scheduled in the list at the prices stated during or after the contract.

The Contractor must also provide a Certification from the Manufacturer or Distributor that the major parts and services, including spare parts, for the goods offered are available for the next five (5) years within the country.

The Contractor shall make arrangements and provide contact details of a local service center in the Philippines that will efficiently cater to the maintenance, repair, and spare parts requirements of the supplied units during the guarantee period. Any occasionally replaced parts that may significantly hinder the system’s operations, including solar PV modules, should be provided with spares, to avoid delays.

2.11 Rejection of faulty equipment

If, within the first twelve (12) months of the Warranty period, ten percent (10%) of more of any class of equipment fails based on record-keeping tracking tools, the Contracting Authority may, at his sole discretion, have the right to demand the replacement of all of that class of component or material throughout the entire set of equipment supply or tender installations awarded to that Contractor.

2.12 Patent Rights

The Contractor shall indemnify the Contracting Authority and its partners against all third party claims of infringement of patent, trademark, or industrial design rights arising from use of the Goods or any part thereof.

2.13 Site Safety and Security

Contractor is expected to ensure the safety and security of personnel and system installations during the contract duration and include anti-theft measures and devices in the equipment to be installed.

2.14 Supervision and reporting Requirements

The Contractor shall prepare weekly status reports and monthly reports to be submitted to the Project Management Unit via email. The final report must be provided to the Project Management Unit along with complete as-built documents in 5 sets of hard copies and electronic copies in a flash drive:

- PDF file
- Original work files (WORD, POWER POINT, EXCEL, AutoCAD, etc.).
- Photographs
- 1 Audio Video Presentation

All deliverables and related documents **will be provided in English.**

2.15 Language Requirements

The experts will be required to be fluent in English. All written material submitted to the PMU should be of such quality that no additional technical editing is required. Knowledge of personnel in the local dialect is also desirable.

3. Contractor's Qualifications

3.1 The CONTRACTOR must:

- Preferably satisfy the criteria set forth in section 2.3 of the Practical Guide to contract procedures for the European Union external actions specifically 2.3.1 the rule on nationality and origin.

a) The Nationality Rule

Participation in tender procedures managed by the beneficiary(ies) is open on equal terms to all natural who are nationals of and legal persons (participating either individually or in grouping-consortium- of tenderers) effectively established in a Member State or a country, territory or region mentioned as eligible by the relevant regulation/basic act governing the eligibility rules for the grant as per Annex A2a to the practical guide. Tenderers must state their nationality in their tenders and provide the usual proof of nationality under their national legislation.

This rule does not apply to the experts proposed under service tenders financed by the grant.

b) The Rule of Origin

If the basic act or the other instruments applicable to the programme under which the grant is financed contain rules of origin for supplies acquired by the beneficiary in the context of the grant¹, the tenderer must be requested to state the origin² of the supplies, and the selected Contractor will always have to prove the origin of the supplies.

For equipment and vehicles of a unit cost on purchase of more than EUR 5 000, Contractors must present proof of origin to the beneficiary(ies) at the latest when the first invoice is presented. The certificate of origin must be made out by the competent authorities of the country of origin of the supplies and must comply with the rules laid down by the relevant Union legislation. Failure to comply with this condition may result in the termination of the contract and/or suspension of payment.

Where supplies may originate from any country, no certificate of origin needs to be submitted.

3.2 Contractor’s Personnel

Contractor must provide a dedicated person in-charge (PIC) and back-up personnel as contact point and project coordinator. The PIC or the backup personnel must be available for meetings during the execution of the project. The Contractor PIC must liaise directly with Project Management Unit (PMU) of I-PURE for this project and comply with requirement put forward by PMU.

A Resident Engineer or Assistant Project Manager is to be made available in each of the Project Site at all times during the project execution time commencing until 3 months after conclusion of testing and commissioning. All engineering services shall be performed by professionals duly licensed in the Philippines or the region, based on the specific discipline required, and have specific experience in implementing solar PV systems. Each submitted final design drawing, calculation document, and technical specifications shall be signed and dated by, bear the seal of, and show the Professional Accreditation Number of the Engineer who prepared the document.

