Request for Proposals (RFP)

Commodity/Service Required:	Two solar mini-grid systems – Balimo District Hospital and Hon. Roy Biyama Balimo Academy, Western Province
Type of Procurement:	Purchase order
Type of Contract:	Fixed price with payment milestones
Term of Contract:	Approximately six months
Contract Funding:	PNG Sustainable Development Program (SDP) and the United States Agency for International Development (USAID)
This Procurement supports:	USAID-PNG Electrification Partnership (PEP)
Submit Proposal to:	procurement@png-pep.org swarnock@png-pep.org
Date of Issue of RFP:	7 November 2024
Date of Pre-Bid Meeting:	15 November 2024 at 11:00 AM – 12:00 PM (PNG time) A reservation is required to attend the bid meeting. Attendance is limited to two representatives per company. Send your reservation request to procurement@png-pep.org by 14 November 2024, 4:00PM (PNG Time). Interested bidders unable to attend in person may join by Zoom.
Date Questions from Bidders Due:	5 December 2024 by 8:00AM (PNG time)
Date Proposal Due:	12 December 2024 by 8:00AM (PNG time)
Method of Submittal:	
Submit proposal via e-mail with attached documents in MS Word/pdf format. Email to procurement@png-pep.org. **For detailed proposal submission guidance please refer to Attachment B: Instructions to Bidders, however, it is crucial that you heed the guidance below to ensure that your proposal is considered for evaluation.** **In order for RTI to conduct the most efficient proposal evaluation, bidders are required to include the items described below in their proposals. Failure to include any of the items below in your proposal will result in your proposal being rejected.**	

a. Cover Letter, signed by an authorized representative of the bidder (see Attachment C for template)
b. Completed Bidder Information Form attached in Attachment D, Bidder Information Form
c. Proof of legal registration in Papua New Guinea
d. IRC Certificate (TIN)
e. Technical Proposal
f. Financial Proposal

The bidder agrees to hold the prices in its proposal firm for **120 days** from the date specified for the receipt of proposals unless another time is specified in the addendum of the RFP.

Solicitation Number:	**PEP RFP-2024-003**

Attachments to RFP:

1. Attachment A: Statement of Work
2. Attachment B: Instructions to Bidders
3. Attachment C: Cover Letter Template
4. Attachment D: Bidder Information Form
5. Attachment E: Technical Specifications
6. Attachment F: Detailed Site Information – Balimo District Hospital
7. Attachment G: Detailed Site Information – Hon. Roy Biyama Balimo Academy
8. Attachment H: 937 Geographic Code Countries

All PO Terms and Conditions are listed on our website at: rti-po-terms_English Version - v1.20.pdf or for commercial items: http://www.rti.org/files/PO_FAR_Clauses_Commercial_Items.pdf (hereinafter the "Terms"). Supplier's delivery of products, performance of services, or issuance of invoices in connection with this purchase order establishes Supplier's agreement to the Terms. The Terms may only be modified in writing signed by both parties.

All bidders are responsible to carefully review each attachment and follow any instructions that may be relevant to this procurement.

Attachment A: Statement of Work

Description of Activity/Service:

RTI International (RTI) is the prime contractor for the USAID-PNG Electrification Partnership Activity (USAID-PEP), a five year project funded by the United States Agency for International Development (USAID). The project aims to help Papua New Guinea (PNG) achieve its goal of connecting 70% of its population to electricity by 2030. To accomplish this goal, USAID-PEP aims to reach a target of at least 200,000 new electricity connections and institutionalize key strategies that will enable PNG to achieve such by the end of the Activity.

USAID-PEP strives to develop viable off-grid electrification models. As part of this effort, USAID-PEP is providing technical assistance and co-funding to develop small renewable energy mini-grid projects for health facilities, schools, churches, or other facilities where a payment model can be tested that provides revenue to the system, improving its viability.

PNG Sustainable Development Program (hereafter referred to as 'SDP') promotes sustainable development within PNG, and advances the general welfare of the people, particularly those of the Western Province, through supporting programs in Health, Education and Livelihoods.

For this project, USAID-PEP's partner is SDP. USAID-PEP and SDP are working collaboratively to develop and fund two mini-grids at the Balimo District Hospital (hereafter referred to as 'Balimo Hospital' or 'Hospital') and Hon. Roy Biyama Balimo Academy (hereafter referred to as 'Balimo Academy' or 'Academy') in Balimo Station, Western Province. The Hospital site contains an existing distribution grid connecting eight staff house buildings, water and sewage pumps, and several other buildings. Ten Hospital staff houses that are currently connected to the town grid and need to be connected to the Hospital grid. The Academy site contains an existing distribution grid connecting nine classroom blocks and two staff house buildings. Another four staff houses are still under construction and when completed, will be connected to the Academy's existing distribution grid. Detailed site information is provided in Appendices F and G.

Product or Service Expectations:

USAID-PEP is seeking proposals from qualified suppliers for the design, supply, and installation of two turnkey solar photovoltaic (PV) and battery energy storage system (BESS) systems at Balimo Hospital and Academy, including engineering, procurement, construction, commissioning and training services. The solar PV and BESS systems shall connect to and supply the existing distribution grids at the sites. The scope also includes:

1) Distribution grid works to connect the 10 Hospital staff houses (that are currently connected to the town grid) to the Hospital grid
2) Replacement of all of the Hospital's fluorescent lights with LED lights and removal of the Hospital's old air-conditioner units (note: the lights at the Academy are already all LED lights).
3) Design of the Academy system to allow for ease of expansion in the future from the initially installed minimum solar PV capacity of 96 kWp to 288 kWp and from the initially installed minimum BESS capacity of 145 kWh to 357 kWh – plus required additional inverter/charge controller capacity.

The high-level specifications of the system components are as follows:	
Balimo Hospital System	
1	Rooftop mounted solar photovoltaic (PV) arrays on several roofs of the Hospital buildings totalling a minimum of 197 kWp, consisting of a minimum of 107 kWp on the northeast facing roofs and 90 kWp on the southwest facing roofs.
2	Lithium-ion (LiFePO4) or equivalent Battery Energy Storage System (BESS) with a minimum capacity of 194 kWh.
3	Inverter/s with a minimum AC total nominal continuous power output of 60 kW 3-phase, installed to connect each rooftop solar PV array, as listed above. Inverter/s and charge controller/s (if used) shall be sized to ensure the BESS can be charged using the full capacity of the solar PV array.
4	A control, remote monitoring and visualisation system, including an automatic transfer switch and hybrid interconnection with the existing 80 kVA Kohler 3-phase diesel genset.
5	A pre-paid metering system (inclusive of any IT equipment required) and meters installed for each of the 18 staff houses. Note: the houses already have internal building wiring.
6	Connection of the 10 Hospital staff houses that are currently connected to the town grid to connect to the Hospital distribution grid instead.
7	Suitably sized distribution boards, wiring, protections and balance of system components that meet PNG's electrical standards, industry best practices, and international standards that apply.
8	Supply of critical spare parts, required accessories, and required O&M tools.
9	The electrical equipment (BESS, inverters, charge controllers, combiner/junction/distribution boards, control and monitoring devices) shall be installed in a safe manner within the existing powerhouse room within the workshop building, or adjacent workshop rooms within the workshop building.
10	Replacement of 212 pieces of installed 4-foot 36W fluorescent tube lights with 18W LED tube lights. Replacement of 101 pieces of installed 2-foot 18W fluorescent tube lights with 9W LED tube lights. Disposal of replaced fluorescent tube lights according to PNG laws. Transport of waste from Balimo to Port Moresby will be provided by SDP.
11	Removal and disposal of the 14 old Kelon brand air-conditioner units according to PNG laws. Transport of waste from Balimo to Port Moresby will be provided by SDP.
12	The system and components must conform to the detailed technical specifications specified in Attachment E: Technical Specifications. Detailed site information, including photos and maps, is provided in Appendix F.
Balimo Academy System	
1	Rooftop mounted solar photovoltaic (PV) arrays on several roofs of the Academy buildings totaling a minimum of 96 kWp, consisting of a minimum of 48 kWp on the north facing roofs, 24 kWp on northwest facing roof and 24 kWp on southeast facing roof.
2	Lithium-ion (LiFePO4) or equivalent Battery Energy Storage System (BESS) with a minimum capacity of 145 kWh.

3	Inverter/s with a minimum AC total nominal continuous power output of 36 kW 3-phase, installed to connect each rooftop solar PV array, as listed above. Inverter/s and charge controller/s (if used) shall be sized to ensure the BESS can be charged using the full capacity of the solar PV array.
4	A control, remote monitoring and visualisation system, including an automatic transfer switch and hybrid interconnection with the existing temporary 33 kVA FG Wilson 3-phase diesel genset, or other genset if the FG Wilson genset is replaced.
5	A pre-paid metering system (inclusive of any IT equipment required) and meters installed for each of the six staff houses. Note: the houses already have internal building wiring.
6	Suitably sized distribution boards, wiring, protections and balance of system components that meet PNG's electrical standards, industry best practices, and international standards that apply.
7	Supply of critical spare parts, required accessories, and required O&M tools.
8	The electrical equipment (BESS, inverters, charge controllers, combiner/junction/distribution boards, control and monitoring devices) shall be installed within a new powerhouse building to be constructed by the Supplier to house the inverters, batteries and other electrical equipment. The proposed powerhouse would be built on a concrete floor and have a metallic roof and walls. A secured door would be installed, as well as forced ventilation to avoid high temperatures in the powerhouse.
9	The design of the system shall allow for ease of expansion of the system capacity in the future to 288 kWp solar PV and 357 kWh BESS capacity, plus required additional inverter/charge controller capacity, i.e. The initially installed distribution boards, wiring, protections, cable trays/conduit, trenching, balance of system components, and the powerhouse shall be sized to ensure minimal equipment and materials need to be replaced or changed when the system capacity is expanded to 288 kWp solar PV, 357 kWh BESS capacity and the required additional inverter/charge controller. A second detailed design of the expanded system shall be provided for the Academy system to verify that the system can be easily expanded.
10	The system and components must conform to the detailed technical specifications specified in Attachment E: Technical Specifications. Detailed site information, including photos and maps, is provided in Appendix G.

The following services shall be included in the work provided by the Supplier:

- Regular coordination with USAID-PEP and SDP throughout the project.
- Provision of design and documents indicated in Deliverables 1 to 4 (below). Note: as per the specifications above, for the Academy system two detailed designs are required – one of the initial system and one for the future expanded system.
- Any construction equipment, infrastructure, required power and water supply, and waste management and disposal according to PNG laws.
- Security during installation. Any losses for any reason during installation, up to the day of the handover, are the responsibility of the Supplier.
- Installation labour, and accommodation and meals for the labour.

- Local sub-contractors and the mini-grid operators' staff shall be employed for the installation, and they shall receive on-the-job training on installation and maintenance of the mini-grids.
- Civil works, electrical works and mechanical installation works that meets PNG and Australia's electrical standards, industry best practices, and international standards that apply.
- Testing and commissioning, as per Deliverables 1 and 3 below.
- Provision of Operations & Maintenance (O&M) practical training program for the operator and users (households), and O&M manual and logbook, as per Deliverables 2 and 4 below.
- As per Deliverable 5 below, a 1-year defects liability period shall be in effect commencing from the date of certificate of handover being signed by all parties. During this period, the Supplier shall provide O&M technical support services as needed to the operator.

Please note: Logistics/transportation, including transport of any labour, materials, construction equipment, and waste materials will be provided by SDP. These costs are not to be included in the financial proposal. Materials and equipment will need to be delivered by the Supplier to Kennedy Wharf, Porebada, Port Moresby, where SDP will arrange for their shipment to Balimo.

Nationality and Source Requirements

The nationality and source requirements for this RFP are as follows:

- Nationality, i.e., the place of incorporation, ownership, citizenship, residence, etc. of the supplier (bidder) of the mini-grids: The nationality of the mini-grid supplier (bidder) must be PNG or the United States of America.
- Source of mini-grid components / equipment, i.e., the country from which each mini-grid component is shipped to PNG, or PNG itself if the components are located therein at the time of the purchase: The source of mini-grid components must be PNG, the United States of America, or any 937 geographic code country (reference Attachment H). Please see important note below.
- Bidder may not offer or supply services or any commodities that are manufactured or assembled in, shipped from, transported through, or otherwise involving any of the following countries: Cuba, Iran, North Korea, or Syria.
- Any and all items that are made by Huawei Technology Company, ZTE Corporation, Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, and Dahua Technology Company will not be accepted. If quotes include items from these entities, please note that they will be deemed not technically responsive, and excluded from competition.
- The US Government has implemented a blanket prohibition on providing direct government financing to international solar projects that source from suppliers that are the subject of a withhold release order (Hoshine Silicon Industry), on the Commerce Entity List, or otherwise sanctioned for their use of forced labor. These People's Republic of China (PRC) energy companies that were added to the Commerce Entity List for their ties to forced labor are found below. NOTE: Bidders may not purchase from any of the suppliers listed below without advance written approval from RTI/USAID.
    - Hoshine Silicon Industry (metallurgical grade silicon and silicon products) – also subject to a WRO
    - Xinjiang Daqo New Energy (polysilicon, wafers)
    - Xinjiang East Hope Nonferrous Metals (polysilicon, ingots, wafers)
    - Xinjiang GCL-New Energy Material (polysilicon, ingots, wafers, cells, modules)

- Xinjiang Production and Construction Corps (state-owned paramilitary organization, electricity supplier)

Note: This does not mean that all PRC-produced solar panels are prohibited. Currently, the restriction is on any solar panels or products that are directly purchased using US Government funds from any of the above companies.

