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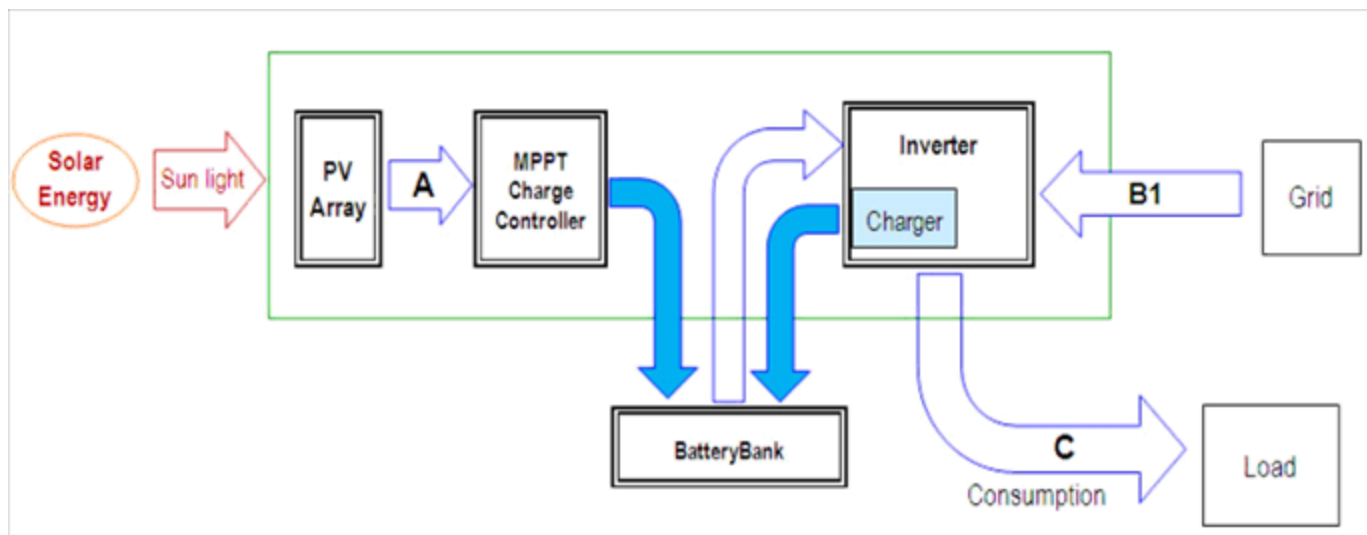
UNITED NATIONS DEVELOPMENT PROGRAMME

Technical Specifications

Programme Title: Right to Education in the Gaza Strip

PAL10- 00094739- LOT 13D & 14B

Design, Supply, Install and operate 10.4 kWp Hybrid PV solar system for IUG administration building



System limitations

System limitations	
System Location	IUG administration building
System demand energy	55 kWh/day
System PV size at STC not less than	10.4 KWp
Roof area required not less than	150 m ²
PV modules location	Roof mounted
Battery Bank installed energy not less than	110 kWh C@10
Allowable average daily DOD not more than	50%
Room area required for equipment not less than	30 m ²

Technical specifications:

- All Electrical works includes all necessary equipment's, materials, accessories and workmanship for installation and operation as per specifications and engineer instructions.
- Single Line Diagram (SLD) for PV system must be submitted.
 - On-site training including (operating and troubleshooting problems) for the consumer .

Solar module (Item 1.22):

The item Includes supply, install &connect the following:

- PVC ducts with clamps, accessories, supports & labels suitable to be installed under the PV arrays.
- Solar DC cables appropriately sized to connect the PV solar cells together and to combiner box then to the inverter to have a complete operational circuit with all conduits, clamps, trays and cable end terminations which shall be DC plug and socket connectors as per specifications . The DC cables must be sized in accordance with the installation requirements applicable on site, the allowable voltage drop for DC cables between PV Arrays and inverter less than 1%.
- Hot galvanized cable trays appropriately sized, Ventilated or Perforated type with cover for outdoor use to protect the DC cables from the PV cells to the battery room and inside the room and also AC cables for the system, complete with all needed clamps, accessories, screws, labels to complete the job.