Contractor attests to be responsible for the professional quality, technical accuracy, and coordination of all engineering services required in this service contract. The contractor shall fill Form No.4: Schedule of Key Staff required for Post-Qualification Assessment

The Contractor must have suitably qualified personnel to fill key positions, as described in the table below:

	Total Experience	Experience in Similar Works (in years)	Background and Description
Project Manager	2 Years	2 Years	Project management and technical experience in the installation and commissioning of similar systems, especially systems located in remote and isolated areas
Resident Engineer for each of the Project Site or Assistant Project Manager	2 Years	2 years	Project management and technical experience in the installation and commissioning of similar systems, especially

			systems located in remote and isolated areas Note. 1 Assistant Project Manager for each project site.
Electrical Engineer	2 Years	2 Years	technical experience in the installation and commissioning of similar systems, especially systems located in remote and isolated areas
Civil Engineer/Mechanical Engineer	2 Years	2 Years	technical experience in the installation and commissioning of similar systems, especially systems located in remote and isolated areas
Agriculture Engineer	2 Years	2 Years	technical experience in the installation and commissioning of similar systems, especially systems located in remote and isolated areas
Safety Engineer or Officer	2 Years	2 Years	experience in the installation and commissioning of similar systems, especially systems located in remote and isolated areas

There must be a dedicated installation team with at least ten (10) staff for every project site.

4. Terms of Payment/Milestones

Terms of payment will be based on technical milestones such as equipment shipment and delivery to the site, completion of site works, installation, completion of electromechanical works, testing and commissioning, training and project turnover with an indicative payment schedule (agreed upon during contract finalization) as below:

Terms of payment will be based on technical milestones such as equipment shipment and delivery to the site, completion of site works, installation, completion of electromechanical works, testing and commissioning including integration with the distribution system and diesel generator and project turnover with an indicative payment schedule (agreed upon during contract finalization) as below:

Schedule of Payment	Milestone
15%	Signing of contract
35%	Complete Delivery of materials
20%	Electromechanical completion

20%	Testing and commissioning
10%	After handover and training

Since all of these payments shall be subject to the usual government accounting and auditing requirements, the Contractor is expected to be familiar with the Government Accounting and Auditing Manual (GAAM).

5. Penalties / Liquidated Damages

Failure to comply with the Terms and Conditions of the contract will result in the payment of corresponding penalties/liquidated damages in the amount equal to 1/10 of 1% of the cost of the unperformed portion for every day of delay. Once the cumulative amount of liquidated damages reaches 10% of the amount of the contract, NEA shall rescind the contract, without prejudice to other courses of action and remedies open to it.

6. TECHNICAL SPECIFICATIONS

6.1 5.5 KWp Photovoltaic (PV) Solar Array

6.1.1 Certification standards

Compulsory certifications for crystalline modules are all of the following:

- IEC 61215 (2005-04): Crystalline silicon terrestrial photovoltaic (PV) modules – Design qualification and type approval and 61730 “Module Safety Qualification”
- IEC 61701 Ed.2: Salt mist corrosion testing of photovoltaic (PV) modules
- All systems must be installed in accordance with IEC 62548 “Installation and Safety Requirements for Photovoltaic systems”
- ISO 9001:2008 and ISO 140001 Certificates of the Manufacturer or equivalent
- Certification from the Distributor that parts and services, including spare parts, for the equipment/machine offered are available for the next five years within the Philippines

6.1.2 PV module Particular Requirements

- a) The photovoltaic (PV) array shall consist of mono-crystalline or poly-crystalline modules. **Note that thin film modules are not acceptable**
- b) High-power high-voltage modules are favoured over low power low-voltage modules. To reduce the attractiveness of the modules to vandals, it is recommended that very large high-voltage modules are used (270Wp minimum). The number of cells per module offered shall be specified.
- c) The panel efficiency is at least 20% at STP.
- d) Only one standard size of module (one manufacturer and model) shall be used to facilitate spares and parts management.
- e) The array is ground-mounted. See below ideal solar PV mounting structure:



6.1.3 General Requirements

- a) All PV modules within an array shall be of the same type and hence interchangeable.
- b) Each module must be factory equipped with 14 to 12 AWG (2.0 to 4mm²) fly-leads length approximately 800mm with weather-proof connectors for interconnection of modules into strings without any additional wiring. There are a multitude of professional PV array quick connectors available for array fly-leads cables in the 2-4mm² range. The connectors shall have the following features:
 - Class II rating for fly-leads and connectors
 - system voltage 1,000V maximum,
 - IP68 protection rating
 - temperature up to 90oC
 - 20A current rating
 - 2.5-4mm² cables
 - Snapping locking system
- c) The module framing should be such that it permits secure connection to the mounting structure, prevents edge damage and has the longevity to withstand environmental factors for the duration of the module warranty period.

6.1.4 Electrical performance

- a) The tolerance of rated output of the PV modules offered shall be positive only. Negative tolerances are not allowed.
- b) Crystalline modules shall have a bypass diode (IP67 and IEC 62790 compliant) which is located in the PV module junction box so that they can be replaced without replacing the module. (Bypass diodes are installed to prevent hot-spots in modules, which occur often as a result of partial shading of modules. Shading may be more likely when anti-vandalism array-security brackets are used to fix modules into place).
- c) Module warranty: 10 years: The PV modules shall be warranted to retain at least 80 percent of its nominal rated output measured at STC for at least twenty-five years.

6.1.5 Labelling and documentation

- a) Labelling: Each module must be labelled indicating at a minimum:
 - Manufacturer, Model Number, Serial Number,
 - Maximum Power Point Watt Rating (Wp ± tolerance),

- Maximum Power Point Current,
 - Maximum Power Point Voltage,
 - Open Circuit Voltage and Short Circuit Current of each module.
- b) The Contractor is required to provide for each PV Module offered the following data: Equipment Origin, Type of Certification, and the following general data
- I-V Curves at AM1.5, NOCT,
 - Electrical data
 - Maximum Power Point Watt Rating ($W_p \pm$ tolerance),
 - Maximum Power Point Current,
 - Maximum Power Point Voltage,
 - Open Circuit Voltage and Short Circuit Current of each module.
 - Dimensions,
 - Warranty,
 - Product brochure
- c) The Contractor is required to provide for each Panel supplied the following test data
- d) Flash test information for each individual module shall be provided.

6.2 Submersible Pump and Controller

Technical Specifications:

a) Pump Type:

The Solar Submersible Water Pump with Controller is a submersible pump that can be used in both shallow and deep wells. It is designed to operate in a vertical position with the motor at the bottom and the pump at the top.

b) Power Supply:

The pump is powered by a solar panel array that generates DC power. The panel array should be selected based on the pump's power consumption and the available solar radiation in the area. The pump comes with a controller that regulates the power supply to the pump and protects it from over-voltage and overload.

c) Flow Rate:

The pump has a maximum flow rate of 7 cubic meters per hour at a head of 140 meters. The flow rate can be adjusted using the controller, which has a user-friendly interface that displays the pump's operating parameters.

d) Maximum Head:

The pump can lift water up to a maximum head of 140 meters, which is the vertical distance between the water source and the discharge point. The maximum head is determined by the pump's power consumption and efficiency.

e) Motor:

The pump has a brushless DC motor that is designed for high efficiency and low maintenance. The motor is encapsulated in a stainless steel casing that protects it from corrosion and wear. The motor has thermal protection that shuts it off if it overheats.

f) Pump Body and Impeller:

The pump body and impeller are made of high-grade stainless steel that is resistant to corrosion and wear. The impeller is designed for high efficiency and low cavitation, which reduces the risk of damage to the pump.