Please note that the Source/Nationality requirements enumerated above apply only to individual purchases over $25,000 USD. Any individual purchase not exceeding $25,000 can be made from any country except the prohibited countries. For example, a bidder could buy $25,000 worth of solar panels from Australia, then $23,000 worth of batteries from New Zealand, and $500 worth of connectors from India and remain compliant. However, bidders are prohibited from breaking up procurements in amounts less than $25,000 to circumvent the Source/Nationality requirements. In addition, if the equipment is already in PNG i.e., it does not need to be imported, then the individual purchase of this equipment does not need to be below USD25,000. For example, if the batteries were manufactured in Australia but are already in PNG, the bidder may include them in their proposal even if the purchase of the equipment is above USD25,000.

Gender Requirements

Gender equity should be considered in the planning and implementation of the project.

Deliverables, Timelines, Special Terms and Conditions:

The Supplier will provide the following deliverables in accordance with the Delivery Timeline for acceptance by USAID-PEP and SDP. The payment for deliverable 5 shall be 5%. The payment percentages/amounts for the other deliverables can be negotiated:

Deliverable 1
Receipt and acceptance of: a. Government approvals and permits (e.g. building, land, CEPA/environmental, NEA, etc.) – or confirmation if not required. b. Detailed design documentation – including single-line diagram, solar PV layout drawing (including string layout/allocation), cable schedule, and electrical calculations (cable sizing calculations and protection sizing calculations), powerhouse civil drawings, powerhouse layout diagram, and underground reticulation drawings at minimum. Note: as per the specifications above, for the Academy system two detailed designs are required – one of the initial system and one for the future expanded system. c. Bill of materials, including critical spare parts, required accessories, and list of tools for installation and O&M. d. Project schedule – including material logistics and team allocation to scheduled items. e. Commissioning plan – including visual, civil, mechanical and electrical test procedures for the system and its components, i.e. solar PV panels/strings/array, shading check, inverters, battery energy storage system (BESS), distribution system, diesel genset integration, switchboards, metering, control and communications, earthing, cables and conduit, insulation resistance, shutdown, mounting structure, concrete slump test and hammer test, etc.

Deliverable 2

Receipt and acceptance of:

a. All materials procured and delivered to site.
b. QA/QC inspection of materials by USAID-PEP.
c. Review and acceptance of operations & maintenance (O&M) training materials, O&M training program, O&M manual and logbook as per the following:
    i. The training shall be conducted for the operator and users. It shall incorporate on-the-job training for the operator during installation.
    ii. The training and O&M manual shall follow manufacturers' recommendations, best practices, and international standards. Both the training and O&M manual shall include :
        - system operation, management and remote monitoring;
        - preventative, reactive and condition-based maintenance, including troubleshooting and emergency procedures;
        - maintaining records ;
        - defects liability period and technical support options;
        - user safety and usage of the mini-grid;
        - a schedule on what needs to be done to operate and maintain the system daily, weekly, monthly, quarterly and annually; and
        - warranties and details of how warranties will be honoured.
    iii. The O&M manual shall be designed with image-based directions to be suitable for users with limited technical experience. It shall include equipment technical datasheets, equipment serial numbers, a spare parts list, and all equipment/component datasheets and manuals.
    iv. The logbook provided shall be used to record what maintenance has been conducted, when it was conducted and by who.

Deliverable 3

Receipt and acceptance of:

a. Installation team mobilised to site appropriately.
b. Land prepared, compacted and cleared if required, including cutting of trees and branches that will cause shading on the solar panels or are in the path of the distribution grid.
c. Installation completed with installation/OHS reports and photos provided to USAID-PEP on a daily basis, The report template will be provided and includes various checks, such as photos of installed cables and cable markings before they are buried or hidden behind walls.
d. On-the-job training on installation and maintenance of the mini-grid provided to local sub-contractors and the operator's staff during the installation.
e. Commissioning plan implemented by the Supplier and supervised by USAID-PEP. Commissioning tests passed and accepted/signed by USAID-PEP.
f. A seven-day performance test period conducted where the system operates normally and any defects are rectified prior to the issue of the certificate of practical completion. This can take place during the O&M training program.
g. Certificate of practical completion signed and issued by USAID-PEP and PNG SDP.

Deliverable 4
Receipt and acceptance of: a. Site remediated, cleaned up and waste disposed. b. O&M practical training program conducted for the operator and users (households) following the training materials and program accepted in Deliverable 2. c. Handover package – one physical copy to be provided to the operator on site, and electronic copies to be provided to the operator, PNG SDP and USAID-PEP – to include: i. Confirmation of supply of critical spare parts, required accessories and required O&M tools. ii. O&M manual and logbook. iii. Scope of Work (SOW). iv. Government approvals and permits. v. Bill of materials. vi. Commissioning plan implemented by Supplier and signed by USAID-PEP. vii. Certificate of practical completion signed and issued by USAID-PEP and PNG SDP. viii. As-built drawings – including, at minimum, single-line diagram, solar PV layout drawing (including string layout/allocation), cable schedule, and electrical calculations (cable sizing calculations and protection sizing calculations), powerhouse civil drawings, powerhouse layout diagram, and underground reticulation drawings at minimum. ix. As-built photos of system and main components, i.e. solar PV panels/array, mounting structure, inverters, BESS, distribution system, diesel genset integration, switchboards, powerhouse, metering, control and communications, earthing, and cables and conduit. d. Certificate of handover signed by the system owners, PNG SDP and USAID-PEP. e. Project close out meeting conducted.
Deliverable 5
Receipt and acceptance of: • Completion of a one-year defects liability period, which shall be in effect commencing from the date of the signing of the certificate of handover by all parties. During this period, the Supplier shall provide O&M technical support services as needed to the operator.

Delivery Timeline

Date	**Activity to be Completed**
(Supplier to advise)	Deliverable 1 documentation submitted to USAID-PEP
(Supplier to advise)	Purchase Order (PO) issuance by Supplier to all of the materials/equipment suppliers
(Supplier to advise)	All internationally purchased materials delivered to shipping company
(Supplier to advise)	All materials delivered to PNG port

(Supplier to advise)	All materials delivered to site
(Supplier to advise)	Installation commenced
(Supplier to advise)	Generation system installed
(Supplier to advise)	Metering system installed
(Supplier to advise)	Mini-grid commissioned
(Supplier to advise)	Training completed
(Supplier to advise)	Handover package (including as-built drawings) submitted

Pricing Template for Bidders

Bidders shall submit a line-item pricing table in Excel format in the general format shown below with per unit costs, including GST, and terms of payment. All prices must be in PNG Kina. Pricing shall include, but is not limited to equipment, materials, logistics/transportation, installation labor, testing and commissioning, O&M training, O&M manual and logbook, drawings, and other services, including the effort of staff who will work on the project.

Example:

Item No.	Description	Qty.	Unit	Unit Price	Total Price
1	Paradise Cement, 25 Kg	50	Bag	PGK 35	PGK 1,750
2	4mm earthing cable 100m roll	2	Roll	PGK 440	PGK 880
3	Certified Electrician PGK55.00/hour x 11 weeks x 44 hours per week	3	Each	PGK 26,620	PGK 79,860
Sub Total Value					PGK XXX
GST 10 %					PGK XXX
Total Value					PGK XXX

By signing this attachment, the bidder confirms he has a complete understanding of the specifications and fully intends to deliver items that comply with the above listed specifications.

Signature:	
Title:	
Date:	

Attachment B: Instructions to Bidders

1. **Procurement Narrative Description**: The Buyer (RTI) intends to purchase commodities and/or services identified in Attachment A. The Buyer intends to purchase the quantities (for commodities) and/or services (based on deliverables identified in a Statement of Work). The term of the Ordering Agreement shall be from Award Date to the Delivery date of the Offeror unless extended by mutual agreement of the parties. The Buyer intends to award to a single "approved' supplier based on conformance to the listed specifications, the ability to service this contract, and selling price. We reserve the right to award to more than one bidder. If an Ordering Agreement is established as a result of this RFQ/RFP, supplier understands that quantities indicated in the specifications (Attachment A) are an estimate only and RTI does not guarantee the purchase quantity of any item listed.

2. **Procuring Activity**: This procurement will be made by **Research Triangle Institute International** located at

   1st Floor, Gordons Business Centre, Hohola
   P.O. Box 209, Vision City
   Port Moresby, National Capital District
   Papua New Guinea

   who has a purchase requirement in support of a project funded by

   United States Agency for International Development

   RTI shall award the initial quantities and/or services and any option quantities (if exercised by RTI) to bidder by a properly executed Purchase Order as set forth within the terms of this properly executed agreement.

3. **Proposal Requirements**. All Sellers will submit a quote/proposal which contains offers for all items and options included in this RFQ/RFP. All information presented in the Sellers quote/proposal will be considered during RTI's evaluation. Failure to submit the information required in this RFQ/RFP may result in Seller's offer being deemed non-responsive. Sellers are responsible for submitting offers, and any modifications, revisions, or withdrawals, so as to reach RTI's office designated in the RFQ/RFP by the time and date specified in the RFQ/RFP. Any offer, modification, revision, or withdrawal of an offer received at the RTI office designated in the RFQ/RFP after the exact time specified for receipt of offers is "late" and may not be considered at the discretion of the RTI Procurement Officer. The Seller's proposal shall include the following:

   (a) The solicitation number:

   (b) The date and time submitted:

   (c) The name, address, and telephone number of the seller (bidder) and authorized signature of same:

   (d) Validity period of Quote:

   (e) A technical description of the items being offered in sufficient detail to evaluate compliance with the requirements in the solicitation. This may include product literature, or other documents, if necessary.

   (f) If RTI informs Seller that the Commodity is intended for export and the Commodity is not classified for export under Export Classification Control Number (ECCN) "EAR99" of the U.S. Department of Commerce Export Administration Regulations (EAR), then Seller must

provide RTI the correct ECCN and the name of Seller's representative responsible for Trade Compliance who can confirm the export classification.

(g) Lead Time Availability of the Commodity/Service.

(h) Terms of warranty describing what and how the warranties will be serviced.

(i) Special pricing instructions: Price and any discount terms or special requirements or terms (special note: pricing must include guaranteed firm fixed prices for items requested.

(j) Payment address or instructions (if different from mailing address)

(k) Acknowledgment of solicitation amendments (if any)

(l) Past performance information, when included as an evaluation factor, to include recent and relevant contracts for the same or similar items and other references (including points of contact with telephone numbers, and other relevant information)

(m) **Special Note:** *The Seller, by his response to this RFQ/RFP and accompanying signatures, confirms that the terms and conditions associated with this RFQ/RFP document have been agreed to and all of its attachments have been carefully read and understood and all related questions answered.*

4. Bidders will be required to submit the response to the RFP in an email with an attached zip file containing two folders: (1) Eligibility Requirements Folder and (2) Proposal Folder. Information submitted in the Proposal Folder will be referenced for scoring during the proposal evaluation, utilizing the factors outlined in Attachment B, paragraph 11.

1) Eligibility Requirements Folder:

Eligibility Folder Requirements: Proposals will only be evaluated if eligibility requirements are met, and all documents listed below are submitted with the proposal.
1. Cover Letter (template located in Attachment C)
2. Bidder Information Form (located in Attachment D)
3. Proof of Legal Registration in Papua New Guinea
4. IRC Certificate (TIN)

2) The Proposal Folder shall consist of two sub-folders: (1) Technical Proposal Folder and (2) Financial Proposal Folder. Information submitted under each sub-folder will be referenced for scoring during the proposal evaluation, utilizing the factors outlined in Attachment B, paragraph 11.

Technical Proposal Requirements:
The information in this sub-folder will be evaluated against the technical evaluation factors: Technical and O&M (30 points), Project Workplan and Schedule (10 points), Risk Assessment and Mitigation (5 Points), Corporate Capabilities and Experience (15 Points) and Past Performance (10 points). Documentation in this folder should contain the information on the proposed project requirements outlined under the RFP section "Product or Service Expectations." Bidders are expected to develop their proposals based on their understanding of needs, their prior institutional experience, and their determination of the approaches that would be feasible, scalable, and successful within the context provided. In all cases, bidders must clearly explain the rationale for the proposed approaches chosen.

