

Light at Home Palawan 2023 Project

Improving quality of life in Philippine communities through access to electricity
through renewable sources: Light at Home Palawan


AECID Project code: 2022/PRYC/000778

NGOD grants for development cooperation projects for the year 2022

Supply of Third Generation
Solar Home Systems


Tender Terms of Reference

Date: 10/07/2023

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INITIAL CONSIDERATIONS

1. PRECEDENTS

acciona.org Foundation Philippines Inc, known as acciona.org Philippines, is a non-stock, non-profit foundation incorporated in the Philippines in 2022. Its objective is to provide access to modern forms of energy to low-income people in rural Philippine communities, where there is no expectation of electricity service by other methods. To this end, it provides access to basic electricity service through third-generation solar home systems (3GSHS) with the Luz en Casa or Light at Home Palawan program.

With cofunding from the Spanish Agency for International Development Cooperation (AECID), since 2023, acciona.org Foundation Philippines Inc. has started the development of a project to benefit nearly 1.200 families in Palawan.

For this reason, acciona.org Foundation Philippines Inc (the "Contracting Party") will be procuring 1.220 Third Generation Solar Home Systems (SHS, the "Supply") in the framework of the "Light at Home Palawan 2023 Project", file code AECID 2022/PRYC/000778, with funds from AECID and contributions from acciona.org Foundation Philippines Inc and acciona.org, The Energy and Water Foundation based in Madrid, Spain.

This tender is broken down into the acquisition of 2 types of 3GSHS depending on the amount of energy available: 1.200 3GSHS referred as "Domestic Systems" and 20 3GSHS referred as "Communal Systems".

Regardless of the content of the bids, all of them must comply with this Tender ToR Document, including the Conditions of Supply and the Technical Specifications.

This Tender ToR Document is of a contractual nature between the Contracting Party and each Bidder who submits a timely bid. Therefore, all bids submitted are binding until the signing of the supply contract, and are subject to the Specifications, and their terms and conditions shall be binding.


The supply contract shall be made up of this Tender ToR, as well as the terms and conditions of the selected Offer, which improve on the provisions of the Tender ToR.

Likewise, if there is any contradiction between the Specifications and the selected bid, the provisions of the Specifications shall prevail.

2. SUPPLY'S SCOPE AND DELIVERY PLACE

The Supply's scope is 1.220 3GSHS (Third Generation Solar Home Systems), formed by the following components that shall meet all the specifications indicated in this document:

- 1.200 Domestic Systems:
 - 01 Solar Panel (Peak Power minimum 120Wp and maximum 150Wp)
 - 01 Control box, including: 01 battery (maintenance free, Lithium-ion, LiFePO4 minimum storage capacity 20Ah at 12.8V DC), charge regulator and pre-payment software (PAYG) integrated.
 - 03 Fixed LED Lamps (minimum 400lm per lamp).
 - 01 Compatible USB phone charger with adapter for USB-C, micro USB, and mini USB.
 - 01 USB distribution wire (minimum two outputs).
 - 02 extension wires for LED lamps and 12V DC appliances, minimum 5m.
 - 01 distribution wire for LED lamps and 12V DC appliances (minimum 3 outputs).
 - 01 Solar panel wire set (minimum 12m), including MC4 and adapter.
- 20 Communal Systems:

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- 01 or 02 Solar Panel(s) (Minimum Total Peak Power 300Wp)
- 01 Control box, including: 01 battery (maintenance free, Lithium-ion, LiFePO4 minimum storage capacity 50Ah at 12.8V DC), charge regulator and pre-payment software (PAYG) integrated.
- 03 Fixed LED Lamps (minimum 400lm per lamp).
- 01 Compatible USB phone charger with adapter for USB-C, micro USB, and mini USB.
- 01 USB distribution wire (minimum two outputs).
- 02 extension wires for LED lamps and 12V DC appliances, minimum 5m.
- 01 distribution wire for LED lamps and 12V DC appliances (minimum 3 outputs).
- 01 Solar panel wire set (minimum 12m), including MC4 and adapter and Y combiner set if the proposed solution consist of 02 solar panels.