g) Controller:

The pump comes with a controller that regulates the power supply to the pump and protects it from over-voltage and overload. The controller has a user-friendly interface that displays the pump's operating parameters, such as flow rate, head, and power consumption. The controller also has built-in diagnostic functions that detect faults and malfunctions in the pump.

h) Installation:

The pump is easy to install and requires no special tools or expertise. The pump is designed for submersion in water and can be installed in a borehole, well, or tank. The solar panel array should be installed in a location that receives maximum solar radiation and is protected from damage.

i) Warranty:

The Solar Submersible Water Pump with Controller comes with 5-year warranty that covers defects in materials and workmanship. The warranty does not cover damage caused by improper installation, misuse, or neglect.

6.3 Elevated Storage Tanks

6.4.1 Required Technical Specifications

- Made of concrete or steel.
- Capacity of 20,000-100,000 liters
- With ladder
- Food Grade
- The Tank must be elevated at least 3 meters from the ground/service area.
- With 3 units tap stands/faucets (min.)
- Design to be included in the bid offer

6.4.2 Warranty

A one (1) – Year warranty on the Tanks for water leaks.

6.4 Products and materials to be supplied

Products and materials supplied must withstand the prevailing seasonal and year-round temperatures and conditions at the site (sunlight, heat, rain, cold, wind, seismic, salt air, fog, marine corrosiveness, etc.). Corrosion-proofing should be considered for PV hardware and rack components as well as inclement weather conditions in the area (e.g. typhoons, storm surges). Design should also withstand wind speeds of up to 250 kph.

For compatibility and consistency of supply of parts equipment and spares, each component (e.g. modules, inverters, and electrical switchgear, etc.) must be from the same manufacturer and product line.

All equipment, products, materials and supplies, including their parts and spares, are to be turned over in brand-new condition; The project will not accept any used, repaired, refurbished or sub-standard equipment, products, materials and supplies.

There should be visible and durable markings on electrical equipment and components used in PV systems to identify the manufacturer, size, type, ratings, hazard warnings, and other specifications.

Section III. Checklist of Technical and Financial Documents

I. TECHNICAL COMPONENT ENVELOPE

Class “A” Documents

Legal Documents

- (a) Valid PhilGEPS Registration Certificate (Platinum Membership) (all pages); **or**
- (b) Registration certificate from Securities and Exchange Commission (SEC), Department of Trade and Industry (DTI) for sole proprietorship, or Cooperative Development Authority (CDA) for cooperatives or its equivalent document, **and**
- (c) Mayor’s or Business permit issued by the city or municipality where the principal place of business of the prospective bidder is located, or the equivalent document for Exclusive Economic Zones or Areas; **and**
- (d) Tax clearance per E.O. No. 398, s. 2005, as finally reviewed and approved by the Bureau of Internal Revenue (BIR).

Technical Documents

- (e) Statement of the prospective bidder of all its ongoing government and private contracts, including contracts awarded but not yet started, if any, whether similar or not similar in nature and complexity to the contract to be bid; **and**
- (f) Statement of the prospective bidder of all its completed government & private contracts which are similar in nature and complexity to the contract to be bid within one (1) year and shall be accompanied by Certificate of Acceptance; **and**
- (g) Statement of the bidder’s Single Largest Completed Contract (SLCC) similar to the contract to be bid, except under conditions provided for in Sections 23.4.1.3 and 23.4.2.4 of the 2016 revised IRR of RA No. 9184, within the relevant period as provided in the Bidding Documents; **and**
- (h) Conformity with the Technical Specifications, which may include production/delivery schedule, manpower requirements, and/or after-sales/parts, if applicable; **and** the following documents:
 - Form No.1: Bill of Quantities
 - Form No.2. Detailed Explanation on Technical Proposal (See Form No.2 for details)
 - Form No. 4 Technical Specifications Compliance
 - Form No. 5 Compliance for Safeguards Obligations
 - Technical Specifications of components, Manufacturer’s Data, Sample Test Certificates and Average Service Life Certificates.
 - Preliminary System Design Guaranteed Electricity Generation, Electrical Design, Civil/Structural Design; and Instrumentation and Control/ Communication System Architecture, Visual Mock-up of the Proposed Facility
 - Location of Local Service Center
 - List of Suggested Spare parts and Tools
 - Specific Experience: Valid proof for this required experience such as completion certificates with technical details of the works executed Form No.3: Schedule of Key Staff