Solar module Specs: -

- From Top 10 , Tier 1 module list in Q1, 2016 .
- 325Wp Polycrystalline silicon Photovoltaic module.
- PV module with high efficiency not less than 16% under STC.
- PV panel must have warranted Tolerance: $\pm 5\%$.
- Front glass must be made of high transmission tempered glass with anti-reflective (AR) coating.
- PV module frame made from Anodized aluminum alloy type 6063.
- Module junction box is IP-65 rated with 3 Bypass diodes.
- Maximum system voltage DC 1000V.
- Strong mechanical resistance which could be capable of taking the pressure of 550kg/m² (5400Pa).
- Class A - Application Classification

- Holds high PTC rate not less than 90%
- Guaranteed for impact resistance and class C fire rating.
- Guaranteed Power output: 90% of its nominal power rating for first 15 years. 80% of its nominal power rating for first 25 years.
- Certified with CE, IEC61215, UL 1703 and TUV1730.
- Holds Anti PID certificate
- 10 years product warranty for material and workmanship defects.`
- Each PV module must be labeled with the following parameters under STC:

(P_{max}, V_{oc}, V_{mp}, I_{sc} and I_{mp}), fire rating class.

- **Notes:**
- The modules frame must be grounded with **10mm²** wire.
- Panels must be faced to the true south with at least 30 degrees tilt angle.
- All solar panels must be cleaned before submission.

Wires and connectors Specs: -

- PV / DC cables must be of type FG21M21 double insulator flexible conductor core
- Voltage drop must be less than 1% between PV combiner and inverter input.
- Connectors must be typical MC4 PV connector (no cut of PV cable).
- Compatible with system rated AC and DC current and voltage.
- Certified by UL4703/ UL854 / TÜV.
- Wires jacket shall be flame retardant, halogen free, e-beam cross linked, UV-resistant
- Wires must be fixed on cable trays
- Wires between PV arrays and other system components (inverter, junction box, etc.) must protected by **UV PVC** tubes or ducts.
- Note : When installing plugs to the ends of wires, it must use heat shrink tubes instead of commercial tape.

water spray pump (Item 1.23):-

- A water spray pump of 1.8kW and 110bar must be provided for panels washing with auto stop function. including all required protection, power & control cables inside pvc pipes from the nearest DB, and all required water pipes and connections from the nearest source in order to operate the pump with auto stop function with all needed connections, piping and required materials for the water system from the source to the pump.

PV steel structure (Item 1.24):

The item Includes supply, install & test the following:

- Grounding system for PV Support structure which includes a separate grounding wire with 16mm² cross section from PV panels to the PV combiner box and at least 50mm² wire to from combiner to the ground with supply , install complete suitable electrodes and manholes , PVC pipes and duct and all workmanship and materials required to complete the job .(The earth resistance should not exceed 2 ohm).
- Supply, install & casting concrete foundations B250 (30*30*10) cm at least for each leg, the structure profile includes bracing and double hot galvanized angles for dividers.
- The mounting structures and the foundations must be designed structurally to be suitable to withstand all static loads (weight of modules, wind loads etc) that might occur according to the Site conditions. The mounting structure components are bonded together to guaranty potential equalization.

Specifications for the structure components as follows:

- Hot galvanized steel with angle shape at least 4cm*4cm*3mm, steel profile 4cm*4cm*3mm & 6cm*4cm*2mm
- PV Panels and grounding points must be installed with stainless steel screws, nuts and lock washers.
- Life span must be over 20 Years.
- Structure for PV modules must be faced to the true south with at least 30 degrees tilt angle
- Inter-row spacing must be at least double the height of the first row.
- 2 cm spacing must be left between PV panels.
- Accept wind speed over 110 km/h
- Must install the rack mount in a steel base 20cm*20cm*3mm for each leg.
- The full system must include safety corridors for maintenance and PV panels cleaning.

Note: PV distribution on the roof must be submitted

PV combiner box (Item 1.25):

- Aluminum Enclosure - lockable PV combiner for 1000VDC applications
- Outdoor rain resistant enclosure (Water proof IP65).