The PAYG software must be accessible for the management of acciona.org Philippines, fulfilling at least one of the following conditions:

- The Bidder will facilitate, without extra cost over the present contract and for an indefinite period, the tokens generation algorithm to acciona.org Philippines.
- The PAYG software by the Bidder is the one developed by OpenPAYGO.
- The Bidder will enable, without additional cost and for an indefinite period for acciona.org Philippines, an API to Access the Bidder's token generator from acciona.org Philippines' management software. In addition to that, the Bidder commits that, in case of Bidder's shutdown, the token generator will be fully transferred to acciona.org in order to ensure the continuity of tokens' generation for the purchased Solar Home Systems.

The delivery shall be in accordance with one of the two following options:


- in the **Port of Manila, Incoterms CIF Manila** (acciona.org and/or its customs broker to handle customs clearance, local permits, and pickup from Port of Manila, including stripping, warehousing, and trucking to Palawan) or;
- DDP at a warehouse in Metro Manila** c/o Bidder from FOB, freight and insurance, customs clearance, payment of duties and taxes, payment of port charges (arrastre, wharfage, storage), payment of carrier destination charges, demurrage/detention that may be incurred, processing of permits at destination, delivery and trucking to designated warehouse, use of warehouse, stripping and unloading works including use of special equipment and manpower, and storage fees. If DDP, acciona.org will only handle pickup from warehouse designated by Bidder in Metro Manila (including use of special equipment and manpower), trucking, vessel booking, transfer by sea, and land transport to Palawan.

3. DESCRIPTION OF TENDER PROCESS

3.1. Tender calendar

The Bidders will conform to the following dates with regard to the different phases of the tender process:

Phase	Deadline
Tender ToR publishing by acciona.org Philippines	10/07/2023
Consultations and queries from Bidders	14/07/2023

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Response to consultations and queries by acciona.org Philippines	19/07/2023
Submission of technical and economic offers	26/07/2023

3.2. Consultations about the Tender ToR and Offers' presentation

The contact email for all matters related with the present Tender is: fundacion@acciona.org cc adminph@acciona.org

The responses to consultations will be sent by the same means to all bidders without specifying the ownership of the queries or identifying the participating companies.

The Offers shall be sent within the term set forth in section 3.1 by e-mail and in English.

All Offers submitted after the indicated date will be rejected.

SUPPLY CONDITIONS

1. BIDDER RESPONSABILITY

Each Bidder is responsible for the veracity of its Offer and for its performance if selected. Any Bidder who fails to comply with the provisions herein shall be liable for any direct or indirect damages caused to acciona.org Philippines.


2. OFFER EVALUATION CRITERIA

acciona.org Philippines will select the best technical and economic Offer, considering the technical, economic and any other evaluation criteria described in the documents comprising this ToR (Supply Conditions and Technical Specifications).

The general criteria applicable to the evaluation of bids are as follows:

Criteria	Points
• Price.	30
• Technical specifications. Improved technical specifications to the required ones will be valued.	40
• Full compliance with the demand for information (reports, graphs, parameters, etc.) required in the ToR documents.	5
• The submission of a tight delivery schedule will be considered as a positive factor, provided that it is reasonably achievable.	5
• Quality of Offers.	10
• Bidder's experience.	10
Total	100

Bidders should score a minimum of 65 out of 100 points for their offers to be selected.

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3. CANCELLATION OF THE BID

acciona.org Philippines may temporarily or permanently cancel the bidding process at any time by notifying each Bidder by email.

4. SUPPLY CONTRACT OR PURCHASE ORDER

acciona.org Philippines and the selected Bidder shall sign a supply contract or purchase order within 15 calendar days of the award to formalize the contractual agreement.

Transfer of the supply contract or purchase order to third parties is prohibited.

5. INFORMATION TO BE INCLUDED IN THE OFFER

a. Company profile

The Offer must include a description of the company and a brief background on previous or ongoing contracts awarded similar in nature and complexity to this tender. If feasible, the background shall specify the name and amount of the contract, types and volumes of goods, and date and location of delivery. Proof of company registration with relevant government authorities shall be included.

b. Minimum conditions and technical specifications

The Offer must include all the information required in sections “Minimum conditions” and “SHS Technical Specifications”.

c. Supply plan

The Supply will be carried out in two deliveries:

- First delivery: 600 Domestic Systems (as stated in Section 2 of the present ToR).
- Second delivery: 600 Domestic Systems and 20 Communal Systems (as stated in Section 2 of the present ToR).