The technical proposal must follow the structure outlined below, contain the sections listed below, and be within page limitations. The bidder may include additional details and annexes if desired.

Section Heading	Description	Page Limit
Technical Approach	Describe the approach and plans for accomplishing the requirements outlined in the Statement of Work. The approach shall be described in sufficient detail to allow RTI to evaluate the approach fairly and with a minimum of possible misinterpretation.	3
Technical Designs	Provide technical designs. The mini-grid shall be designed and installed according to the requirements and specifications given in Attachments E to G. The technical designs shall include: diagrams (such as single-line diagram, solar PV layout drawing, cable schedule, and electrical calculations), component datasheets/specifications (including at minimum the sizes/manufacturers/models/etc.), bill of materials, and commissioning details.	10
Training and Operations & Maintenance Plan	Provide details on the operations & maintenance (O&M) training materials, O&M training program, and O&M manual, as per the requirements given in Attachment A. Service contract options shall also be provided in this section.	1
Project Workplan and Schedule	Include a project workplan and schedule, including details of lead times and stock availability, material logistics and team allocation to scheduled items.	3
Risk Assessment and Mitigation Measures	Describe and assess any risks that could affect the installation and operation of the system and the measures to be taken to mitigate these risks.	3
Corporate Capabilities and Experience	Provide a brief description of your company/organization and how long you have been operating. Include a fact sheet, and/or brochure, management structure, and client list/client reference letters.	10
Key Personnel	Identify key staff who will or may provide the services required in this RFP and describe their specific experience providing the required services. Use specific examples and include their roles and responsibilities in the project. Include their bio and list any relevant training certificates or technical certifications they possess.	1 page per person

Past Performance	Provide at least three client references for similar work. The references must include the following: 1. Name of the organization, contact person, current email and phone number of the organization for which work was provided. 2. A brief description of the work performed. 3. The duration (including the dates) of the work and amount (specify the currency) of the contract.	1 page per reference

Financial Proposal Folder Requirements: The information in this sub-folder will contribute to the financial evaluation factor (30 Points) and must include a detailed cost breakdown, including terms of payment.
1. Submit a line-item pricing table in Excel format with per unit costs, including GST and terms of payment. All prices must be in PNG Kina. Pricing shall include, but is not limited to detailed design and engineering, drawings, equipment, materials, installation labor, security, testing and commissioning, O&M training, O&M manual and logbook, and other services. Include budget justification notes detailing how funds will be allocated during the project, including proposed level of effort of staff who will work on the project. Bidders shall present separate cost proposals for each site they bid on. Bidders may price proposals using the Pricing Template in Attachment A or the bidder may utilize another format with clear and concise costing for each deliverable as listed.
2. Include any special pricing instructions: Price and any discount terms or special requirements or terms if applicable. Special note: pricing must include guaranteed firm fixed prices for items requested.
3. List payment address or instructions.

5. **Questions Concerning the Procurement:** All questions in regard to this RFP should be directed to

   USAID-PEP Procurement, Steve Warnock, Deputy Chief of Party, Operations and Compliance

   at this email address:

   procurement@png-pep.org
   Copy Steve Warnock @ swarnock@png-pep.org

   The cut-off date for questions is.

   5 December 2024 by 8:00AM (PNG time)

6. **Notifications and Deliveries**: Time is of the essence for this procurement. Seller shall deliver the items or services no later than the dates set forth in the contract that will be agreed by both parties as a result of this RFQ/RFP. The Seller shall immediately contact the Buyer's Procurement Officer if the specifications, availability, or the delivery schedule(s) changes. Exceptional delays will result in financial penalties being imposed of Seller.

7. **Documentation**: The following documents will be required for payment for each item:
   (a) A detailed invoice listing Purchase Order Number, Bank information with wiring instructions (when applicable)
   (b) Packing List
   (c) All relevant product/service documentation (manuals, warranty doc, certificate of analysis, etc.)
8. **Payment Terms**: Refer to RTI purchase order terms and conditions found in https://www.rti.org/sites/default/files/rti-po-terms_english_version_-_v1.18.pdf , http://www.rti.org/files/PO_FAR_Clauses.pdf, or http://www.rti.org/files/PO_FAR_Clauses_Commercial_Items.pdf. Payment can be made via wire transfer or other acceptable form**.** Sellers may propose alternative payment terms and they will be considered in the evaluation process.
9. **Alternative Proposals**: Sellers are permitted to offer "alternatives" should they not be able to meet the listed requirements. Any alternative proposals shall still satisfy the minimum requirements set forth in Attachment A Specifications.
10. **Inspection Process**: Each item shall be inspected prior to final acceptance of the item. All significant discrepancies, shortages, and/or faults must be satisfactorily corrected and satisfactorily documented prior to delivery and release of payment.
11. **Evaluation and Award Process:** The RTI Procurement Officer will award an agreement contract resulting from this solicitation to the responsible Seller (bidder) whose offer conforms to the RFQ/RFP will be most advantageous to RTI, price and other factors considered. The award will be made to the Seller representing the **best value** to the project and to RTI. For the purpose of this RFQ/RFP, price, delivery, technical and past performance are of equal importance for the purposes of evaluating, and selecting the "best value" awardee. RTI intends to evaluate offers and award an Agreement without discussions with Sellers. Therefore, the Seller's initial offer should contain the Seller's best terms from a price and technical standpoint. However, RTI reserves the right to conduct discussions if later determined by the RTI Procurement Officer to be necessary.

    Each proposal shall be evaluated against the following evaluation factors:

Technical Evaluation Criteria	**Maximum Points**
Factor 1: TECHNICAL AND O&M	
Adequacy and quality of the proposed technical approach, technical designs, and training and O&M plan in response to the Statement of Work and the technical specifications and requirements (Attachments E to G).	30
Factor 2. PROJECT WORKPLAN AND SCHEDULE	
Adequacy and reasonableness of the workplan and project schedule. Is the workplan and schedule realistic and implementable? Will the installation be completed expeditiously?	10
Factor 3: RISK ASSESSMENT AND MITIGATION	
Adequacy and reasonableness of the risks identified that could affect the installation and operation of the system and the measures to be taken to mitigate these risks. Are the mitigation measures realistic?	5
Factor 4: CORPORATE CAPABILITIES AND EXPERIENCE	

Adequacy and quality of the organization's corporate/organizational capabilities, experience and key personnel to complete the proposed work. Is the proposed team experienced and capable of performing the work? Is the overall team composition balanced with the appropriate mix of skills?	15
Factor 5: PAST PERFORMANCE	
Rated performance feedback from references and previous clients.	10

Financial Criteria	**Maximum Points**
Fairness and reasonableness of the prices offered.	30

12. **Award Notice**. A written notice of award or acceptance of an offer, mailed or otherwise furnished to the successful bidder within the time acceptance specified in the offer, shall result in a binding contract without further action by either party.
13. **Validity of Proposal**. This RFP in no way obligates RTI to make an award, nor does it commit RTI to pay any costs incurred by the bidder in the preparation and submission of a proposal or amendments to a proposal. Your proposal shall be considered valid for 120 days after submission.
14. **Representations and Certifications.** Winning bidders under a US Federal Contract are required to complete and sign the RTI Representations and Certifications for award values over $10,000.
15. **Certification.** The offeror, by signing its offer, hereby certifies to the best of its knowledge and belief that no Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress on its behalf in connection with the awarding of this contract.
16. **Anti- Kick Back Act of 1986**. Anti-Kickback Act of 1986 as referenced in FAR 52.203-7 is hereby incorporated into this Request for Proposal as a condition of acceptance. If you have reasonable grounds to believe that a violation, as described in Paragraph (b) of FAR 52.203-7 may have occurred, you should report this suspected violation to the RTI's Ethics Hotline at 1-877-212-7220 or by sending an e-mail to ethics@rti.org. You may report a suspected violation anonymously.
17. **The John S. McCain National Defense Authorization Act for fiscal year 2019 – section 889**. RTI cannot use any equipment or services from specific companies, or their subsidiaries and affiliates, including Huawei Technologies Company, ZTE Corporation, Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, Aventura Technologies, Kaspersky Lab – Russian hardware & software products, and Dahua Technology Company ("Covered Technology"). In response to this request for proposal, please do not provide a quote which includes any Covered Technology. Any quote which includes Covered Technology will be deemed non-responsive. Additionally, if the United States Government is the source of funds for this RFP, the resulting Supplier (bidder) shall not provide any equipment, system, or service that uses Covered Technology as a substantial or essential component.

Acceptance:

Bidder agrees, as evidenced by signature below, that the bidder's completed and signed solicitation, bidder's proposal including all required submissions and the negotiated terms contained herein, constitute the entire proposal for the services described herein.

By: (Bidder's Company Name)

Signature: _____
Title:
Date:

Attachment C: Cover Letter Template

[Bidder: Insert date]

Procurement Department
USAID-Papua New Guinea Electrification Partnership (PEP) Activity, RTI International
Port Moresby, Papua New Guinea

Reference: Request for Proposals, Two solar mini-grid systems – Balimo District Hospital and Hon. Roy Biyama Balimo Academy, Western Province – PEP RFP-2024-003

Subject: [Bidder: Insert name of your organization]'s Eligibility Documents and Technical and Financial Proposals

Dear USAID-PEP Procurement Department:

[Bidder: Insert name of your organization] is pleased to submit its proposal in regard to the above referenced request for proposals. For this purpose, we are pleased to provide the information furnished below:

Name of the company or organization:	
Address:	
Telephone	
E-mail address	
Taxpayer Identification Number	
Unique Entity Identifier (UEI) if available	
Name of company authorized representative:	
Nationality of authorized representative:	
Address:	
Telephone:	
E-mail address:	

We are further pleased to provide the following items containing the required documents requested in the RFP:

Note: It is incumbent on each bidder to clearly review the RFP and its requirements. It is each bidder's responsibility to identify all required documents and include them in their proposal.

- ☐ Cover Letter, signed by an authorized representative of the bidder
- ☐ Completed Bidder Information Form attached in Attachment D. Bidder Information Form
- ☐ Proof of legal registration in Papua New Guinea
- ☐ IRC Certificate (TIN)
- ☐ Current Insurance Coverage (CIC)
- ☐ Financial Proposal
- ☐ Technical Proposal

We confirm that our proposal, including the financial proposal, will remain valid for_____ calendar days after the proposal deadline.

Sincerely,

_____
Signature
Bidder: Insert name of your organization's representative]

Attachment D: Bidder Information Form

	KEY QUESTIONS	BIDDER INFORMATION FORM *Please write your answers clearly and use additional paper if needed to provide as much detail as possible in your answers to these questions. More details and facts are always better than fewer details. We will attempt to verify the important facts you have listed below using our local personnel in and around the country.*
1	Contact name of designated representative	
2	Title or position of designated representative	
3	Phone Number(s) for designated representative	
4	E-mail address for designated representative	
5	Company name	
6	Company address	
7	Primary business of company	
8	List cities where company has offices and/or workshops	
9	List manufacturers or brands your company currently represents	
10	Define type of representation of each brand (agent, dealer, authorized manufacturing rep, etc.) and whether or not it is exclusive	
11	Is company locally owned or foreign owned?	
12	Describe previous experience in working with USAID-funded projects.	
13	If your company has been awarded previous USAID-funded work, please describe.	
14	Please describe your recent experience (last 36 months) with doing work, providing equipment or services as defined in our specifications or statement of work.	

15	List the names and current contact information for the project managers working for your customers in your last two projects for us to contact and ask about your performance.	
16	If your company is based outside of the country, please describe how you would effectively service and support a future contract.	