- Mounting on the back of supporting rack installation.
- Includes DC protection double pole 1000VDC OCPD on input
- Includes DC surge arrestors for 1000VDC applications

All junction boxes must be labeled as :

" PV Array DC Junction Box contains live parts during daylight "

System Batteries (Item1.26):

The item Includes supply, install & connect the followings:

- Battery Banks complete Original rack from the same manufacturer of the batteries with dividers and all needed accessories to finish the job. the rack must be enough to carry all the weight of the required batteries for the system.
- DC cables between the batteries together and to the battery fuse box to have a complete operational circuit with all required materials and workmanship to complete the work. the allowable voltage drop must be less than 1% as per the below specifications.
 - Battery inter connecting and output wires must be **95mm²**
 - Battery bank must be negative grounded with at least **95mm²** wire

The specifications of the battery banks as follows:

- 2V/1150Ah @ C10 , 1.8Vpc tubular gel Deep Cycle industrial battery
- Storage capacity must be Not less than **110 kWh @ C10**
- Original Battery rack and connectors must be included
- Compliant with IEC61427 requirements for photovoltaic energy systems
- Tested according to IEC60896-21 and fully compliant with IEC60896-22 requirements for valve regulated batteries
- Full conformity to DIN40742 specifications for OPzV cells and DIN40744 for OPzV blocks
- Compliant with the safety requirements of EN50272-2 for stationary batteries
- Battery efficiency must not be less than 90 %.
- Float life time from 18-20 years at 20°C.
- Allowable average DOD not more than 50%
- Must be designed and offer up to 3000 cycle @ 50% DOD (20°C)
- Container must be made from ABS ((Acrylonitrile Butadiene Styrene) Material
- The battery bank must be protected by DC fuses (double pole) with All Communication and control cables
- The manufacturing date shall be at most 6 months before the project operation.

Hybrid inverter (Item 1.27):

The item Includes supply, install & connect DC and AC cables appropriately sized in accordance with the installation requirements to connect the AC & DC Connections to operate complete system.

Hybrid inverter specifications:

- Voltronic Power InfiniSolar 3Ph 10kWh Hybrid Inverter or equivalent
- 3-phase in/3-phase out
- Rated Output Power 10000W
- Pure sine wave output
- Self-consumption and Feed-in to the grid
- Programmable supply priority for PV, Battery or Grid
- User-adjustable battery charging current suits different types of batteries
- Programmable multiple operation modes:
 - Grid-tie
 - off-grid
 - grid-tie with backup
- Built-in timer for various mode of on/off operation
- Multiple communication for USB, RS-232, Modbus and SNMP
- Monitoring software for real-time status display and control
- Parallel operation up to 6 units
- Parallel kit must be included
- SNMP card must be included
- Voltage drop must be less than 1% between grid inverter and load.
- All DC and AC Wires and cables to connect the inverter with other components of the solar system (inverter, combiner boxes, battery banks combiner box,, etc.) must protected by UV PVC tubes or ducts or hot galvanized cable trays as per the engineer instructions .

AC and DC Protections: (Item 1.28):

Note : All protections must be ABB brand or equivalent

_ DC side Protections: -

- ***Supply, install and operate 48VDC combiner box to protect the batteries including the following:***
 - 1500A DC busbars and OCPD with appropriate size and characteristics according to international standards.

- Double poles DC LTLs with DC fuses with suitable sizes to the capacity of the battery banks system with all accessories and DC cables.
- Supply, install a separate grounding system for the negative busbar includes all required copper electrodes, clamps, manholes, PVC conduits, copper earth cables with size not less than 70mm² and accessories to complete the job.(the earth resistance should not exceed 2 ohm).

- AC side Protections: -

- Supply, install 400VAC protected loads panel the panel made of galvanized steel sheet and frame 2mm thick, painted with anti-static primer paint and 2coats of final polyester paint, the panel includes all needed cu bus bars of adequate sizes and all other accessories and civil works that may needed to complete the job and hand over in operable conditions trenches, power and control wires, terminals bus bars neutral bus bar, earthing bus bar ducts, supports, labels and numbers and all necessary accessories to complete the work.
- with all required AC bus bars AC power cables, conduits, cable trays, protections including MCCB, MCB, RCD, SPD and all other material needed to have a complete job ready for protected load powering according to approved shop drawing by the engineer.
- The contractor should submit technical drawing and SLD for AC circuit.
- The protected loads panel shall have 30% extra space for future extension.