The Offer must include a complete description of the supply process, specifying each stage and detailing the start and end date for each one. At a minimum, the stages considered are: manufacturing, Factory Acceptance Tests, shipment and delivery.


The Offer must specify the total volume of the systems per delivery, including the container size for transport.

The Bidder shall notify acciona.org Philippines at least 10 days in advance of the exact delivery date in the Port of Manila, as well as submit the invoice and other documents.

d. Delivery period

The Offer must include both delivery dates at the Port of Manila or for DDP, any other location in Metro Manila designated by the Bidder, indicating the best transportation option suggested by the Bidder. The date for the first delivery must not exceed 100 calendar days from the date on which the purchase order is signed by both parties and must include the EXW period. The second delivery shall take place not later than 90 calendar days later than the first one. Tighter delivery schedules and delivery DDP will be considered positively.

In addition, acciona.org Philippines reserves the right to deduct 1% from the delivery price for each week (or fraction thereof) of delay over the delivery time indicated in the purchase order except for delays caused by war, invasion, riot, military force, natural calamities, epidemic, pandemic, prohibition by law, or other similar disturbance beyond the reasonable control of the Bidder.

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e. Price

All prices included in the Offer must be in U.S. dollars (US\$). The Offer must include the following information related to the supply price:

Part. Nº	SHS Supply or Service	Unit Price (US\$)	Total Price (US\$)
1.	3G-SHS (CIF Manila or DDP as stated above, Incoterms 2020) including detailed Price per component		
2.	Transport and insurance services (CIF Manila or DDP as stated above)		
3.	Other costs (to be detailed)		
	TOTAL		

6. TRANSPORT CONDITIONS

The supply must be properly packed and insured, and each component must be delivered in secure packaging with appropriate cargo markings. Transportation and handling are the responsibility of the Bidder.

For CIF Manila, prior to transport, the selected Bidder must prepare draft Commercial Invoice, Packing List, Certificate of Origin, and Bill of Lading with HS code of each item for review and approval of acciona.org and/or its customs broker. Any request for clarification or change should be addressed by the selected Bidder promptly to minimize delays in transport and customs clearance.

Hard copy of the original Certificate of Origin must be mailed to acciona.org and/or its customs broker, along with the hard copy of the original Bill of Lading or clear soft copy of telex release.

Other documents, such as Material Safety Data Sheet, photos, serial numbers, and technical specifications or brochures of items in English, may be required from the Bidder as needed for customs clearance and permits required at the destination.

7. WARRANTIES


7.1. Technical Warranty

A minimum warranty of 3 years is required for all components included in the SHS offered. This technical warranty period shall commence upon provisional acceptance of the supply.

7.2. Warranty under systematic failure

In the event of systematic failure of any of the equipment supplied, the Bidder undertakes to replace all the equipment of the same type supplied, within a period not exceeding the original supply period and at no additional cost to the acciona.org Philippines. Systematic failure of equipment is defined as a cumulative annual failure rate of more than 5% attributable to any of the following causes:

- Manufacturing defects.
- Failures attributable to noncompliance with the technical specifications committed by the Bidder.

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- Failures due to non-compliance with the manufacturer's warranty.

In case of disagreement, the determination of systematic failure of any of the types of components of the supply shall be carried out by a recognized and independent laboratory agreed between the Parties. The Bidder shall also bear the costs that acciona.org Philippines may incur for the replacement of the defective equipment.

7.3. Replacements and repairs

In the event that, within the 3-year warranty period, for reasons not attributable to acciona.org Philippines or the users of the SHS, failure of the equipment or any of its components occurs, the Bidder shall deliver the equipment or its replacement components as soon as possible to the original point of supply.

In order to expedite the repair and replacement processes, the Bidder shall deliver with the supply a 5% stock of major parts/components at no charge to acciona.org Philippines. The Bidder shall indicate in its Offer which parts will be in stock.

This replacement stock shall be maintained at 5% in accordance with acciona.org Philippines' needs as communicated to the Bidder.