Attachment E: Technical Specifications

The mini-grid system, components, design and installation shall meet all applicable standards in Papua New Guinea and Australia, including the following at minimum (note: the latest editions of standards shall apply):

Electrical standards –

- PNG Power Electrical Trade Circular
- AS/NZS 3000 – Electrical wiring rules
- AS/NZS 3008 – Electrical installations – Selection of cables
- AS/NZS 4836 – Safe working on or near low-voltage electrical installations and equipment
- AS 4509.1 – Stand-alone power systems – Safety and installation
- AS 4509.2 – Stand-alone power systems – System design
- AS/NZS 5033 – Installation and safety requirements for photovoltaic (PV) arrays
- AS/NZS 5139 – Electrical installations – Safety of battery systems for use with power conversion equipment
- AS 3011 – Electrical installations – Secondary batteries installed in buildings
- AS 2676.2 – Guide to installation, maintenance, testing and replacement of secondary batteries in building
- AS/NZS 4777.1 – Grid connection of energy systems via inverters – installation requirements
- AS 1768 – Lightning Protection
- Solar PV equipment standards – IEC 61215 and IEC 61730, or meets the Australian Clean Energy Council's list of approved products[1]
- Inverter equipment standards – Depending on the Australian Clean Energy Council's inverter categories required standards[2], the inverter shall comply to IEC 62109-1, IEC 62109-2, IEC 62477-1, AS/NZS 4777.2:2020 or AS/NZS 4777.2:2020 Appendix M, Alternatively, the inverter shall meet the Australian Clean Energy Council's list of approved products[3]
- BESS equipment standards – IEC 62619, or meets the Australian Clean Energy Council's list of approved products[4]
- Charge controller equipment standards – IEC 62509 and/or UL 1741
- Solar PV cable standards – IEC 62930 or equivalent
- Meters – IEC 62052 and IEC 62053, or equivalent standards

Civil, structural, etc. standards –

- HB 212 – Design wind speeds for the Asia-Pacific region.
- PNGS 1001: Parts 1 & 2 – General structural design and design loadings for buildings Part 1 – General design requirements Part 2 – Dead and live loads
- PNGS 1001.4 – Earthquake loading
- AS/NZS 1170.0 – Structural design actions – General principles
- AS/NZS 1170.1 – Structural design actions – Permanent, imposed and other actions
- AS/NZS 1170.2 – Structural design actions – Wind actions

[1] https://www.cleanenergycouncil.org.au/industry/products
[2] https://assets.cleanenergycouncil.org.au/documents/products/CEC-inverter_listing_categories_2021.pdf
[3] https://www.cleanenergycouncil.org.au/industry/products
[4] https://www.cleanenergycouncil.org.au/industry/products

In addition, the following specific minimum technical requirements and standards shall be met, and datasheets and other evidence shall be provided of this.

Item	Minimum Requirements
3.1 System (overall)	1. The solar PV panels and batteries may be designed as either an AC-coupled, DC-coupled, or combined AC and DC coupled system. 2. The system shall be modular to allow for further expansion when required. 3. Anti-theft measures and systems (such as PV panel locking fasteners / fittings) shall be provided.[5] 4. A 1-year defects liability period shall be in effect commencing from the date of commissioning during which time the Supplier shall also provide O&M technical support services as needed to the operator.
3.2 Solar PV	1. Rooftop mounted solar photovoltaic (PV) arrays with the following description/capacities: a. **Balimo Hospital**: solar PV arrays to be installed on three adjacent Hospital building roofs totalling a minimum of 197 kWp (consisting of a minimum of 107 kWp on the northeast roofs and 90 kWp on the southwest roofs). The specific roof locations are shown in Appendix F. b. **Balimo Academy**: solar PV arrays to be installed on three adjacent Academy building roofs totalling a minimum of 96 kWp (consisting of a minimum of 48 kWp on the north facing roofs, 24 kWp on northwest facing roofs and 24 kWp on southeast facing roofs north facing PV arrays). The specific roof locations are shown in Appendix G. 2. Complies to IEC 61215 and IEC 61730 or meets the Australian Clean Energy Council's list of approved products[6]. 3. Only one (1) solar PV manufacturer and model shall be used in the system. 4. Manufacturer shall have been present in the solar PV manufacturing market for at least 10 years. 5. Life expectancy in excess of 25 years. 6. Minimum 10-year manufacturer's warranty covering defects and workmanship. 7. Performance warranty – maximum STC power degradation of 10% during the first 10 years and 20% during a period of 25 years. 8. PV panels shall have suitable earthing connection to the array mounting structure, such that continuity is maintained after removal of any panel. 9. Transportation and storage of all PV panels shall comply with the manufacturer's guidelines and installation manuals. 10. A list of serial numbers of all PV panels shall be provided.
3.3 Rooftop PV mounting structure	1. PV panels shall be installed flush mounted on indicated existing rooftops in areas that maximize solar access and minimize shading. 2. The mounting structure must be designed to meet wind speed classification level I in accordance with HB 212-2002 (i.e. 3 s gust, 10 m height, open country terrain nominal 50 year return period of 32 m/s and nominal 500-year return period of 40 m/s). The bidder shall supply evidence confirming the mounting structure is certified to this standard.

[5] Anti-theft systems and technologies may include those described in the following pages –
https://www.energymatters.com.au/panels-modules/solar-panel-security/
https://sinovoltaics.com/technology/kleptovoltaics-a-comparison-of-solar-pv-plant-anti-theft-technologies/
[6] https://www.cleanenergycouncil.org.au/industry/products

	3. All support structure components including brackets and fasteners must be able to resist at least 20 years of outdoor exposure in a harsh, tropical environment without any appreciable corrosion or structural fatigue. 4. PV panel frames shall be through bolted using a locking fastener tightened to a specified torque rating. The bolted connections shall be vibration resistant. 5. The mounting structure shall have a minimum 10-year manufacturer's warranty covering defects and workmanship. 6. Shall have suitable earthing connection and protection, which ensures continuity of earthing protection between the mounting structure, PV panels, and earthing system that remains functional with the removal of any panel. 7. Installation and layout of the PV panels to be mounted meets manufacturers recommendations including but not limited to distance from the roof's edge, minimum gap with the rooftop surface, and any leak prevention installation methods. 8. Installation and layout of the PV panels to be mounted meets industry safety standards and considers service and maintenance activities, e.g. considers having sufficient walkway width from the edge of the roof and between rows, if needed.
3.4 Battery Energy Storage System (BESS)	1. Lithium-ion (LiFePO4) or equivalent BESS with the following minimum capacities: a. **Balimo Hospital**: minimum capacity of 194 kWh. b. **Balimo Academy**: minimum capacity of 145 kWh. 2. Complies to IEC 62619 or meets the Australian Clean Energy Council's list of approved products[7]. 3. Only one (1) BESS manufacturer and model shall be used in the system. 4. Life expectancy in excess of 10 years. Minimum cycle life of 5000 cycles at 80% depth of discharge at 20°C. 5. Minimum 5 year manufacturer defect warranty from the date battery received. 6. All battery equipment shall be capable of normal operation without the need for air conditioning, with minimum ambient temperature operational range 15°C – 45°C. 7. Protected with appropriately sized DC circuit breakers or fuses, internally or externally. 8. The maximum height of battery racking shall be 1200mm above FFL to reduce risk of toppling during seismic events. 9. The battery racks shall be of suitable strength and design for local seismic conditions and shall be securely anchored to the floor to avoid movement. 10. Specifications provided shall include (1) minimum and maximum state of charge; (2) round trip efficiency; and (3) stand-by losses. 11. Transportation and storage of all BESS shall comply with the manufacturer's guidelines and installation manuals. 12. Installed with manufacturer's recommended clearances, orientation, and other recommendations for long service life and warranty eligibility. 13. A list of serial numbers of all BESS modules shall be provided.
3.5 Inverters (i.e., battery inverter/charger, PV inverters, depending on DC	1. Inverter/s with the following minimum capacities: a. **Balimo Hospital**: minimum AC total nominal continuous power output of 60 kW 3-phase. b. **Balimo Academy**: minimum AC total nominal continuous power output of 36 kW 3-phase.

[7] https://www.cleanenergycouncil.org.au/industry/products

or AC coupling)	2. The above is the minimum inverter capacity. Inverter/s shall be sized to ensure the BESS can be charged using the full capacity of the solar PV array. 3. Depending on the Australian Clean Energy Council's inverter categories required standards[8], the inverter shall comply to IEC 62109-1, IEC 62109-2, IEC 62477-1, AS/NZS 4777.2:2020 or AS/NZS 4777.2:2020 Appendix M, Alternatively, the inverter shall meet the Australian Clean Energy Council's list of approved products[9]. 4. Manufacturers shall have been present in the inverter manufacturing market for at least 5 years. 5. Minimum 5 year manufacturer's warranty covering defects and workmanship. 6. IP rating of ≥ IP65 if outdoors and ≥ IP20 if indoors. 7. Protected with appropriately sized overcurrent protection and Type II surge protection devices (SPDs), either internally or externally. 8. Battery inverter/chargers must be able to be operated in a hybrid manner with a diesel genset. 9. Battery inverter/chargers must be able to supply/accommodate reactive loads with a power factor of not less than 0.9. 10. Battery inverter/chargers must be able to provide double the specified power for 5 seconds or more without damage. 11. For PV inverters, the ratio between the PV capacity (kWp @ STC) and the nominal AC output of the inverter at 35°C shall be ≤ 1.3 12. Transportation and storage of all inverters shall comply with the manufacturer's guidelines and installation manuals. 13. Installed with manufacturer's recommended clearances, orientation, and other recommendations for long service life and warranty eligibility. 14. A list of serial numbers of all inverters shall be provided.
3.6 Charge controllers (for DC coupled systems)	1. Charge controllers shall be sized to ensure the BESS can be charged using the full capacity of the solar PV array. 2. Manufacturer shall have been present in the charge controller manufacturing market for at least 5 years. 3. Complies to IEC 62509 and/or UL 1741. 4. Minimum 5 year product warranty. 5. MPPT charge controllers to be used with an efficiency of 95% or better. 6. Standby power consumption of 2.5W or lower. 7. Data logging included. 8. Display preferred. 9. Protected with appropriately sized Type II surge protection devices (SPDs), either internally or externally. 10. Protected with appropriately sized overcurrent protection. 11. Transportation and storage of all charge controllers shall comply with the manufacturer's guidelines and installation manuals. 12. Installed with manufacturer's recommended clearances, orientation, and other recommendations for long service life and warranty eligibility. 13. A list of serial numbers of all charge controllers shall be provided.
3.7 Control, remote monitoring and	1. A control, remote monitoring and visualization system shall be designed and installed to monitor the performance of the system components (including inverters, charge controllers, BESS and energy meters), monitor the temperature

[8] https://assets.cleanenergycouncil.org.au/documents/products/CEC-inverter_listing_categories_2021.pdf
[9] https://www.cleanenergycouncil.org.au/industry/products

visualization system	of the BESS, manage the charging and discharging of the BESS, and automatically start and stop a connected genset according to a set control algorithm. 2. An automatic transfer switch shall be installed to allow starting the genset when the battery voltage falls beyond a nominated depth of discharge and allow shut down of the genset when the battery bank reaches 100% capacity or when the PV array begins to supply power to the inverter at full capacity. 3. The control, remote monitoring and visualization system shall have digital panels and gauges to display parameters of the system. 4. The system shall have configurable alarms to indicate faults and other conditions. 5. Communication for remote monitoring and control using mobile communication (i.e., SIM card) shall be provided. 6. The system shall enable monitoring and operation via an internet-based portal, including fault information, alarms and historical data. 7. Data logging with storage devices that can capture and store data for a month or more and includes local download of the data (USB, memory card, Bluetooth, TCP/IP, etc.) is highly preferred. 8. 2 years warranty on the control, remote monitoring and visualization system.
3.8 Switchboards (distribution / protection boards, combiner boxes, etc.)	1. Selection, sizing and installation of switchgear shall comply with the PNG Power Electrical Trade Circular, AS/NZS 3000, AS/NZS 3008, and AS 4509. 2. Switchboards shall include suitably sized busbars, overcurrent protection, surge protection devices (SPDs), earthing, isolators/disconnection switches and other switchgear. 3. The main distribution board shall include a suitably sized main switch/isolator, distribution isolators, load shedding contactor, Class 1 energy meter and an appropriately sized Type I SPD. 4. Strings shall be protected with both PV fuses and Type II SPDs that are appropriately sized. 5. Spare fuses shall be supplied. 6. Switchboards shall be corrosion proof with sufficient IP rating for their installation location. 7. Switchboards shall be installed with sufficient cable entry allowances.
3.9 Cabling and wiring – general	1. Suitable cable sizes and types shall be designed and installed in conformity with the PNG Power Electrical Trade Circular, AS/NZS 3000 and AS/NZS 3008 for all cabling and AS/NZS 5033, including for PV arrays, BESS, inverters, control systems, and powerhouse. 2. Wiring between batteries and inverters will be no more than 4 meters apart and the copper connecting wires will introduce no more than 2% voltage drop when the inverters are operating at rated capacity. Calculations shall be provided with detailed design. 3. Insulated circular PVC or XLPE cables shall be used for AC and DC cabling with a minimum temperature breakdown rating of 90°C – apart from solar PV cables, which shall comply to IEC 62930 or equivalent. 4. All cabling shall be marked, and colour coded to allow for identification in conformity with the PNG Power Electrical Trade Circular or AS/NZS 3000 Electrical Wiring Rules. Any cable not meeting the colour code natively shall be coded with heat-shrink adjacent to the connecting terminal with the correct colour heat-shrink. 5. Where possible, all cables shall be installed either in rigid conduit or cable trays. Unenclosed cable or corrugated conduit shall not be used except for difficult bends or other similar circumstances.

