



**The MENA Region Initiative as a Model of
NEXUS Approach and Renewable Energy Technologies (MINARET)**

**Off-Grid Photovoltaic System for the Sport Facility
in Jdeideh Al Chouf (Tender No: 12/2021)**

Preliminary Handover Report

Submitted by:

Advance Engineering and Management Services, SAL



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Off-Grid Photovoltaic System for the Sport Facility in Jdeideh Al Chouf Preliminary Handover Report		Revision: 00 Page 2 of 9 Contract #: (750200) 505/28/22/13321

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1. Introduction

This document presents a completion report for the installed Off-grid PV Solar system for the Sport Facility in Jdeideh under tender 21/2021. This document focuses on the main installed components of the systems and its operation procedures in addition to the maintenance schedule and plans for the system.

2. Description of the system

Description of the system focuses on the following points:

- Summary of the Project
- Systems Components
- Operation of the system
- Measurements
- Maintenance of the system
- As Built Drawings

3. Summary of the Project

The summary of the Project can be categorized in the implementation of the following PV System:

1. 5 kWp Off-grid photovoltaic system with storage 10 kWh

4. Systems Components

The installed Off-Grid Photovoltaic system with storage powers the Sport Facility in the municipality as a canopy for the Amphitheater with Cantilevered Beam structure (one pole only) connected to the utility grid. This was achieved by installing the following items:

- PV Modules: ZNShine Polycrystalline 72 cells, 335 Wp. The PV Modules are connected in two arrays on 15 modules.
- Batteries: Pylontech Lithium Iron Phosphate 48V, 2400 Wh connected in parallel
- Mounting Structure: as per the proposed drawings
- Inverter: GoodWe single phase 5.0 kW with two MPPT trackers
- DC fuses, DC breakers, AC breaker as per the inverter SLD
- Communication cable between the batteries & inverter and the inverter & meter.
- Earthing system

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Figure 1: Installed PV Modules, PylonTech Batteries and GoodWe Inverter

5. Operation & Measurements of the System

The PV systems consist of two arrays. One of the arrays has 8 PV modules and the other has 7 PV modules in series providing a total of 5 kWp. The GoodWe inverter is connected through 2 DC inputs with MPPT operating voltage range 120 V ~ 500 V. The system is currently not connected to the utility grid because there's no utility subscription for the sport facility, but the breaker is ready to be connected once the utility is there.

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It is recommended to accelerate the process to subscribe with the utility for more benefit of the implemented system.

Measurements	5 kWp Off-Grid PV system with storage 10kWh
PV Array measurements (V)	247.2 V
Battery Voltage (V)	50.6 V
AC current when all lights in the sport facility are ON	19.55 Amp



Figure 2: Measurements on PV System

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Figure 3: Running System

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6. Signages

The signage in metal frame structure with digital printing on outdoor vinyl with 150cm height * 70cm width fixed on galvanized steel was installed on the wall of the Sport facility as agreed with the municipality.