8. MANUFACTURING TESTS

The offer must include the list of manufacturing tests to be applied to the SHS components, which will be performed by the Bidder and the test protocols followed during these processes. The report of results in relation to these tests (factory acceptance tests) must be sent to acciona.org Philippines prior to shipment of the supply, which will accept the shipment only if the tests are satisfactory.

In any case, the Bidder will have to ensure the possibility of the physical presence of acciona.org Philippines or persons/companies hired by acciona.org Philippines when the manufacturing tests are carried out. To this end, it shall give more than 15 calendar days' notice of the start of the manufacturing tests.

At minimum, manufacturing tests need to include:

- For Solar Panels:
 - Quantity
 - Visual quality
 - Marking and packaging
 - Dimensions. This shall include the verification of the location of holes, as well as their dimensions according to the drawing sent in the Offer.
 - Module flash test.
- For battery and charge controller:
 - Complete function test, including: deep discharge test, overcharge test, short circuit test.
 - Quantity
 - Voltage of connection points and USB.
- For LED Lamps:
 - Quantity
 - Power consumption at 12V with a tolerance of +/-5%.
 - Luminous intensity (in lm) +/-5%.

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In the event that the tested SHS components do not pass the manufacturing tests, acciona.org Philippines may reject the entire lot of SHS to be supplied.

acciona.org may replicate the same tests as part of the acceptance of the supply and may reject the lot in case of failure.


9. TERMS AND METHOD OF PAYMENT

Acciona.org Philippines shall pay the price described in the Offer as follows:

- 40% of the cost of the equipment in the first and second (Part N1 of the price in Section 5.e) as an advance payment, once the final purchase order is signed, in accordance with the prices of the equipment offered. The Bidder shall provide to acciona.org Philippines an advance payment guarantee for the same amount (commonly issued by any commercial bank of recognized prestige).
- 40% of the cost of the equipment of the **first delivery** as stated in section 5.c plus the cost of final transportation and insurance before shipment, after confirmed factory acceptance tests, and supported by the Bill of Lading, Certificate of Origin, commercial invoice, packing list, and technical specifications as specified above, also related to the **first delivery** as stated in section 5.c
- 20% of the cost of the equipment of the **first delivery** as stated in section 5.c after delivery and a basic check of the shipment. In any case, this will be no later than 6 weeks after arrival of the shipment at the agreed destination.
- 40% of the cost of the equipment of the second delivery as stated in section 5.c plus the cost of final transportation and insurance before shipment, after confirmed factory acceptance tests, and supported by the Bill of Lading, Certificate of Origin, commercial invoice, packing list, and technical specifications as specified above, also related to the **second delivery** as stated in section 5.c
- 20% of the cost of the equipment of the **second delivery** as stated in section 5.c after delivery and a basic check of the shipment. In any case, this will be no later than 6 weeks after arrival of the shipment at the agreed destination.

10. OTHER DOCUMENTATION

The winning Bidder shall submit a certificate of registration from the relevant tax authority and a bank certificate showing proof of bank account ownership, in addition to accomplishing a Supplier Information Sheet.

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Technical Specifications

1. GENERAL TECHNICAL SPECIFICATIONS

1.1. Capacity of the Solar Home Systems

At a minimum, the Domestic System shall be capable of supplying several hours of electricity for three LED lamps, charging one or more cell phones, the use of small appliances like radio, TV or fans for 3-4 hours, as well as an equivalent amount for a day's standby.

The system must operate automatically and continuously, without intervention of the system user except for the operation of lamps and devices. The system must be adapted to operate at 12V loads in DC.

The Communal System, in addition to the above, should allow the use of household appliances for more hours and others of higher power consumption such as refrigerators, always adapted to 12V DC.


The Bidder's contributions and recommendations regarding the energy availability of the systems for the use of these appliances (hours of use, appliances to be used...) will be valued.

1.2. General features of the SHS

Installation should be based on Plug & play in order to facilitate installation. SHS components should be selected to minimize the number of tools for maintenance and repair (e.g. through the use of standard sized parts) and should exclude the use of special/specific tools for these activities.