	6. All conduits and cable tray shall be securely fastened and laid out in a neat and orderly manner. 7. All conduits exposed to direct sunlight shall be of the UV stabilized type. 8. Appropriately sized cabling accessories shall be installed, including but not limited to glands, connectors, lugs, heat shrinks, ducts, and labels. 9. RS485 cable data cabling shall be 0.22mm^2 two sheathed shielded twisted pair. 10. All data and communications cable that run externally shall have suitably rated inline surge protection installed. 11. All cabling shall be permanently marked for identification. 12. All cable entry to and from enclosures shall be through the underside of the enclosures and glanded and sealed to ensure that IP rating of the enclosure is maintained. 13. All cables shall be installed so that no stresses are placed on any terminations. 14. Termination fasteners and any wiring related fasteners shall be tightened to the specified torque recommendations by the manufacturers, industry standards, or best practices.
3.10 Cabling and wiring – PV cabling	1. Solar PV cables shall comply to IEC 62930 or equivalent. They shall be UV resistant and flame retardant. 2. Wiring between PV array and inverters will not cause a voltage drop of more than 2% at the rated Isc of the arrays at standard conditions. Calculations shall be provided with detailed design. 3. PV cables shall be reticulated underground from PV array roofs to the powerhouse. 4. For underground conduit: a. Trenches shall be located to permit changes of direction in easy stages eliminating strain on cables or ducts. b. The location pits shall be planned and approved before any trenching commences. c. Accurate records of underground reticulation routes shall be kept for later inclusion in as-built drawings. d. All underground conduit shall be heavy duty UPVC type, suitable for underground installation and shall comply with all current Australian Standards relating to underground installation. e. Underground conduit carrying or intended for electrical power cables shall be orange in colour. Installation shall comply with the requirements of AS 3000 Category A system. f. Trenches shall be excavated to a depth not less than 150mm below the minimum depth of laying. Minimum depth of laying shall be 500mm to top of conduit and greater where required for trafficable areas. g. The bottom of the trench shall be cleared of all rocks, stones and other hard and sharp materials. Stones or sharp objects having a nominal dimension of 25mm or greater shall be removed from the backfill materials. h. Trenches shall be backfilled in maximum layers of 150mm and shall be mechanically rammed and consolidated to the compaction of surrounding adjacent material. i. Conduit shall be watertight at all joints. j. Conduit shall use sweep bends where changing direction. k. Where running downhill to, and entering a building, conduit shall be installed to prevent any liquid in the conduit from entering the building.

	l. Buried entries to ducts and conduits shall be sealed with a pliable non-setting waterproof compound immediately after installation.
3.11 Earthing system	1. A suitable earthing system shall be designed and installed as per the PNG Power Electrical Trade Circular, AS/NZS 3000 Electrical Wiring Rules, and AS/NZS 5033:2021 for solar PV systems. 2. All the equipment shall be interconnected by an equipotential bonding and connected to a single earth electrode. The resistance to earth shall not exceed 5 Ohm. 3. The earthing conductor of the PV arrays shall be buried if it is longer than 50 m. In such a case, the conductor shall be made of bare copper with a minimum cross-section of 25 mm^2 to minimise corrosion. 4. The earthing conductors shall be always as close as possible to the active conductors to minimize the induced loop areas. 5. The earthing of the electric equipment (inverters, distribution boards, diesel genset, etc.) shall always follow the manufacturer's requirements. The minimum cross-section for the earthing conductor shall be 6 mm^2. 6. All earthing conductors liable to be exposed to a PV fault current shall be rated to carry the maximum possible fault current. 7. The bonding of each sub array shall be continuous over the whole array frame and such that the removal of any one frame element / PV panel shall not cause a disruption to the earthing bond.
3.12 Pre-paid metering system	1. Shall conform to IEC 62052 and IEC 62053, or equivalent standards. 2. Shall have anti-tampering features. 3. Shall include any IT equipment required to administer the pre-paid metering system. 4. Shall not require communications to the mobile network or internet to function.
3.13 Powerhouse	1. The powerhouse shall house the following electrical equipment: BESS, inverters, charge controllers (if included and appropriate), switchboards, and control, remote monitoring and visualization system. 2. Installation of equipment within the powerhouse shall ensure sufficient space to allow for ease of operation and maintenance, and shall ensure compliance with any specific installation conditions as stipulated by equipment manufacturers (in terms of spacing, air flow, etc.). 3. The powerhouse shall include active ventilation, sufficient LED lighting for working inside, a double GPO inside and two (2) security lights outside. 4. A fire detection system and fire extinguisher shall be included. 5. For **Balimo Hospital**, the existing powerhouse room within the workshop building, or adjacent workshop rooms within the workshop building shall be used as the powerhouse. The specific location is shown in Appendix F. 6. For **Balimo Academy**, a powerhouse shall be constructed at the specific location shown in Appendix G. It shall meet the following requirements. a. Construction of the powerhouse, including all foundations, shall comply with all design documentation, manufacturer specifications and installation manuals, all relevant PNG and international standards and codes, and be appropriate for site-specific conditions. b. Design life of the structure shall be 25 years. c. The roof and walls shall contain insulation or be constructed of materials that reduce heat transfer into the powerhouse. d. The powerhouse must be designed to meet wind speed classification level I in accordance with HB 212-2002 (i.e. 3 s gust, 10 m height, open country

	terrain nominal 50-year return period of 32 m/s and nominal 500-year return period of 40 m/s). The bidder shall supply evidence confirming the powerhouse meets this standard. e. The entrance door shall be solid and weatherproof and shall have a key locking system. The door shall open outwards. f. The powerhouse shall have suitable earthing connection and protection. g. The powerhouse shall provide sufficient environmental protection (IP rating, thermal loading, fire resistance, etc.) for all enclosed power system equipment to operate safely. h. The Supplier shall provide a warranty. i. The powerhouse shall be designed to prevent insects, rats and other pests from easily entering, using mesh and other prevention measures.
3.14 Signage and labelling	1. Safety signage and labelling of key components shall be provided and installed as per the PNG Power Electrical Trade Circular, AS/NZS 3000, AS/NZS 4509.1, AS/NZS 4509.2, AS/NZS 4777, and AS/NZS 5033. 2. Each and every item of switchgear and control equipment in switchboards shall be labelled. 3. Additional safety signage and labelling shall be provided and installed that will assist the ongoing maintenance and operation of the system. Signage shall include emergency contact details, including that of local police, firefighters, the bidder, and other relevant contacts. 4. All signs and labels shall be fit for purpose, made of durable materials and color coded as per the requirements of the relevant standards. Size of the signs and associated text heights shall be visible for purposes intended.
3.15 Critical spare parts, accessories and O&M tools	1. Critical spare parts, required accessories and required O&M tools shall be provided by the Supplier.
3.16 Design of Academy system for ease of expansion	1. The design of the Academy system shall allow for ease of expansion in the future from the initially installed minimum solar PV capacity of 96 kWp to 288 kWp and from the initially installed minimum BESS capacity of 145 kWh to 357 kWh – plus required additional inverter/charge controller capacity. 2. The initially installed distribution boards, wiring, protections, cable trays/conduit, trenching, balance of system components, and the powerhouse shall be sized to ensure minimal equipment and materials need to be replaced or changed when the system capacity is expanded to 288 kWp solar PV, 357 kWh BESS capacity and the required additional inverter/charge controller. 3. A second detailed design of the future expanded system shall be provided for the Academy system to verify that the system can be easily expanded. 4. The indicative roof locations to be used for the future expanded system are shown in Appendix G.
3.17 Replacement of Hospital fluorescent lights with LED lights and removal of old air-	1. Supply of 212 pieces of 4-foot 18W LED tube lights and 101 pieces of 2-foot 9W LED tube lights. 2. Removal of existing 212 x 4-foot 36 W fluorescent tube lights and installation of replacement equivalent 4-foot 18W LED tube lights. 3. Removal of existing 101 x 2-foot 18 W fluorescent tube lights and installation of replacement equivalent 2-foot 9W LED tube lights. 4. Disposal of all fluorescent lights in Port Moresby according to PNG laws.

conditioner units	Transport of waste from Balimo to Port Moresby will be provided by SDP. 5. Removal and disposal of the Hospital's fourteen (14) old Kelon brand air-conditioner units according to PNG laws. Transport of waste from Balimo to Port Moresby will be provided by SDP.
3.18 Connection of 10 Hospital staff houses to the Hospital grid	1. At the Hospital, there are 10 staff houses currently connected to the town grid that need to be connected to the Hospital grid. These 10 staff houses are south of the main Hospital buildings. Refer to **Figure 2**, **Figure 3**, **Figure 4** and **Figure 5** in Attachment F below for pole locations and numbers. 2. Removal of the tee-off connection at pole PP03, so the line PP01-PP02-PP03 is disconnected from the town grid. 3. Install a 100NB water pipe 9 m power pole at the location indicated at PP00. 4. Install a 25 mm2, Aluminium 3-phase ABC cable from Pole PP00 to Pole PP01. Pole must include a cross arm and necessary accessories as per PNG and Australian standards. 5. In the existing Hospital powerhouse, install a 50 A,3-phase circuit breaker in the existing switchboard in either the essential or nonessential board depending on a space availability. 6. Install a 25 mm2 orange circular 3-phase copper (OCC) cable from the distribution board in the powerhouse to PP00. Terminate the OCC cable to the ABC cable at PP00. If possible, extend the ABC cable from PP00 to the powerhouse roof for termination to the OCC. 7. Leave all connections to the houses from line PP01-PP02-PP03 as they are. 8. Re-check all connections to the line PP01-PP02-PP03 to ensure loads are equally distribution to the 3 phases.

Attachment F: Detailed Site Information – Balimo District Hospital

Information category	Details
Coordinates (latitude, longitude)	-8.038056, 142.959722
Location	Balimo District Hospital, Balimo Urban Local Level Government (LLG), Delta Fly District, Western Province
Dates of site assessment by USAID-PEP	• 13-17 May 2024
Hospital funding and operation	• Funded by Ok Tedi Mining Limited & the Evangelical Church of PNG through the OTML Tax Credit Scheme Program and implemented by the Regional Engineering Department of OTDF. • Operated by the Evangelical Church of PNG (ECPNG)
Hospital buildings and loads	• Building 1 – Admin building, Dental and Accidents & Emergency (A&E). Existing loads include Lights, ceiling fans, floor fans, fridges/freezers, desktop computers, laptops, water pump, electric jug, printer/scanner/photocopier, dental equipment and x-ray machine, autoclave, ultrasound scanner, suction machine, nebulizers, oxygen concentrator. Estimated electricity use: 55.5 kWh/day • Building 2 – Lab, X-ray, Pharmacy and Paediatrics Ward. Existing loads include lights, ceiling fans, floor fans, fridges/freezers, desktop computers, laptops, water pump, electric jug, autoclave, microscopes, smoke detectors, emergency lights/speakers, exhaust fans, centrifuges, electronic balance, blood analysers, water distillation unit, electronic water baths, lab equipment, GeneXpert equipment, X-ray equipment, hot water heaters, phone chargers. Estimated electricity: 79.7 kwh/day • Building 3 – Labour Ward, Antenatal Ward and Operation Theatre. Existing loads include lights, ceiling/table fans, suction pump, infant incubator, smoke detectors, emergency light/speakers, electric jug, hot water systems, x-ray viewer, oxygen concentrator, infant incubator, suction units, fridges, phone chargers, anesthetic machine, washing machine, dryer. Estimated electricity use: 38.3 kWh/day • Building 4 – General Ward and TB Ward. Existing loads include lights, ceiling fans, smoke detectors, emergency light/speakers, fridges, nebulizer, hot water systems, exhaust fan, phone chargers, oxygen concentrator. Estimated electricity use with energy efficient option: 15.8 kWh/day • Building 5 – Laundry, kitchen and drug storage. Existing loads include lights, ceiling fans, smoke detectors, emergency light/speakers, rice cookers, hot water system, urn, fridge, washing machine, dryer. Estimated electricity use: 14.9 kWh/day • Building 6 – Workshop and genset room. Existing loads include lights, ceiling fans, smoke detectors, emergency light/speakers, fridges, phone charger,

	exhaust fan, benchtop drill, air compressor, welding machine, angular grinder, circular saw, electric fuel pump. Estimated electricity use: 10.0 kWh/day • Building 7 – Mortuary. Existing loads include lights and freezers. Estimated electricity use: 34.4 kWh/day • Sewage and southern-cross tank loads. Existing loads include water and sewage pumps. Estimated electricity use: 6.8 kWh/day • Outside hospital lighting loads. Existing loads include lights. Estimated electricity use: 5.7 kWh/day
Staff houses and loads	• Eighteen (18) existing staff houses are on site with 8 already connected to the hospital grid and an additional 10 staff houses currently connected to the town grid to be connected to the hospital grid. • Each existing staff house has existing loads that include lights, phone chargers, fans, rice cookers, electric jugs, fridges, electric stoves. Estimated electricity use: 50.4 kWh/day
Total load	• The total daily energy demand for Balimo Hospital, including staff houses, is estimated to be 311 kWh/day.
PV and battery system installation locations	• The solar PV array is to be installed on the Balimo Hospital building roofs shown in ***Figure 7*** and ***Figure 8*** below. The hospital buildings are relatively new and the roof structural elements are made of steel. There is ample, unobstructed roof space available. • The electrical equipment (BESS, inverters, charge controllers, combiner/junction/distribution boards, control and monitoring devices) shall be installed in a safe manner within the existing powerhouse room within the workshop building, or adjacent workshop rooms within the workshop building – as shown in ***Figure 2*** and ***Figure 12*** below.
Existing power supply	• Currently there are four existing power supplies for the hospital being run through the main switchboard: o 80 kVA Kohler 3-phase diesel generator – in operation for 9 hours daily when fuel is available. Not operating at full capacity due to maintenance and fuel availability issues. o 2 x 113 kVA Cummins 3-phase diesel generator – both not in operation due to maintenance issues. o Town power supply – in operation daily from 6pm to 10pm when diesel fuel is available for the town's diesel generator, which is quite unpredictable. The hospital staff usually listen for when the town supply is on and when it is on, they manually switch over to the town supply using manual change over switches. • The cost of diesel fuel at Balimo Station was advised to be PGK 10 per litre, which is relatively expensive. The hospital administration advised that 200 L of diesel fuel typically lasts for 2-3 days. • The existing distribution grid of the hospital has a maximum circuit length of about 100 m for underground cables and 200 m for the aerial cables from the powerhouse to the staff houses. The distribution system

	connects all hospital buildings and the eight staff houses shown. An additional 10 staff houses are currently connected to the town grid and are not connected to the hospital grid. These 10 staff houses are south of the main hospital buildings and will need to be connected to the hospital grid.

