

Terms of Reference (ToR)

Solarization of GeneXpert Sites – Liberia

Project Title	Provision and Installation of Solar Power Systems at GeneXpert Sites in Liberia
Implementing Agency	Plan International Liberia, Principal Recipient under GFTAM Grant
Partner Institution	National Diagnostics Division (NDD)
Duration	Three Months
Start Date	June 2025

1. Background

The GeneXpert® platform, developed by Cepheid, is a critical molecular diagnostic tool for the rapid and accurate detection of infectious diseases including TB, rifampicin-resistant TB, HIV, and COVID-19. In Liberia, 28 health facilities host GeneXpert machines as part of the national disease surveillance and diagnostic network.

However, Liberia faces significant energy challenges, with less than 20% of the population having access to reliable public electricity. This hinders the consistent operation of diagnostic equipment. Solar energy offers a cost-effective, sustainable, and independent power source essential for maintaining uninterrupted diagnostic services.

To mitigate power-related diagnostic disruptions, Plan International Liberia, in collaboration with NDD, will support the solarization of 14 high and medium load GeneXpert sites across nine counties.

2. Purpose and Objectives

The objective of this engagement is to ensure reliable and continuous power supply to critical GeneXpert platforms by installing solar power systems at targeted health facilities. This intervention will:

- Reduce downtime due to power outages
- Improve diagnostic throughput and efficiency
- Contribute to Liberia's broader health infrastructure solarization strategy
- Initiative to protect environment through sustainable energy

3. Scope of Work

The selected service provider will be responsible for:

- Designing, supplying, and installing solar PV systems (5 kVA, 10 kVA, and 15 kVA based on site load) Refer to the table.
- Integrating systems with existing power infrastructure (grid/generators)
- Training local staff on operations and maintenance
- Providing documentation, warranty, and remote monitoring tools

4. Technical Specifications

System Size	5 kVA System	10 kVA System	15 kVA System	Warranty
Hybrid Inverter	Inverter Power Output: 5000 VA (4000 W continuous at 25°C) Battery Voltage: 48 V DC AC Input Voltage: 187–265 V AC AC Output Voltage: 230 V AC ±2% Charger Current: 70 A Transfer Switch: 50 A Protection Rating: IP21 Cooling: Fan-assisted	Inverter Continuous Output Power: 10,000 VA / 8,000 W Battery Voltage: 48 V DC AC Input Voltage Range: 187–265 V AC AC Output Voltage: 230 V AC ±2% AC Output Frequency: 50 Hz or 60 Hz Charger Current: 140 A Transfer Switch Rating: 100 A Protection Rating: IP22 Operating Temperature Range: -40°C to +65°C	Inverter Continuous Output Power: 15,000 VA / 12,000 W Peak Power: 27,000 W Battery Voltage: 48 V DC AC Input Voltage Range: 187–265 V AC AC Output Voltage: 230 V AC ±2% AC Output Frequency: 50 Hz or 60 Hz Charger Current: 200 A Transfer Switch Rating: 100 A Protection Rating: IP22 Operating Temperature Range: -40°C to +60°C	5 Yrs
Solar PV Array	Power Output: 555–575 W; Module Efficiency: Up to 21.48%; Cell Type: N-Type Monocrystalline; Cell Configuration: 144 (6×24) Half-Cells; Front Glass: 3.2 mm tempered glass with anti-reflection coating; Frame: Anodized aluminum alloy; Junction Box: IP68 rated; Cables: 4 mm ² , length customizable			25-30 Yrs
	Qty: 15	Qty: 28	Qty: 42	

Battery Bank	Nominal Voltage: 51.2V; Nominal Capacity: 106Ah; Energy Capacity: 5.4kWh; Usable Capacity: Approximately 4.86kWh (based on 90% Depth of Discharge); Battery Chemistry: Lithium Iron Phosphate (LiFePO ₄); Cycle Life: Up to 6,000 cycles at 80% Depth of Discharge			5-year linear performance warranty 10 Years lifespan (25°C)
	Units: 2	Units: 4	Units: 6	
Charge Controller	MPPT 250/100 VE.Can			
	Units: 2	Units: 4	Units: 4	