- Cash Flow and Payment Schedule
- (i) Original duly signed Omnibus Sworn Statement (OSS); and if applicable, Original Notarized Secretary’s Certificate in case of a corporation, partnership, or cooperative; or Original Special Power of Attorney of all members of the joint venture giving full power and authority to its officer to sign the OSS and do acts to represent the Bidder.
- (j) Other documents required by NEA (To be submitted during Post Qualification or may be included in bid submission)
 1. Certification confirming statement on the delivery schedule;
 2. Certification confirming statement on the installation schedule;
 3. Certification confirming statement on warranty being offered;
 4. Certificate of origin/importation/delivery proving the materials and equipment are brand new (to be submitted upon 100% delivery)
- (k) Other documents required by NEA (To be submitted before signing of contract)
 1. Performance Bond;
 2. Warranty Bond

Financial Documents

- (l) The Supplier’s audited financial statements, showing, among others, the Supplier’s total and current assets and liabilities, stamped “received” by the BIR or its duly accredited and authorized institutions, for the preceding calendar year which should not be earlier than two (2) years from the date of bid submission; **and**
- (m) The prospective bidder’s computation of Net Financial Contracting Capacity (NFCC); **or**

A committed Line of Credit from a Universal or Commercial Bank in lieu of its NFCC computation.

Class “B” Documents

- (n) If applicable, a duly signed joint venture agreement (JVA) in case the joint venture is already in existence; **or** duly notarized statements from all the potential joint venture partners stating that they will enter into and abide by the provisions of the JVA in the instance that the bid is successful.

Other documentary requirements under RA No. 9184 (as applicable)

- (o) [For foreign bidders claiming by reason of their country’s extension of reciprocal rights to Filipinos] Certification from the relevant government office of their country stating that Filipinos are allowed to participate in government procurement activities for the same item or product.
- (p) Certification from the DTI if the Bidder claims preference as a Domestic Bidder or Domestic Entity.

FINANCIAL COMPONENT ENVELOPE

- (a) Original of duly signed and accomplished Financial Bid Form;
- (b) Original of duly signed and accomplished Price Schedule(s).

NAME OF BIDDER: _____
 BIDDING NO.: _____

BILL OF QUANTITIES

Provide a bill of quantities in a format similar to that provided below, under Table X–Example Bill of Quantities Format. The structure may be changed to fit the bid, as outlined in the Technical Specifications. Bidders shall provide BoQ information & unit prices for each component of the PURE system. This table will be used for ensuring completeness of the systems.

It is required that both ‘toolbox’ and items listed per the ‘spare’ are also itemized in such a table. Presented below is an illustrative bill of quantities (BOQ). Bidders are required to use this format, but component sizes, quantities and descriptions may be adjusted to suit the specific components offered. Bidders shall provide BOQ information and unit prices for each component for each PURE Site. Bidder should also provide total unit price (goods and related services) of each type of system.

PURE SITE: _____

Item No.	Description	Quantity	Unit	Unit Cost (PHP)	TOTAL (PHP)
	A)Machine Components				
1	Xxxxx				
2	Xxxxx				
3	Xxxxx				
4	Tools				
5	Spare Parts (if any)				
	B)Related Services				
6	Installation, site inspection/monitoring and documentation				
7	Training for Technical Staff of the Project & Beneficiary Organization/s for the operation, management and maintenance (OM&M) of PURE system/s				
8	Detailed OM&M Manuals for each appropriate unit of the supplied Goods;				
9	Sub-Total Related Services				
10	TOTAL COST				

PURE SITE: _____

PURE SITE: _____

PURE SITE: _____

TOTAL PROJECT COST: _____

FORM NO.2.