Logistical access	• Balimo Station is approximately 600 km from Port Moresby via water transport. Ships can deliver materials and equipment from Port Moresby to Balimo via sea and up the Bumu and Aramia Rivers.
	• Balimo does not have a wharf but has two landing ramps; the use of which is seasonal depending on weather patterns (dry season can last for a year):
	  ○ The Balimo District Headquarters (DHQ) has a mud-filled landing ramp, which can be used during high tide for landing barges and small ships/boats. It is not suitable for large cargo ships. From the DHQ landing ramp, materials must be transported over 5 km to the Balimo Academy and less than 1 km to the Balimo Hospital.
	  ○ There is another landing ramp at Tai village that can be used during low tide and is suitable for large cargo ships. From Tai, cargo must be transported by truck over 9 km to the Balimo Academy and 13 km to Balimo Hospital. However, at Tai there are occasional issues with the landowners that might potentially affect the transportation of materials through there.
	• Some of the shipping services available that can freight materials from Port Moresby to Balimo are: KW shipping, Rosanna Shipping, RH Shipping, and Fly River Queen (used by PNG SDP). Shipping usually takes two days from Port Moresby to Balimo during fine weather.
	• A crane from the ship can be used to move materials to trucks owned by PNG SDP, PNG CR, New Century, or the shop owners of Niugini Pride and Silver Place, in order to transport materials to site. During long periods of rain, roads in and around Balimo are likely to be slippery and not traversable at certain locations.
	• The Balimo airstrip can also be used for logistics to and from Balimo Station. Tropic Air and MAF are the only airlines that have regular services to Balimo. Tropic Air has commercial flights from Port Moresby to Balimo every Tuesday and Thursday, as well as PNG SDP chartered flights every Monday and Friday. MAF also has flights from Hagen to Balimo through their own schedules. From Port Moresby, it takes approximately 2 hours to reach Balimo by plane, with a flight cost of about K2,000 one way.
	• Sea transportation options are available as follows:
	  ○ Transportation of large cargo from Port Moresby to Balimo is charged based on the cargo cubic meter (CBM) volume. KW Shipping, Rosanna Shipping and Fly River Queen usually do cargo runs twice a month but they can also be done upon request.
	  ○ Local dinghies travelling alone the riverine typically charge a ride fare of K250 per person for travel to and from surrounding villages less than 30 km away.

	• Land transportation options are available as follows:
	  ○ PNG CR will rent their vehicles and machines out. They charge about K300 per hour for a 6 tonne Isuzu truck. Their rental quote can be facilitated from their head office in Port Moresby.
	  ○ Eda Civil Works, who are working on upgrading and maintaining the Balimo airfield, and the shop owners of Niugini Pride and Silver Place within Balimo Station may also rent out trucks
	• Please note: Logistics/transportation, including transport of any labour, materials and construction equipment, will be provided by SDP. These costs are not to be included in the financial proposal.

Communications	• There is a Digicel tower nearby Balimo Station that can provide phone and internet services. It was working well during the site assessment. • Balimo Hospital has their own satellite internet Wi-Fi connection. This satellite internet connection can be utilised for the remote monitoring of the system once built.
Safety/Security	• Balimo Station is generally deemed to be safe.
Load profile	• The load profile was developed by identifying the electrical appliances used and to be used in the Hospital and existing staff houses, accounting for the replacement of all of the Hospital's fluorescent lights with LED lights and removal of old air-conditioner units at the hospital.

The layout and photos of Balimo Hospital facilities are provided on the following pages.

Balimo Hospital Estimated Load Profile	
Time (hour starting)	Demand (kWh)
0	8.2
1	7.6
2	7.6
3	7.8
4	7.9
5	8.8
6	16.9
7	8.5
8	16.4
9	20.1
10	28.3
11	19.3
12	15.6
13	17.4
14	18.7
15	14.6
16	15.4
17	7.5
18	14.4
19	13.0
20	12.4
21	9.2
22	7.8
23	7.8
Total Estimated Demand	311 kWh/day

***Figure 1**. Balimo Hospital estimated load profile*

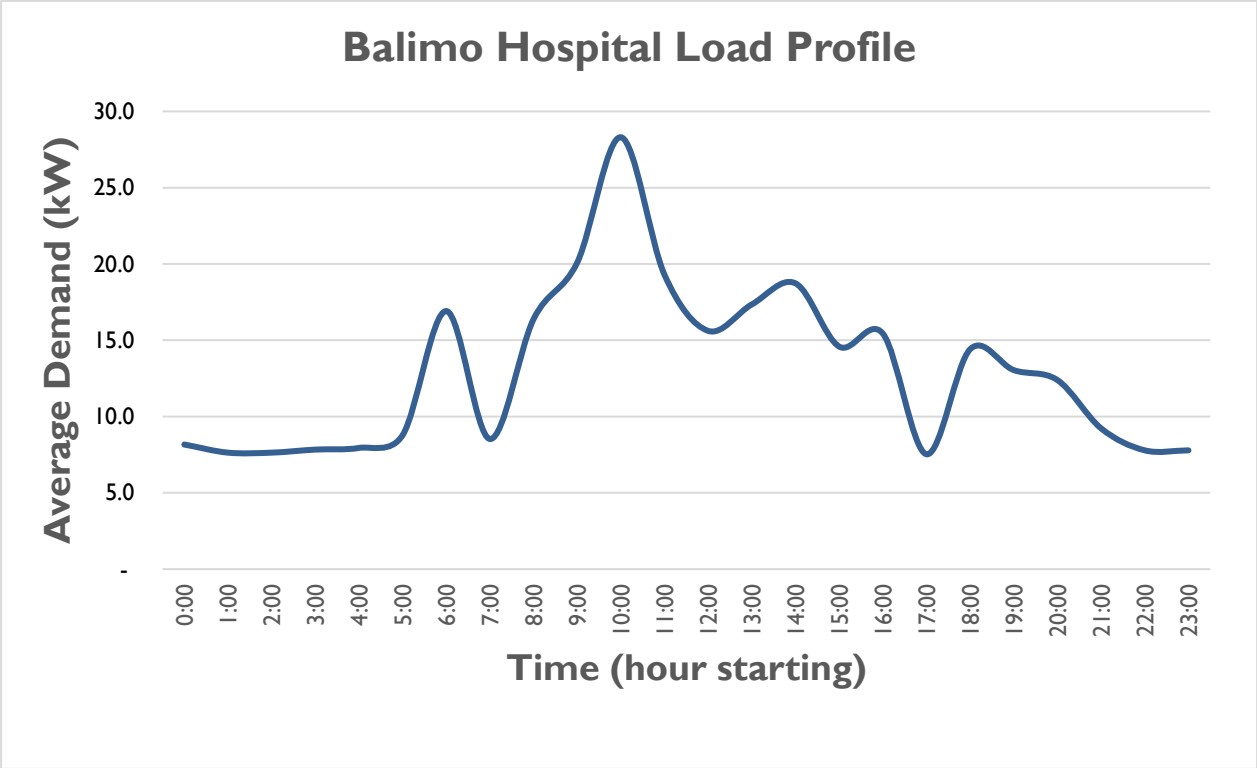

***Figure 2**. Balimo Hospital buildings (note: the staff houses on the right are currently connected to the town grid and not the Hospital grid)*

***Figure 3**. Balimo Hospital ten staff houses that are currently connected to the town grid and need to be connected to the Hospital grid*

***Figure 4**. Power poles currently connected to the town grid around the Hospital compound*

***Figure 5**. Power poles PP01, PP02 and PP03 that need to be disconnected from the town grid and connected to the Hospital grid*

***Figure 6**. The eight staff houses currently connected to the Hospital grid*

***Figure 7**. Available rooftops at the Balimo Hospital for solar PV array*

***Figure 8**. Indicative solar PV layout design for the Balimo Hospital system*

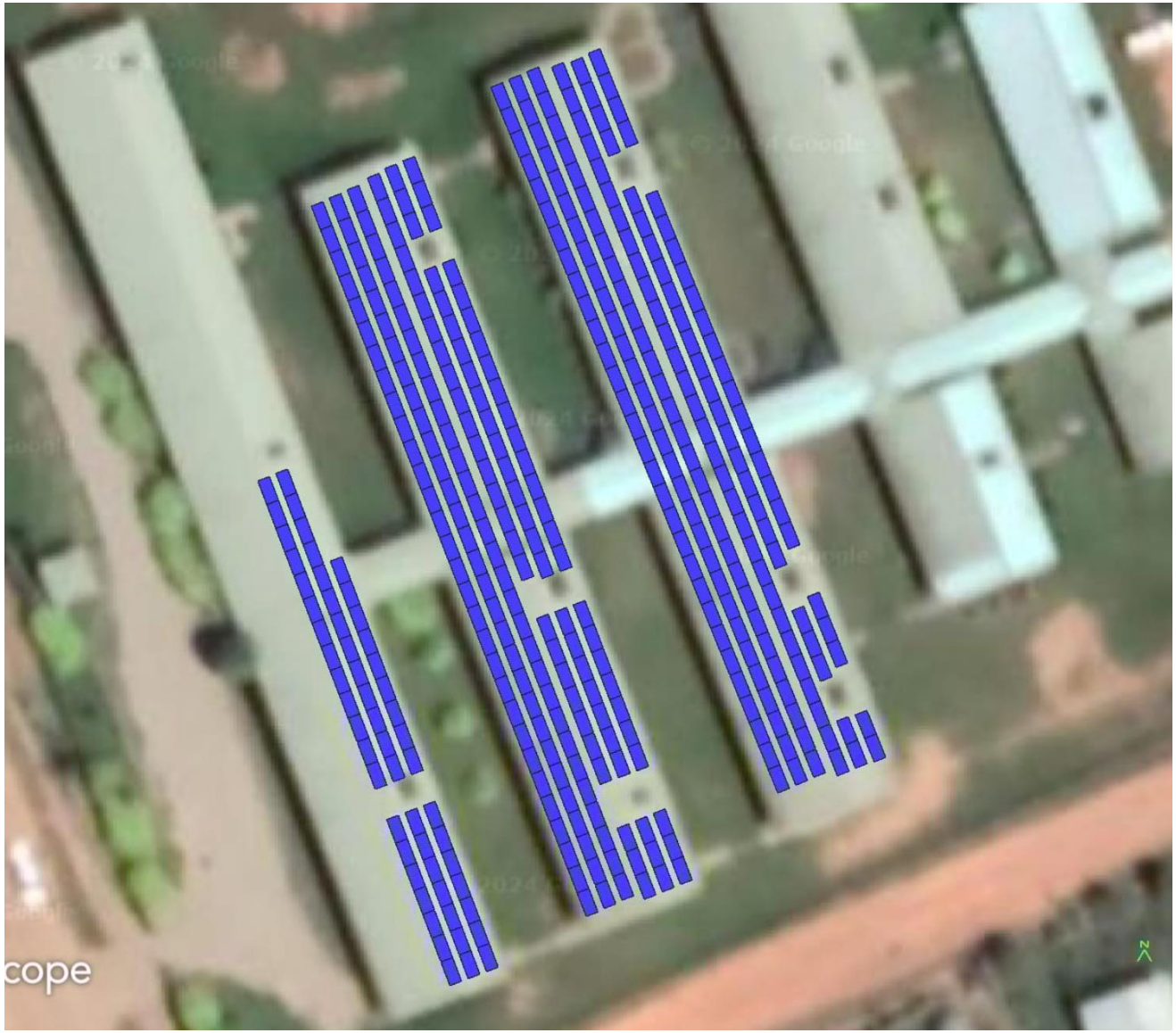

***Figure 9**. Left: Existing switchgear – manual changeover switches for four sources. Right: Hospital essential and non-essential mains distribution board*