5. Site List and Energy Requirements

Facility	County	Peak Load (kVA)	Day Energy (kWh)	Night Energy (kWh)	System Size
Charles B. Dunbar Hospital	Bong	4.15	25.63	12.51	5 kVA
Rally Time Hospital	Grand Kru	4.41	19.44	13.15	5 kVA
Sr. Barbara Ann HC	Montserrado	4.75	30.26	20.52	5 kVA
G.W. Harley Hospital	Nimba	--	--	--	15 kVA
NACP Molecular Lab	Montserrado	14.68	114.92	69.04	15 kVA
Liberia Government Hospital	Bomi	7.15	48.39	19.16	10 kVA
Phebe Hospital (OPD)	Bong	5.65	37.63	17.01	10 kVA
Sinjeh CHC	Grand Cape Mount	5.83	26.59	17.23	10 kVA
Martha Tubman Mem Hosp	Grand Gedeh	7.30	34.12	21.31	10 kVA
Kolahun Hospital	Lofa	7.14	35.35	21.17	10 kVA
J.J. Dossen Hospital	Maryland	7.43	47.14	18.74	10 kVA
Pleebo Health Center	Maryland	6.74	42.26	27.60	10 kVA
Redemption Hospital	Montserrado	7.60	36.28	20.20	10 kVA
TB Annex	Montserrado	7.66	53.61	25.88	10 kVA

6. Key Deliverables

Deliverable 1:

- a. Detailed Planned Schedule of works.
- b. Detailed site assessment report, including:
 - i. Identification for components' location(s)
 - ii. Photo documentation and assessment of any shading objects
 - iii. Selection of a suitable mounting system
- c. Design sizing and documentation, including (where applicable):
 - i. Site specific layout of the solar array
 - ii. Appropriate sizing in piping lengths and sections for the entire installation
 - iii. Shop Drawings (e.g., single line diagram, wiring layout including distances; protections; components etc.)
- d. A description of the proposed performance and acceptance testing procedure that will be undertaken during commissioning phase.
- e. A letter certifying the compliance with requirements on warranties, spare parts for 2-3 years and standards, etc.
- f. The PV modules will be roof-mounted, supplier will take responsibility for structural integrity.

Deliverable 2:

- a. Complete solar system installation (PV array, inverter, batteries, controllers)
- b. Performance testing and acceptance
- c. Commissioning reports signed by health facilities or NDD/PIL official

Deliverable 3:

- a. Formal signed User Acceptance Test (UAT) and Commissioning of the Solar PV system, etc. Report shall be approved by the Health Facilities and NDD officials
- b. Submission of final Technical Report, inclusive of:
 - i. As-built drawings
 - ii. Technical description of the final solution
 - iii. Testing/Commissioning report (inclusive of final testing and values)
 - iv. Datasheets
 - v. Static verification of mounting structure (if applicable)
 - vi. Warranty certification/documentation for the main components
 - vii. Submission of photos, videos and visual material of the final system installed

- c. Training on Operation and Maintenance (O&M) of the installed equipment for the beneficiaries' representatives (end users and beneficiaries' staff maintenance crews) and provision of training materials and O&M manuals. Inclusive of:
 - i. Basics on the Solar PV system commissioned (components and operation)
 - ii. Basic shutting-down procedures (in case it is necessary)
 - iii. Operation and Maintenance of the solar PV system (for future hand-over after maintenance period)
 - iv. Integration with gensets (where applicable)
 - v. All basic issues that might occur and the relevant troubleshooting.
 - vi. A special focus should be on using the online monitoring system and troubleshooting of basic errors and problems that occur frequently.
- d. Signaling labelling:
 - i. All components shall be labelled in English.
 - ii. Signs or labelling warning about safety hazards, e.g. smoking, water contact, etc.
 - iii. Emergency shutdown procedures (visual information) shall be provided.
 - iv. Panel with up keeping and operating instructions for the beneficiary shall be installed.

Deliverable 4:

- a. Integration of remote monitoring tools
- b. Defect liability and post-installation support (12 months)
- c. Final report for commissioning and installation of solarization system in all 14 sites with pictures

7. Timeline

Phase	Duration
Contract Signing & Mobilization	Week 1
Site Assessment & Design	Week 2
Procurement & Delivery	Weeks 3–4
Installation & Commissioning	Weeks 5–8
Training & Handover	Weeks 9–11
Final Reporting	Week 12

8. Payment Schedule

Milestone	Payment (%)
Contract Signing	30%
Equipment Delivery & Installation	30%
Commissioning & Training	30%
Final Documentation & Handover	10%

9. Qualification Criteria

- Minimum 5 years of experience in solar PV installations
- Proven work on health infrastructure projects in low-resource settings
- Licensed engineer/electrical contractor in Liberia
- Demonstrated capacity to mobilize within 2 weeks
- References from at least 3 similar projects

10. Project Oversight

The contract will be managed jointly by the National Diagnostics Division, Ministry of Health and Plan International Liberia, with oversight provided by the Senior Supply Chain Manager and Civil Engineer at PIL.