NAME OF BIDDER: _____

BIDDING NO.: _____

DETAILED EXPLANATION ON TECHNICAL PROPOSAL

Bidder shall provide a technical proposal of approach and method statement that will include:

- **Work Organization**
- **Method Statement**
- **Mobilization Schedule**
- **Installation Schedule**
- **Personnel**
- **Equipment**
- **Training Experience & Method**

Supply, delivery and installation

Describe the approach, staffing plan, logistical arrangements and schedule for the supply and installation/supervision of the systems as with adequate detail to permit verifying:

- The completeness and realism of approach, methodology and logistics for the supply, including procurement and delivery, and installation of the Goods
- Installation practices, commissioning tests and initial user-training comply with specifications.
- Delivery schedule is consistent with the required time-frame.
- Adequate managerial competence, including for supervision and financial controls.

The description and plan should cover the provision of the appropriate skills at offices serving the project area, as well as back-up support from other offices.

- Adequate technical competence, including for quality assurance, installation and maintenance support services. Cover the provision of the appropriate skills at offices serving the project area, as well as back-up support from other offices.
- Describe the Supplier's own arrangements and procedures for quality control of the equipment supply and installations.

Include a work breakdown and GANTT chart. Also, provide qualification requirements, job descriptions and names of the principal staff that will provide management, installation and maintenance support to the project areas. Include an organogram indicating the organizational structure and location of key staff and organizational units.

Specific numeric data to be provided to the below requirements (provide data for every project site/work package):

- 1. Key management staff:** list of tasks, number of people,
- 2. Key logistics staff and vehicles:** list of tasks, number of people, number of vehicles
- 3. Installation teams:**

- Number of Installation teams,
- Installation Team Management approach

FORM NO.3

NAME OF BIDDER: _____
 BIDDING NO.: _____

SCHEDULE OF KEY STAFF

[The Bidder shall fill this Form for each project site or work package]

PROJECT SITE / WORK PACKGE: _____

1	Name of Project Manager	Qualifications and Experience Attached? [Y / N]
	Nature of tasks assigned [describe key tasks to be undertaken]	
2	Name of Site Engineers/Assistant Project Managers (1 Site Engineer per site)	Qualifications and Experience Attached? [Y / N]
	Nature of tasks assigned [describe key tasks to be undertaken]	
3	Name of Electrical Engineer	Qualifications and Experience Attached? [Y / N]
	Nature of tasks assigned [describe key tasks to be undertaken]	
4	Name Civil Engineer/Mechanical Engineer	Qualifications and Experience Attached? [Y / N]
	Nature of tasks assigned [describe key tasks to be undertaken]	
5	Name of Agriculture Engineer	Qualifications and Experience Attached? [Y / N]
	Nature of tasks assigned [describe key tasks to be undertaken]	
6	Name of Safety Engineer or Officer	Qualifications and Experience Attached? [Y / N]
	Nature of tasks assigned [describe key tasks to be undertaken]	
7	Name of Maintenance/Operational and Training Staff	Qualifications and Experience Attached? [Y / N]
	Nature of tasks assigned [describe key tasks to be undertaken]	
8	Name of Installation Team/Staff	Qualifications and Experience Attached? [Y / N]
	Nature of tasks assigned [describe key tasks to be undertaken]	

NAME OF BIDDER: _____
 BIDDING NO.: _____

TECHNICAL SPECIFICATIONS COMPLIANCE

Bidders must state here either “YES” for compliance or “NO” for non-compliance against each of the individual parameters of each Specification stating the corresponding performance parameter of the equipment offered. Statements of “Comply” or “Not Comply” must be supported by evidence in a Bidders Bid and cross-referenced to that evidence. Evidence shall be in the form of manufacturer’s un-amended sales literature, unconditional statements of specification and compliance issued by the manufacturer, samples, independent test data etc., as appropriate. A statement that is not supported by evidence or is subsequently found to be contradicted by the evidence presented will render the Bid under evaluation liable for rejection. A statement either in the Bidders statement of compliance or the supporting evidence that is found to be false either during Bid evaluation, post-qualification or the execution of the Contract may be regarded as fraudulent and render the Bidder or supplier liable for prosecution subject