***Figure 10**. Top: Existing 80 kVA Kohler generator. Bottom: Nameplate of existing 80 kVA Kohler generator*


Conforme à l'ISO8528 / In compliance with ISO8528
PLACA DEL FABRICANTE
KOHLER
POWER SYSTEMS
Type / Modelo / النموذج
KD88
Execution
Version / Version
IV
Masse (Kg)
Weight / Peso
1530
V
Hz
rpm
Cos Phi
Phase
415/240
50
1500
0.8
3
kVA
kW
A
Ambiance (°C)
Ambiant / Ambiante
Altitude (m)
Altura (m)
PRP
80
64
111
35
1000
ESP
88
70
122
27
1000
PRP
Puissance Principale / Prime Power / Potencia Prime
ESP
Service Secours / Emergency Standby Power / Potencia Emergencia
Année / Year
Ano
2019
Numéro de série / Serial Number
Número de serie / الرقم التسلسلي
19007370
KOHLER, WI 53044 U.S.A.
EHL
CE
dB(A)
1m
7m
50 Hz
79
67
60 Hz
PUISSANCE ACOUSTIQUE / SOUND POWER
POTENCIA ACUSTICA EC 2000/14
LWA
96
dB

***Figure 11**. Balimo Hospital existing switchgear powerhouse electrical schematic diagram*

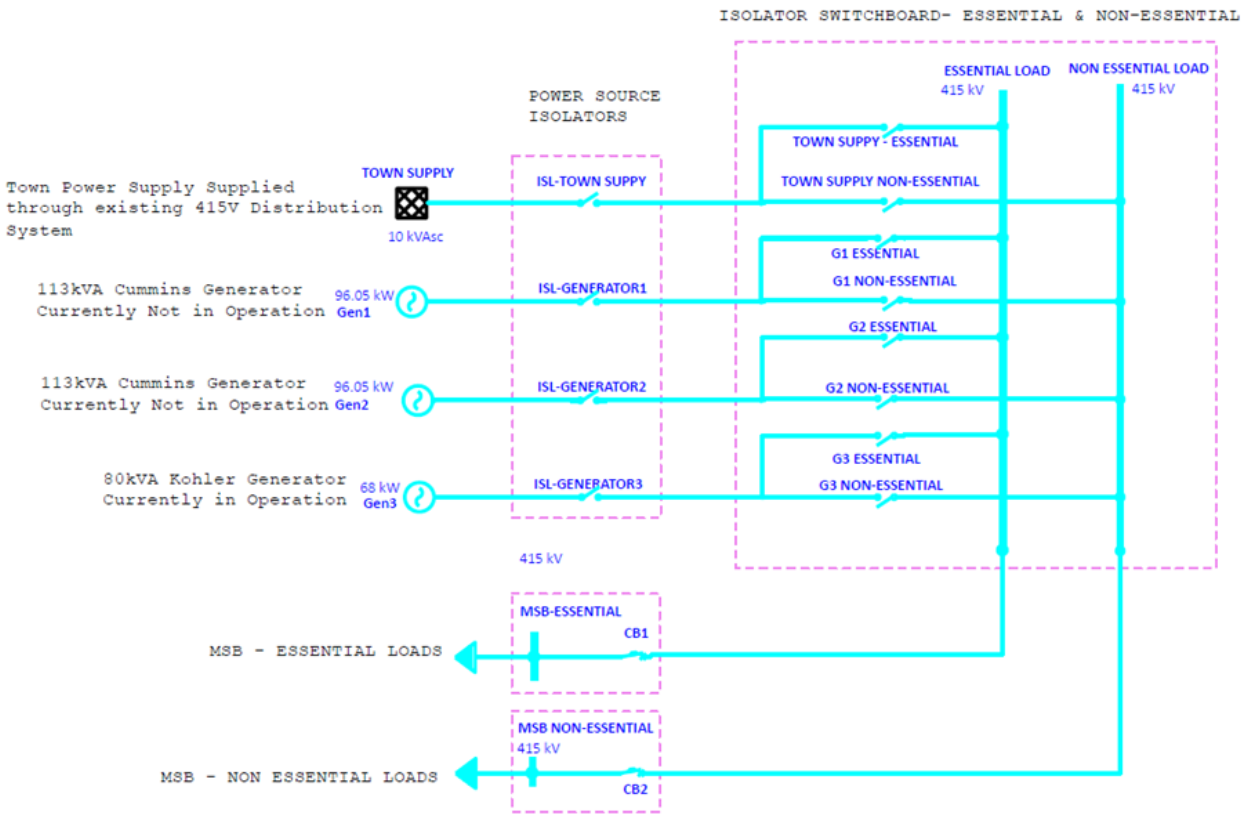

Figure 12. *Top left: Existing powerhouse room showing available space. Top right: Space available next to existing powerhouse room. Bottom: Another space within the workshop building that can potentially be used.*

Attachment G: Detailed Site Information – Balimo Academy

Information category	Details
Coordinates (latitude, longitude)	-8.0496825,142.9496878
Location	Hon. Roy Biyama Balimo Academy, Balimo Urban Local Level Government (LLG), Delta Fly District, Western Province
Dates of site assessment by USAID-PEP	• 13-17 May 2024 – USAID-PEP Mini-grid Team
Balimo Academy funding	• Funded by PNG SDP.
Balimo Academy buildings	• Classroom Building Blocks (elementary and primary) x 6. Existing loads include lights, ceiling fans, laptops, phone chargers, wi-fi router, smart TVs, water pump, security flood lights, electric jug. Estimated electricity use: 20.4 kWh/day • Classroom Building Blocks (elementary and primary) x 6. Existing loads include lights, ceiling fans, security floodlights. Estimated electricity use: 16.1 kWh/day • School Ablution Block. Existing loads include lights, exhaust fans. Estimated electricity use: 1.6 kWh/day • Girls' dormitory buildings (x 6). Existing loads include lights, ceiling fans, security flood lights, exhaust fans. Estimated electricity use: 25.8 kWh/day • Boys' dormitory buildings (x 6). Existing loads include lights, ceiling fans, security flood lights, exhaust fans. Estimated electricity use: 25.8 kWh/day • Dormitory ablution blocks (x 2). Existing loads include lights and water pumps. Estimated electricity use: 4.4 kWh/day • Mess building. Existing loads include lights, security floodlights, ceiling fans, water pump. Estimated electricity use: 11.2 kWh/day • A number of the buildings were still under construction during the site assessment dates. A new large kitchen and 15 air conditioners are planned to be installed in the new buildings. A future expansion of the solar PV and BESS system will be required to cater to these new loads.
Staff houses and loads	• Staff houses (x 6). Existing loads include lights, ceiling fans, fridge, washing machine. Estimated electricity use: 21.6 kWh/day • Four of the staff houses were still under construction during the site assessment dates.
Total load	• The total daily energy demand for Balimo Academy, including staff houses, is estimated to be 126.9 kWh.
PV and battery system installation and future	• The 96 kWp solar PV array is to be installed on the classroom blocks 04, 05 and 06 as shown in ***Figure 15*** and ***Figure 21*** below.

expansion locations	• A new powerhouse building is to be installed in the location indicated in ***Figure 15*** and ***Figure 21*** below. The powerhouse will to house the electrical equipment (BESS, inverters, charge controllers, combiner/junction/distribution boards, control and monitoring devices). The powerhouse is to be built on a concrete floor and have a metallic roof and walls. A secured door shall be installed, as well as forced ventilation to avoid high temperatures in the powerhouse. • The indicative layout of the future expanded 288 kWp solar PV system is shown in ***Figure 24*** below.
Existing power supply	• Currently, the Balimo Academy utilises a temporary 33 kVA FG Wilson 3-phase diesel generator that exclusively powers the currently operational classrooms through an existing distribution grid at the Academy. The genset runs daily from 6am to 10pm when diesel fuel is available. There is no main distribution board or powerhouse. Rather, each classroom building is connected to the distribution grid through aerial cables, which directly feed into individual sub-distribution boards within each classroom building.
Logistical access	• The logistical access is the same as that for Balimo Hospital, as per the logistical access details given in Attachment F.
Communications	• There is a Digicel tower nearby Balimo Station that can provide phone and internet services. It was working well during the site assessment. • PNG SDP have a satellite internet Wi-Fi connection that can be used at the Balimo Academy. This satellite internet connection can be utilised for the remote monitoring of the system once built.
Safety/Security	• Balimo Station is generally deemed to be safe.
Load profile	• The load profile was developed by identifying the electrical appliances used and to be used in the existing staff houses and Balimo Academy. These were used to build an hour-by-hour load profile. Some of the appliance usage are estimated because a number of the buildings were still under construction during the site assessment dates.

The layout and photos of Balimo Academy facilities are provided on the following pages.

Balimo Academy Estimated Load Profile	
Time (hour starting)	Demand (kWh)
0	3.5
1	3.5
2	3.5
3	3.5
4	3.8
5	7.5
6	4.8
7	1.3
8	2.4
9	1.9
10	4.1
11	4.0
12	4.7
13	4.3
14	3.4
15	1.1
16	1.2
17	5.0
18	9.6
19	17.8
20	16.8
21	12.4
22	3.5
23	3.5
Total Estimated Demand	127 kWh/day

Figure 13. *Balimo Academy estimated load profile*

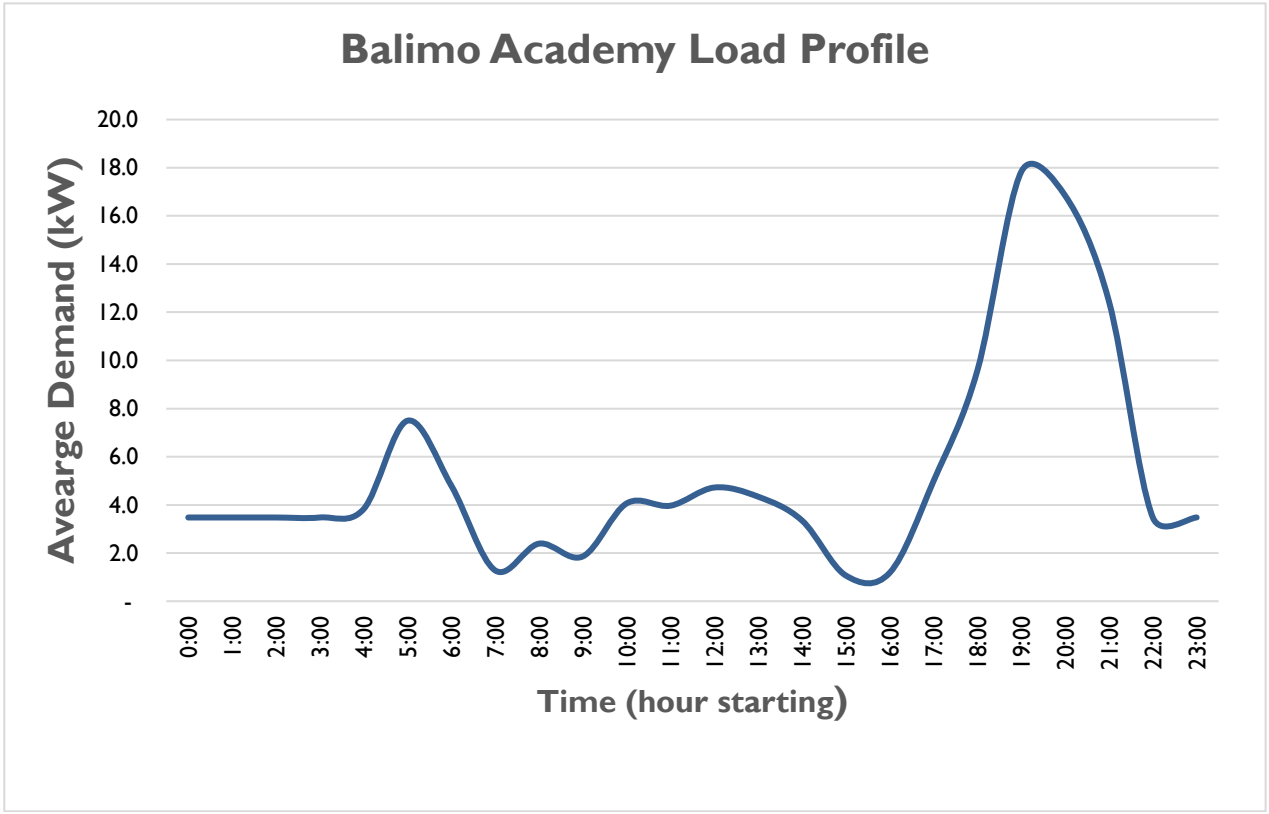

***Figure 14**. Balimo Academy site overview within the PNG SDP Balimo Hub*

***Figure 15**. Balimo Academy classrooms and location of the powerhouse to be built*

Figure 16. *Balimo Academy dormitories and staff houses*

Figure 17. *Existing and planned distribution grid towards north side of Balimo Academy*