Specifications for the following components:

Over current protection devices (OCPD) :

- Must be Double pole protection
- Must be designed for PV systems , also each fuse must be in fuse holder for easy to replace (Touch-safe Fuse holder).
- IEC60269-6 and UL2579 certified.
- IP20 Finger-Safe Holder with Indication

AC/DC MCCB Circuit breakers :

- Mounting on DIN top hat rail EN 60715
- IP20 or IP40 Protection category
- Resistance to vibration according to IEC 60068-2-6;EN 61373
- Covers all common PV system voltages and currents
- High ambient temperatures

DC Surge arrestors for PV :

- Must be Double pole protection 1000VDC , 40kA
- UL1449 and IEC 60364-7-712 certified.
- Must include Visual Status Indication.
- Short-Circuit Interruption (SCI) over current Protection.

- <25ns Response Time [tA]
- IP20 Degree of Protection
- **Note: All MCCB, MCB and RCD must be double pole**

AC Surge arrestors:

- Class II, Non-combination Arrestor, 40kA, Three phase 400VAC TT system, Pluggable with Standards: IEC61643-1:2005; EN61643-11:2007 and CE, TUV, KEMA certified.
- Must be installed for both AC input & output of the inverter
-

MTS for input line

- 63A - 3phsae 4-pole MTS must be installed for emergency and maintenance
- The output of the inverters must be overload protected by single phase 9A thermal overload between each phase and neutral.

Three Phase Monitor Relay

- Over-/under voltage monitoring
- Over-/under frequency monitoring
- Phase failure detection
- Phase unbalance monitoring
- Phase sequence monitoring
- TRMS measuring principle
- Easy Connect Technology with push-in terminals

Thermal overload :

- The output of the system must be protected by three single phase thermal overloads, between every phase line and neutral rated 9A @ 230v .
- Manual control / short-circuit current and overload protection
- Adjustable current setting for overload protection and magnetic trip indication
- Disconnection function
- Temperature compensation

Programmable time switch for Air Condition operating intervals:

- Counting range : 15m...24h
- Output type : SPDT
- Output electrical parameters : 250VAC/16A
- Supply voltage : 110...230V AC
- Counter operation modes : cyclical operation

Miscellaneous:

Monitoring system (Item 1.29):

- The item includes supply and install all required data communication, router or switch units with all needed data wires SFTP/FTP with Ethernet connection for monitoring, recording data and controlling PV system compatible with the inverter, Via included software
- All connections and control cables from Digital bidirectional 3Ph KWh meter on the input (Schneider PM3200 or equivalent) and digital directional KWh meter (Siemens) at the output of the inverters with all required protection.

Smart Inverter Energy Saving Air Condition (Item 1.30):

The item includes pipes from indoor unit to the nearest floor drain, copper pipes , sleeves, thermostat , Remote control and including AC Socket with switch and all required electrical power cables (3x4mm² XLPE) from SDB to the unit.

- Capacity: 12,000 BTU
- LED Temperature display
- Split Air conditioner
- Energy efficient with automatic power saving
- Save up to 50% in energy consumption over a non-inverter AC
- Auto up/Down air direction
- Auto-filter cleaning
- Night glow buttons included on remote and device
- Automatic restart feature
- Easy to use hand remote control
- Quiet running noise level.
- Quickly cools entire room.

Portable ABC Powder Fire Extinguisher (Item 1.33):

- 6kg capacity
- 14 Bar operating pressure
- Suitable to Electrical equipment fires
- Up to 6m range of throw

Lighting Protection for Solar System (Item 1.36):

The item includes supply, install and test following:

- air terminal, 95 mm² copper conductors around the PV modules locations on the roof top and for the drops to the earth pit manhole, PVC chairs, inspection boxes, earthing pit.
- Complete earth pit includes copper electrodes, clamps, manholes, PVC conduits, copper earth cables and accessories to complete the job. (the earth resistance should not exceed 2 ohm).

The price includes all required materials and workmanship to complete the job.

All works and materials must be according to drawings, specifications and supervisor instructions and approval.