Technical Specifications Compliance			
IPURE REQUIRMENTS		Compliance Yes/No	Remarks
Item	Name and Required parameters		
1	Equipment, parts, supplies		
1.1	5.5 KWp Off Grid Solar PV		
	Detailed Specifications in Section 6.1		
	Ground-mounted		
	Mono-crystalline or Poly-crystalline modules		
	ten (10)-year warranty on the solar PV modules with at least eighty percent (80%) power output guaranteed at 10 (10) years and 25 years expected useful life		
	Nominal Power - P _{MAX} (Wp) per module: 270Wp (min.)		
	Panel Efficiency: 20% under STP		
	No. of Cells: To be specified by bidder		
	Nominal Power Voltage-VMPP: To specified by bidder		
	Nominal Power Current - IMPP: To specified by bidder		
	Open Circuit Voltage - VOC: To specified by bidder		
	Short Circuit Current - ISC: To specified by bidder		
	Connectors: MC4		
	Cable: 12 AWG (4mm ²) PV Wire		

	Terminals: Screw-type & must be marked with (+) and (-)		
	With bypass diodes IP67 (IEC 62790 compliant)		
	<p>Required Certifications:</p> <ul style="list-style-type: none"> • ISO 9001:2008 and ISO 140001 Certificates of the Manufacturer or equivalent • International Electrotechnical Commission (IEC) 61215, IEC 61730, and IEC 62548 • Certification from the Distributor that parts and services, including spare parts, for the equipment/machine offered are available for the next five years within the Philippines 		
1.2	Balance of System (BOS)		
	PV CABLE		
	Wire Size: 4mm ²		
	PV CONNECTOR (MC4 PV CONNECTOR)		
	Rated Voltage: 1000V maximum		
	IP68 protection rating		
	system voltage 1,000V maximum		
	temperature up to 90°C		
	Snapping locking system		
	Class II rating for fly-leads and connectors		
	PV SYSTEM MOUNTING ACCESSORIES		
	10-year warranty on racking and mounting supports		
	Aluminum Railings: Required Aluminum End Clamp: Required Aluminum Mid Clamp: Required Aluminum L-foot: Required Solar Panel Earthing Clip: Required Solar Panel Grounding Lug: Required		
	1.3	Submersible Pump and Controller	
	5-year warranty on the motor pump and controller.		
	Pump Speed = 3300 rpm		
	Rated flow = 7.0 m ³ /h		
	Rated Power = 4.0 Kw		
	Motor and Pump should be of the same brand		
	Optimum V _{mp} = > 238 V		
	Enclosure class (IEC 34-5) = IP68		
	Insulation class (IEC 85) = F		
	Pump, Motor and Impeller Material =		

	Stainless Steel EN 1.4301 AISI 304		
1.4	Elevated Storage Tanks		
	1-year warranty on the Water Tank for leaks.		
	Made of Concrete or Steel		
	Modular Panel-Type		
	Capacity of 20,000-100,000 liters or		
	Dimension (To be specified by the Bidder)		
	Food Grade		
	Tank must be elevated at least 3 meter from the ground/ service area.		
	With 3 units tap stands/faucets (min.)		
	With ladder		
1.5	Powerhouse/Control House		
	Size: to be specified by the bidder		
	A five (5)-year warranty on the structure to withstand wind speed of 200kph		
	Materials: Wall: Concrete Roof: Metal or Vinyl		
1.6	Solar Array Perimeter Fence Perimeter fence (wire mesh) for the solar modules and substation or equivalent.		
1.7	Spare Parts		
1.8	Basic and Special Tools		
2	Related Services		
2.1	Engineering Design		
2.2	Virtual Factory Acceptance Test		
2.3	Installation, site inspection/monitoring and documentation		
2.4	Training for Technical Staff of the Project & Beneficiary Organization/s for the operation, management and maintenance (OM&M) of PURE system/s		
2.5	Detailed OM&M Manuals for each appropriate unit of the supplied Goods		
2.6	After-Sales Services		