Figure 18. *Existing distribution reticulation towards west side of Balimo Academy*

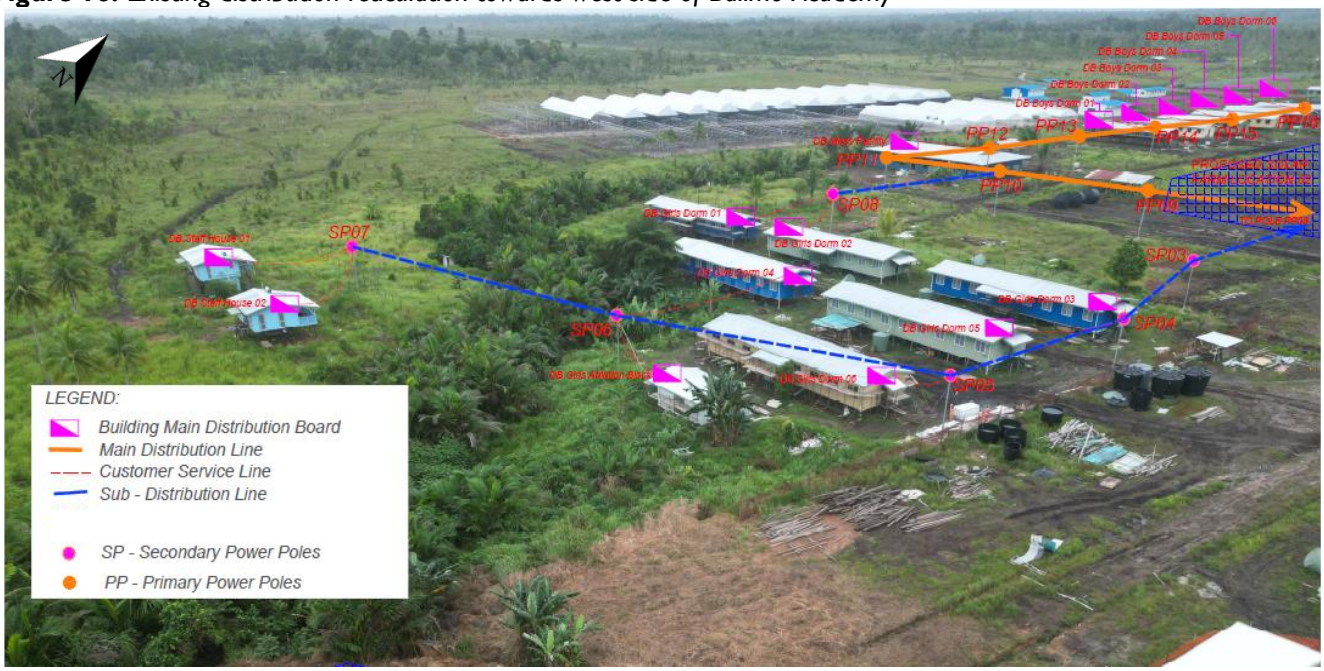

Figure 19. *Balimo Academy existing electrical distribution single line diagram*

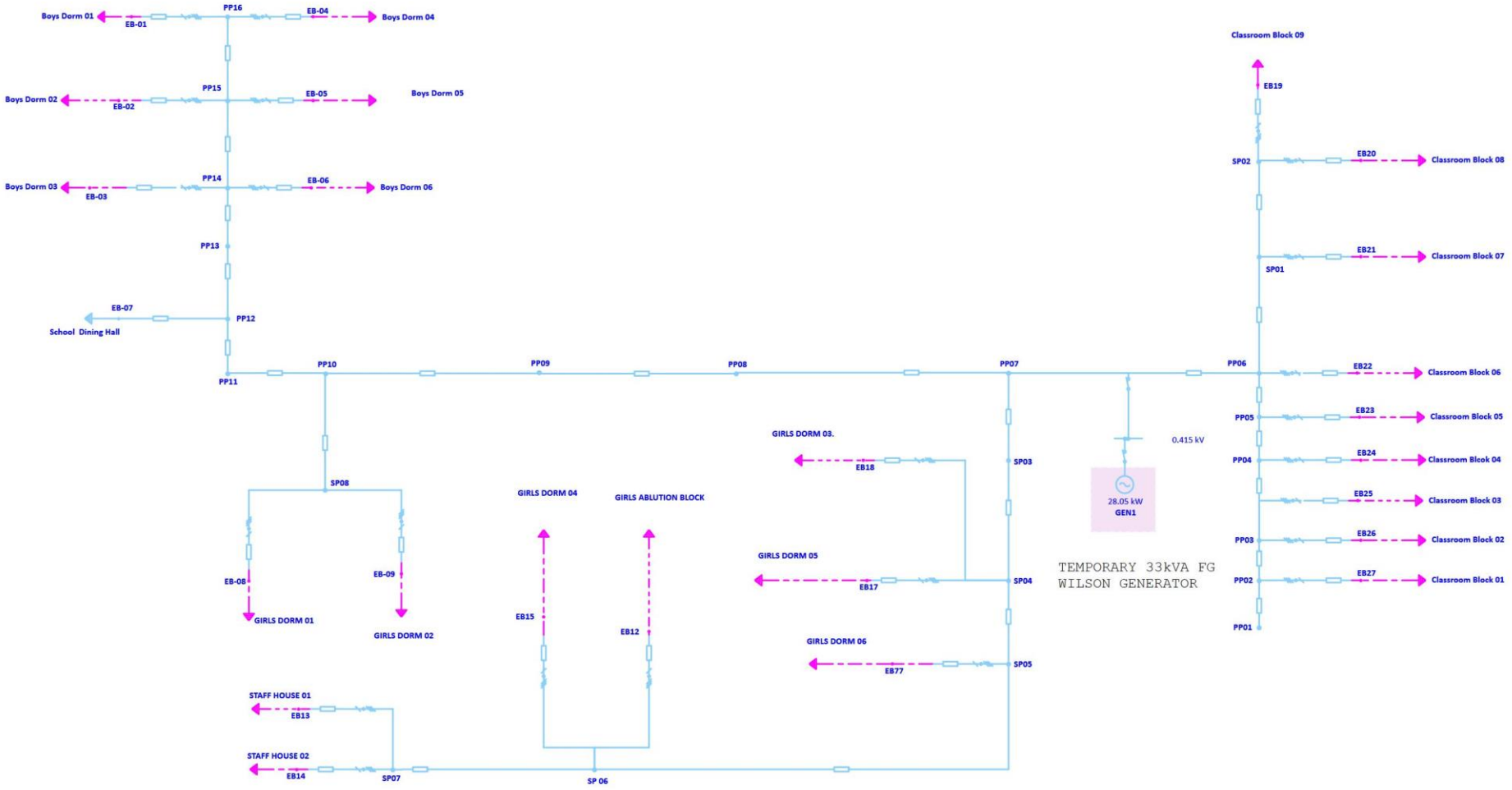

Figure 20. *System layout proposed for the Balimo Academy system*

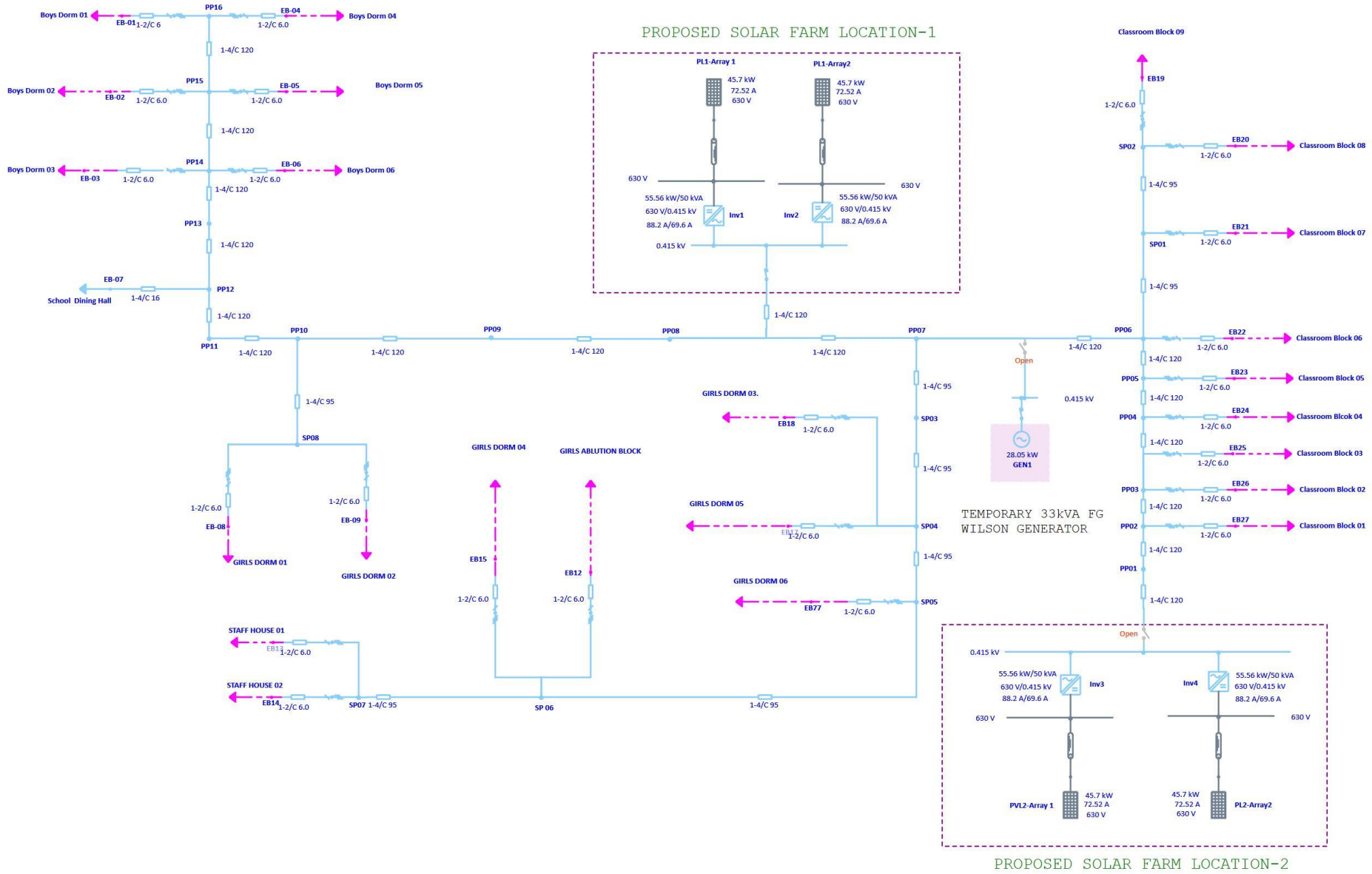

Figure 21. *Indicative 96 kWp solar PV layout design on the classroom blocks 04, 05 and 06 and location where the powerhouse is to be installed*

***Figure 22**. Existing Temporary 33 kVA FG Wilson Generator*

***Figure 23**. Nameplate of existing temporary 33 kVA FG Wilson Generator*

***Figure 24**. Indicative solar PV layout design of the future expanded 288 kWp system*

Attachment H: 937 Geographic Code Countries

Countries included in the 937 Geographic Code per ADS 310 (310maa_020612):

Afghanistan	Gambia, The	Myanmar
Bangladesh	Guinea	Nepal
Benin	Guinea-Bisau	Niger
Burkina Faso	Haiti	Rwanda
Burundi	Kenya	Sierra Leone
Cambodia	Korea, Dem Rep.	Somalia
Central African Republic	Kyrgyz Republic	Tajikistan
Chad	Liberia	Tanzania
Comoros	Madagascar	Togo
Congo, Dem. Rep	Malawi	Uganda
Eritrea	Mali	Zimbabwe
Ethiopia	Mozambique	
Angola	India	São Tomé and Principe
Armenia	Iraq	Senegal
Belize	Kiribati	Solomon Islands
Bhutan	Kosovo	Sri Lanka
Bolivia	Lao PDR	Sudan
Cameroon	Lesotho	Swaziland
Cape Verde	Marshall Islands	Syrian Arab Republic
Congo, Rep	Mauritania	Timor- Leste

Côte d'Ivoire	Micronesia, Fed. Sts.	Tonga
Djibouti	Moldova	Turkmenistan
Egypt, Arab Rep.	Mongolia	Tuvalu
El Salvador	Morocco	Ukraine
Fiji	Nicaragua	Uzbekistan
Georgia	Nigeria	Vanuatu
Ghana	Pakistan	Vietnam
Guatemala	Papua New Guinea	West Bank and Gaza
Guyana	Paraguay	Yemen, Rep.
Honduras	Philippines	Zambia
Indonesia	Samoa	