UCAS Server Works

HPE DL580 Gen10 CTO Svr [#1]

1 869854-B21 HPE DL580 Gen10 8SFF CTO Server
1 869854-B21 B19 Europe - Multilingual Localization
1 878150-L21 HPE DL580 Gen10 Xeon-P 8160 FIO Kit
1 878150-B21 HPE DL580 Gen10 Xeon-P 8160 Kit
1 878150-B21 0D1 Factory integrated
8 815100-B21 HPE 32GB 2Rx4 PC4-2666V-R Smart Kit
8 815100-B21 0D1 Factory integrated
1 872267-B21 HPE DL560 Gen10 Universal Media Bay Kit
1 872267-B21 0D1 Factory integrated
3 878366-B21 HPE DL580 Gen10 8SFF HDD Bay Kit
3 878366-B21 0D1 Factory integrated
1 878214-B21 HPE DL580 Gen10 7-slot Pri Riser Kit
1 878214-B21 0D1 Factory integrated
3 804398-B21 HPE Smart Array E208e-p SR Gen10 Ctrlr
3 804398-B21 0D1 Factory integrated
1 830824-B21 HPE Smart Array P408i-p SR Gen10 Ctrlr
1 830824-B21 0D1 Factory integrated
8 872479-B21 HPE 1.2TB SAS 10K SFF SC DS HDD
8 872479-B21 0D1 Factory integrated
16 872481-B21 HPE 1.2TB SAS 10K SFF SC 512e DS HDD
16 872481-B21 0D1 Factory integrated
1 726537-B21 HPE 9.5mm SATA DVD-RW Jb Gen9 Kit
1 726537-B21 0D1 Factory integrated
1 684208-B21 HPE Ethernet 1GbE 4P 331FLR FIO Adptr +| 2-10gb fiber
1 875241-B21 HPE 96W Smart Storage Battery 145mm Cbl
1 875241-B21 0D1 Factory integrated
4 865414-B21 HPE 800W FS Plat Ht Plg LH Pwr Sply Kit
4 865414-B21 0D1 Factory integrated
All according to engineer instructions.

IUG Server Works (Item 1.34)

CISCO Wireless Network System

- 1- Cisco 5520 Wireless Controller supporting 50 APs w/rack kit (Prt# AIR-CT5520-50-K9) (Qt: 1)
- 2- Cisco 5520 Wireless Controller 50 AP License (Prt# LIC-CT5520-50A) (Qt: 1)
- 3- Power Cord, 250VAC 10A CEE 7/7 Plug, EU (Prt# CAB-9K10A-EU) (Qt: 2)
- 4- Cisco 5520 Wireless Controller DTLS License (Prt# LIC-CT5520-DTLS-K9) (Qt: 1)
- 5- Cisco 5520 Wireless Controller SW Rel. 8.1 (Prt# AIR-CT5520-SW-8.1) (Qt: 1)
- 6- 770W AC Hot-Plug Power Supply for 5520 Controller (Prt# AIR-PSU1-770W) (Qt: 1)
- 7- PCIe Network Interface 20G (Prt# AIR-CT6870-NIC-K9) (Qt: 1)
- 8- 1.90 GHz E5-2609 v3/85W 6C/15MB Cache/DDR4 1600MHz (Prt# AIR-CPU-E52609D) (Qt: 1)
- 9- Cisco 5520 Wireless Controller Security Bezel (Prt# AIR-BZL-C220M4) (Qt: 1)
- 10- Trusted Platform Module 1.2 for UCS (SPI-based) (Prt# AIR-TPM2-001) (Qt: 1)
- 11- 770W AC Hot-Plug Redundant Power Supply for 5520 Controller (Prt# AIR-PSU1-770W) (Qt: 1)
- 12- 8GB DDR4-2133-MHz RDIMM/PC4-17000/single rank/x4/1.2v (Prt# AIR-MR-1X081RU-A) (Qt: 4)
- 13- 32GB SD Card for UCS servers (Prt# AIR-SD-32G-S) (Qt: 1)
- 14- 240GB 2.5 inch Enterprise Value 6G SATA SSD (Prt# AIR-SD240G0KS2-EV) (Qt: 1)
- 15- Top Level SKU for 5520 AP Adder Licenses (Prt# LIC-CT5520-UPG) (Qt: 1)
- 16- Cisco 5520 Wireless Controller 1 AP Adder License (Prt# LIC-CT5520-1A) (Qt: 100)
- 17- Cisco 5520 Wireless Controller DTLS License (Prt# LIC-CT5520-DTLS-K9) (Qt: 1)
- 18- 802.11ac W2 10 AP w/CleanAir; 3x4:3; Ext Ant; I (Prt# AIR-AP2802E-IK910) (Qt: 11)
- 19- 802.11n AP Low Profile Mounting Bracket (Default) (AIR-AP-BRACKET-1) (Qt: 110)
- 20- BOM Level AP2800e Bulk PID for I Domain (Prt# AIR-AP2802E-IBULK) (Qt: 110)
- 21- Cisco Aironet 2800 Series CAPWAP Software Image (Prt# SW2802-CAPWAP-K9) (Qt: 110)
- 22- Ceiling Grid Clip for Aironet APs - Recessed Mount (Default) (Prt# AIR-AP-T-RAIL-R) (Qt: 110)
- 23- 2.4 GHz 2 dBi/5 GHz 4 dBi Dipole Ant., White, RP-TNC (Prt# AIR-ANT2524DW-R) (Qt: 440)
- 24- Power Injector (802.3at) for Aironet Access Points (AIR-PWR-CORD-IS) (Qt: 16)
- 25- AIR Line Cord Israel (Prt# AIR-PWRINJ6=) (Qt: 16)
- 26- Catalyst 2960-X 24 GigE PoE 370W, 2 x 10G SFP+, LAN Base (Prt# WS-C2960X-24PD-L) (Qt: 11)
- 27- AC Power Cord (Europe), C13, CEE 7, 1.5M (Prt# CAB-ACE) (Qt: 11)
- 28- Console Cable 6ft with USB Type A and mini-B (Prt# CAB-CONSOLE-USB=) (Qt: 1)