The general characteristics and required specifications for each SHS are as follows:

Nº	Specifications	Unit	Required (Section 2)	Proposed
1.	Daily Energy Generation	Wh		
2.	Daily Energy Storage	Wh		
3.	Daily time for full charge	hours		
4.	"Plug and play" installation			
5.	Charge regulator integrated in the battery and PAYG system			
6.	Minimal maintenance requirements. Components easily repairable or replaceable.			
7.	Lightweight SHS, easily transportable by users	kg		
8.	Minimum IP protection			

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The length of the cables must be adaptable using the switches with simple connections (without soldering) and fixed with screwdrivers.


The SHS and its components must be supplied with protective packaging in order to guarantee a prolonged storage outdoors and in saline environment. Each box shall be identified in English or Spanish with the name of the purchaser, manufacturer, name and type of equipment, quantity, bar code or QR code, net mass and total mass in kg.

1.3. Required technical documentation of SHS

For each of the major components of each type of SHS (PV module, control box including charge controller, battery and PAYG and lamps), the Bidder shall provide information demonstrating compliance with the technical specifications, including:

- Manufacturer's technical specification sheets indicating model, type, dimensions, weight, materials, standards, certifications, etc. for each of the system components.
- Manufacturer's direct contact for technical information including contact person, position, exact address, e-mail and telephone number.
- User's manual. This should contain illustrations for proper installation and should be printed and supplied together with the SFD3G.
- Installation and maintenance instructions.
- Repair manual.
- Technical warranty of at least 3 years.
- Manufacturer's lifetime warranty certificate indicating brand and model and including information on the lifetime of the main components (PV module, charge controller, battery and lamps).

Component	Technical Specifications Sheet	Manufacturer contact	User Manual	Installation and maintenance manual	Technical Warranty (minimum 3 years)	Manufacturer's lifetime warranty certificate	Minimum lifetime	
							Required	Proposed
Solar Panel	X	X	X	X	3 years	X	25-year warranty with production over 80% of initial power (Wp)	
Charge regulator	X	X	X	X	3 years	X	10 years	
Battery	X	X	X	X	3 years	X	2,000 cycles for Li-ion batteries with -DoD 100%.	

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Component	Technical Specifications Sheet	Manufacturer contact	User Manual	Installation and maintenance manual	Technical Warranty (minimum 3 years)	Manufacturer's lifetime warranty certificate	Minimum lifetime	
							Required	Proposed
PAYG System	X	X	X		3 years	X	10 years	
LED Lamps	X	X	X	X	3 years	X	30.000 hours	
Other components of the SHS (cable, connectors, switches, etc)	X	X		X	3 years	X	20 years >10.000 cycles for switches and connectors	

All components used for control, protection, current measurement, operating voltage, etc. must be clearly identified according to their function.

In addition, the following minimum information must be included for each component of both types of SHS:


Minimum technical information

PV Solar Panel	Peak Power (Wp)	
	Current at maximum power point (Imax) (A)	
	Voltage at maximum power point (Vmpp)	
	Short circuit current (Isc) (A)	
	Open circuit voltage (Voc) (V)	

Battery	Capacity (Ah)	
	Nominal voltage (V)	
	Curve Power Vs Efficiency	

Regulator	Nominal Voltage (V)	
	Nominal current from solar panel (A)	
	Nominal current supplied to charges(A)	
	Defined points for disconnection and re-connection of solar panel	
	Defined points for disconnection and re-connection of charges	

Fixed lamps	Power (W)	
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	Voltage (V)	
	Luminous flux (lm)	