I hereby certify that the statement of compliance to the foregoing technical specifications are true and correct, otherwise, if found to be false either during bid evaluation or post-qualification, the same shall give rise to automatic disqualification of our bid.

Name of Bidder/Company

Signature over Printed Name of
Authorized Representative

Date

FORM NO.5

NAME OF BIDDER: _____
BIDDING NO.: _____

Compliance for Safeguards Obligations

The contractor commits to ensure that all staff comply with associated safeguards procedures outlined in the project's Environmental and Social Safeguards Framework (ESSF) in accordance with EU Policy guidance on Environmental Assessment, Involuntary Resettlement, and Indigenous Peoples and Philippine National laws (PD 1586) or the EIS System, (DAO No. 2003-30) Implementing the IRR for the Philippines EIS System and its Procedural Manual, RA 6969 and 9003, as prepared by DENR. In line with the ASEP environmental and social safeguards, the project should meet the following:

1. The Contractor/Supplier commits to follow the Environmental Management Plan (EMP) during construction and operation of the project. The EMP consists of mitigation measures to solve possible adverse impacts and monitoring compliance. Mitigation measures to follow include:
 - a) Setting up of temporary disposal units within the construction area and properly dispose generated wastes.
 - b) Contractor and workers observe proper housekeeping, sanitation and waste minimization.
 - c) Activities should only be done during the day to avoid noise.
 - d) Refer to RA 6969 for accidental release of pollutants to soil and/or groundwater.
 - e) Preparation and conduct of decommissioning plans, including proposed disposal methods, recycling opportunities and collection.
 - f) Properly dispose used chemicals.
2. The Contractor commits to observe the Environmental Codes of Practice (ECoP) for solar energy development by due diligence during procurement, and construction / installation of facilities.
3. In procuring, consider type of PV cells manufactured. Take note of toxicity and health hazards posed by chemical substances used in the PV manufacturing process (e.g. phosphine used in amorphous silicon cells is very toxic and poses a severe fire hazard through spontaneous chemical reaction.).
4. In sourcing out the PV cells and other solar components, consider manufacturer's experience and its compliance with local, national/and or international laws and regulations concerning toxic and hazardous substances
5. The Contractor commits to avoid any damage to properties such as lands, structures, crops, and trees. Should any private assets or public properties be affected, the contractor shall restore or replace such assets/properties or compensate the owners in accordance with the ESSF.
6. The Contractor commits to conduct its activities with full respect and consideration of Indigenous Peoples' unique culture and practices. Before entering IP areas, the Contractor is expected to coordinate with relevant local authorities, i.e., representatives of the National Commission on Indigenous Peoples (NCIP) or leaders of ethnic groups, etc. Indigenous Peoples are mixed within the general populations of the areas targeted, and their rights and cultures must always be respected even though they will be indirect recipients of the installed system.

Name of Bidder/Company

Signature over Printed Name of
Authorized Representative

Date

ANNEX 1: GENERAL TIME SCHEDULE

ACTIVITIES	2023																			
	June				July				August				September				October			
WEEK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Contract Signed and work started				■																
Drafting and Approval of Detailed Design				■	■															
Virtual Factory Acceptance Test						■														
Shipment of Equipment and Materials							■	■	■	■	■	■								
Civil, Plumbing and Electromechanical Installation							■	■	■	■	■	■	■	■						
Testing and Commissioning															■					
Project Turn-over																■				
Training													■	■	■	■				
Last Payment																	■			