UCAS Equipment

Digital Signage Player

- Dual 1.60 GHz processor with integrated GPU @ 400MHz,
- System Memory – 2GB DDR3 @ 800 MHz
- Storage – 32GB SSD (70MB/s write speed) and SD card slot
- Connectivity – 1x Ethernet 10/100/1000-Gbps port with PoE and PoE+ support
- Wireless version only: Dual band Wi-Fi 802.11 b/g/n + Bluetooth 4.0
- Video Output – 1x HDMI 1.3a, 1x 1 VGA port, dual-display support, single touch and multi-touch screens support.
- HD Video – MPEG-2 and MPEG-4, H.264, and VC-1 hardware decoding, Up to two simultaneous HD video streams.
- Audio – 1x audio-in and 1x audio-out port (3.5mm jack)
- USB – 4x USB ports
- Misc – 1x RS-232 (DB-9) port, 1x infrared extender port, 1x console port (RJ45),
 - Kensington safety lock, factory mode and power buttons, as well as Bluetooth, HDD, Wi-Fi, and Ethernet LEDs.
- Power Supply – 12V/3A

8-way Satellite distribution

- Inputs: FM, DAB, UHF, CCTV, LNB
 - Outputs: FM-88-108MHz, DAB-218-230MHz, UHF-470-854MHz, CCTV-470-854MHz, LNB-950-230MHz
 - Downlink output (Gain/loss): FM-4dB loss, DAB-4.5dB loss, UHF-2.5dB loss, CCTV-6.5dB loss, LNB-2dB loss
 - Distribution outputs (Gain/loss): FM-0dB loss, DAB-1dB loss, UHF-*A, CCTV-*A, LNB-*B
 - Uplink path (operating frequency): 470 - 854MHz
 - Uplink path (Gain per distribution port): 8dB
 - Return path (RF return frequency): 470 - 854MHz
 - Return path (RF return gain): 0dB
 - Return path (Dig eye compatible): all output ports compatible
 - Return path (RF return gain): 9V DC at 15mA max. per outlet, short-circuit protection
 - RF return frequency: 470 - 854MHz
 - RF return gain: 0dB
- Has built in filter to prevent interference from the 4G mobile phone network
- All according to engineer instructions.