2. TECHNICAL SPECIFICATIONS OF PV SOLAR PANELS

2.1. Technical specifications and basic information required

- The panel must be polycrystalline or monocrystalline.
- The maximum power under standard conditions must be at least 120Wp and with a nominal voltage of 18V for Domestic Systems and 300Wp (of one single panel or two of them) and 18V nominal voltage for Communal Systems.
- The actual maximum power of the module, at the time of delivery, shall not be less than 5% or more than 10% of its nominal maximum power (Wp).
- The photovoltaic modules must be certified according to the international regulation IEC-61215 "Photovoltaic Modules for Terrestrial Use" and IEEE-1262 "Recommended Practice for Qualification of Photovoltaic Modules" or equivalent and have been issued by a certified institution different from the manufacturer.
- Photovoltaic module frames shall be anodized aluminum and rigid EVA (Ethylene Vinyl Acetate) encapsulated and securely attached to the photovoltaic panel, with factory made holes for installation.
- A dimensional drawing with precise position of fastening holes must be included.
- Description of the characteristics of the junction box: dimensions, degree of protection, indication of polarity mode, attachment, terminal block size, number of diodes.
- This junction box must be firmly attached to the module and have two "by pass" diodes. The minimum degree of protection after installation must be IP65. Cable inlets and outlets shall be gasketed for proper fit. The grounding connection shall be marked on its anodized aluminum frame.
- The cover of the junction box shall not be sealed and shall have a hole for the cable to pass through. Wires should be allowed to be connected to the panel junction box without altering the warranty.
- The polarity of the terminals in the junction box should be clearly identified.
- When coupling with other cables is required, special connectors for photovoltaic use should be used to allow a firm and airtight fastening.
- The cable connecting the photovoltaic panel must be at least 12 meters long and suitable for outdoor use with protection against solar radiation (UV rays). One side shall have an eyelet type terminal and the other side shall have a MALE DC JACK type connector (size must be specified).
- The panel must be properly labeled, so that the label can be read without having to remove parts of the module. The label must be firmly affixed or printed (guarantee of weather resistance for at least 25 years) on the back surface of the PV module. It must contain: the brand, model number, serial number, trade name

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(if any), module type, the minimum technical information indicated in the previous point, under Standard Measuring Conditions (EMC).

- The degree of protection must be IP3x or IP2x with circuit protection.
- Solar radiation I-V curves for 200, 400, 600, 800 at Standard Measurement Conditions.
- Photovoltaic module efficiency.
- Panel degradation curve or capacity reduction factor over time.

Nº	Specifications	Unit	Required	Proposed
1.	Maximum Power in Standard Measuring Conditions (EMC) (minimum required)	Wp	120 for Domestic Systems 300 for Communal Systems	
2.	Quantity of cells	Cells		
3.	Nominal voltage	V	18V	
4.	Power tolerance	%		
5.	Maximum voltage in open circuit (V_{oc})	V		
6.	Maximum short circuit current (I_{sc})	A		
7.	Maximum voltage in maximum power point (V_{mpp})	V		
8.	Maximum current in maximum power point (I_{max})	A		
9.	Efficiency	%		
10.	Protection grade	IP	IP3x o IP2x with circuit protection	

3. TECHNICAL SPECIFICATIONS OF THE SHS CONTROL BOX (BATTERY, CHARGE CONTROLLER AND PREPAID SYSTEM)

The battery, the charge regulator and the SHS PAYG system must be integrated in a control box, which must display the battery charge status by means of an indicator light, as well as the service credit status.

This box must have at least four inputs for connection of 12 V jack type loads and two USB inputs.


The control box, terminals and other accessories must be made of corrosion resistant materials and allow the incorporation of a logo defined by the acciona.org Philippines into the box design. The Bidder shall be in charge of affixing the prescribed logo into the box design.

Installation and maintenance requirements for the control box and its components must be provided.

3.1. Battery specifications and technical information

The technical characteristics of the batteries must conform to the following:

- Li-ion, LiFePO4 maintenance-free batteries, with a capacity for domestic systems of at least 20Ah and 50Ah for Communal Systems with a nominal voltage of 12V.
- For a fully charged battery, capacity decreases due to self-discharge should be limited to a maximum of 4% per month.
- The battery must be labeled, indicating nominal voltage and charge capacity.
- Batteries must be UN 38.3 Transportation Testing for Lithium Batteries certified and have overcharge protection.

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- Battery protection must remain active even when the system is inactive at the direction of the PAYG. To avoid damage during long periods of non-payment, the solar module must be able to charge the battery even if the system is inoperative.


The following Charts, tables or catalogs should be provided:

- Battery capacity at C10, C20 and C100.
- Curve of number of cycles vs. depth of discharge (20%, 30%, 50%, 60% and 100%).
- Temperature correction curve for Cn capacity and number of cycles.
- Current and recharge time.
- Recommended charger.

Technical specifications required for batteries					
Nº	Specifications	Unit	Required	Preferred	Proposed
1.	Minimum Capacity of Domestic System	Ah	20		
2.	Minimum Capacity of Communal System	Ah	50	50	
3.	Nominal Voltage	V	12		
4.	Type		Free-maintenance, Li-ion, LiFePO4	LiFePO4	
5.	Recharge time	hours			
6.	Maximum monthly discharge (a 25C)	%	4		

3.2. Charge regulator technical specifications

- The controller should have a battery charge level indicator, two USB type outputs that provide a nominal voltage of 5 +/- 0.5Vdc and the outputs for the lamps or luminaires should be a nominal voltage of 12 +/- 0.5Vdc.
- The controller should limit overload and deep discharge so as not to damage the battery.
- The maximum input (PV generator) and output (loads) current should be indicated.
- The controller's operating points (load disconnect, load reconnect, consumption disconnect, consumption reconnect) must be predetermined for the battery supplied with the system and must be included as technical information.
- The controller shall be protected against open circuit, short circuit and reverse polarity conditions.
- The regulator shall comply with the Electromagnetic Compatibility standard 2004/108/EC.
- Restart after deep discharge and short circuit.
- It shall indicate the state of charge of the system, as well as when the system is in the process of charging.

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Nº	Specification	Unit	Required	Proposed
1.	Maximum self-consumption	mA		
2.	Protection		Open circuit, short circuit and reverse polarity	
3.	Voltage of the controller set points (load disconnection and reconnection, consumption disconnection and reconnection).	V		
4.	Maximum input and output current	A		
5.	Labeling requirements		Model, serial number, voltage and current operating points	
6.	Display with charge status indicator		Fully loaded Charging Charging disconnected	


3.3. Specifications of the PAYG system

- The system must be able to display on the control box, according to the pre-set deadlines, the payment status of the service (at least 3 statuses: in service, near completion, completed).
- The system must have a standard control (remote control) that allows easy entry of the unlocking token for service delivery or a keypad in the same box where the battery and controller are located. If the remote control requires batteries for operation, they shall be provided initially with the control box and shall have a minimum life of 1 year. These batteries shall be available in local stores.
- The hardware of the prepaid system installed in the control box must be free, allowing acciona.org Philippines to use its own prepaid system software.
- The necessary information shall be provided for acciona.org Philippines to incorporate the prepaid system in its own software.

4. TECHNICAL SPECIFICATIONS OF FIXED LED LAMPS

4.1. Specifications and technical information of fixed LED lamps

- Information on the nominal power (W) and operating voltage (V) should be provided.
- The lamp must be of white LED type with an efficacy of at least 100 lumens/W under all operating conditions and a CRI (Color Rendering Index) of not less than 65%.
- They must be suitably labeled, indicating power (W) and operating voltage.
- Bulbs should operate at a nominal voltage of 12Vdc and provide a minimum of 400 lumens.
- They should have a sealing mechanism that does not allow insects to enter the interior of the bulb screen and at the same time allows the equipment to be assembled and disassembled for spare parts replacement.
- The lumen maintenance should not be less than 95% of the initial luminous flux after 1,000 hours of continuous use.

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- It is recommended that the lamp maintains a constant luminous flux in the discharge process.
- Fixed lamps should have a cable of at least 6 meters and a switch. Switches should be of excellent durability and should have a minimum IP rating of 40.
- The availability of lamp cables longer than 6 meters or the option of supplying extensions will be valued.
- Cables shall comply with international technical safety standards.
- It must have RoH "Restriction of Hazardous Substances" certificate as well as CE.
- Lamp connections must be standard.
- Type of protection against reverse polarity and overvoltage is required.

Specifications required for fixed LED lamps					
Nº	Specification	Unit	Required	Preferred	Proposed
1.	Maximum Power	W			
2.	Voltage	V	12		
3.	Minimum lumens/ W	Lumens /W	100	>100	
4.	Lumens preservation (% out after 1.000 hours)	%	95		
6.	Expected lifetime	Hours	30,000	50,000	
7.	Minimum luminous flux	Lumens	400		
8.	Test certificate		CE & RoHS		
9.	Minimum IP		40		