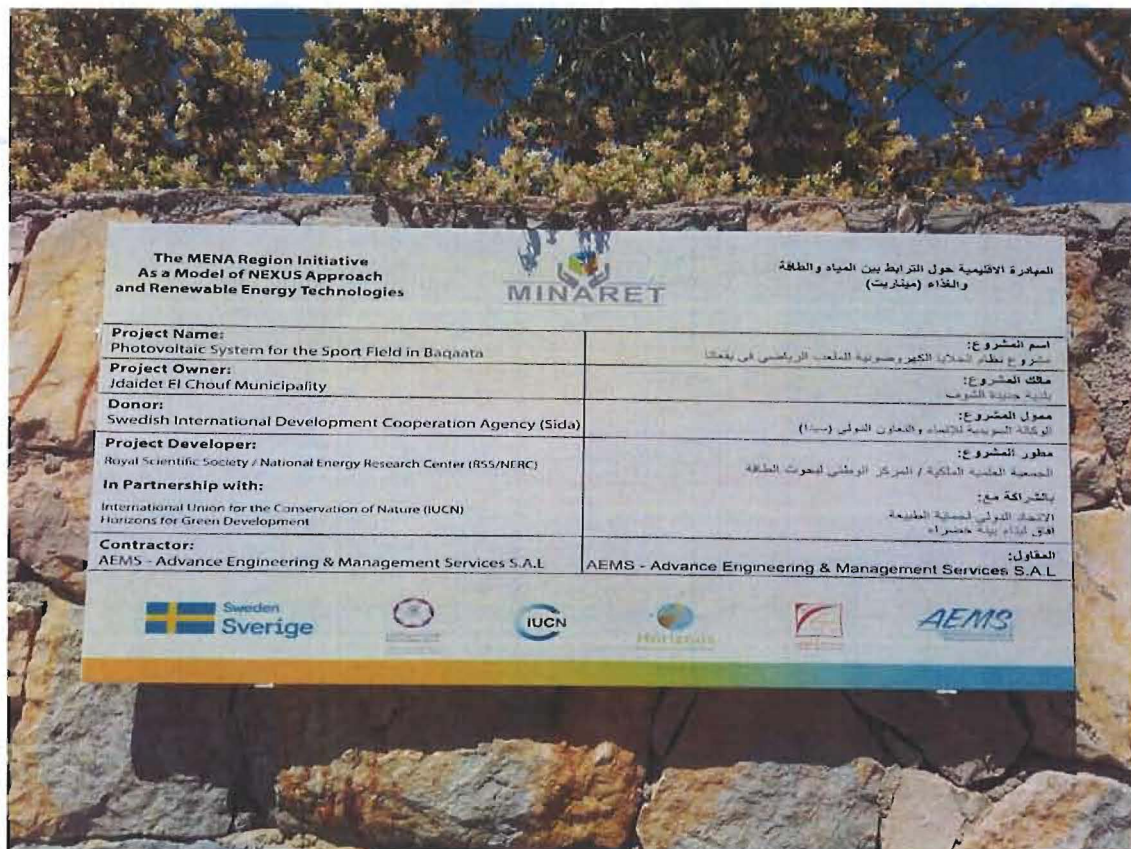


Figure 4: Project Signage

Municipality Representative **رئيس بلدية جديدة الشوف**

Reviewed by:

Approved by:



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Annex 01- O & M Plan



**The MENA Region Initiative as a Model of
NEXUS Approach and Renewable Energy Technologies (MINARET)**

**Off-Grid Photovoltaic System for the Sport Facility
in Jdeideh Al Chouf (Tender No: 12/2021)**

Operation & Maintenance Plan

Submitted by:

Advance Engineering and Management Services, SAL



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1. O & M Plan

A maintenance plan ensures required service is performed on a regular schedule. The maintenance plan shall include a list and schedule for all required system maintenance and service for the PV arrays, mounting structure, inverter(s), batteries, and DC and Ac wiring systems.

The operational maintenance for solar PV system includes monthly and regular maintenance. The maintenance person must be qualified and must have certain professional knowledge related to solar PV systems to check the operating status of the solar PV system, observe readings and measurements of the equipment, conduct regular visual inspection visits, and record the results.

Maintenance can be broken down as follows:

1. Visual inspection: This activity is done daily to check the physical condition of the components and the performance of the system.
2. Scheduled or preventive maintenance: Planned in advance and aimed at preventing faults from occurring, as well as keeping the plant operating at its optimum level.
3. Unscheduled or corrective maintenance: Carried out in response to failures.

Thorough scheduled maintenance should minimize the requirement for unscheduled maintenance although, inevitably, some failures still occur.

Visual Inspection

1. Check the recorded data and measurements and compare them with previous measurements to ensure proper functioning of the solar PV system.
2. Check the exteriors and interiors of the equipment, mainly movable and connection wires.
3. Visual inspection of the PV arrays for cleanliness and/or damaged PV modules.
4. Visual inspection of the inverter to check if there are any alarms or improper functioning.
5. Check the mounting structure sturdiness and for any corrosion.
6. All records and measurements shall be saved in a database.

Scheduled/ Preventive Maintenance

Preventive maintenance maximizes system output, prevents more expensive failures from occurring, and maximizes the life of a PV system. The scheduling and frequency of preventative maintenance is dictated by a number of factors. These include the technology selected, environmental conditions of the site, warranty terms and seasonal variances. The scheduled maintenance is generally carried out at intervals planned in accordance with the manufacturers' recommendations and as required by the

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equipment warranties. Scheduled maintenance should be conducted during non-peak production periods and, where possible, at night.

The table below lists the activities and the frequency of the maintenance activities that have to be carried out in accordance with manufacturer's recommendations.

Item	Preventive Maintenance Service Description	Frequency
PV Arrays		
1	General site inspection and cleaning (remove any sprouting seeds, vegetation, bird nests, leaves, debris, etc.)	Every 6 months
2	Visual inspection of PV system's general site conditions, PV arrays, electrical equipment, mounting structure, shading, vegetation, damage, erosion, corrosion, and discolored panels	Every 6 months
3	Visual inspection and correction of PV system for loose electrical connections and ground connections	Every 6 months
4	Array cleaning from dust, snow, pollen, birds, etc.	Annual or when required
5	Clean PV modules with plain de-mineralized water with mild detergent recommended by the manufacturer to remove any dirt or stains from the PV module then dry it with a dry cloth. DO NOT use high-pressure water, chemicals, corrosive solvents, brushes, or hard objects for cleaning	Annual or when required
6	Measure open-circuit voltage of PV arrays and DC operating current tests	Annual
7	Check the MC Connectors between modules and replace damaged ones	When required

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Item	Preventive Maintenance Service Description	Frequency
Inverter		
1	Inspect inverter housing or shelter for physical maintenance required if present	Annual
2	Clean inverter cabinet air vents	Annual
3	Replace inverter AC fuse(s)	When required
4	Clean and change inverter air filters, if present, per manufacturer's warranty requirements	Annual or when required
5	Clean/remove dust from inverter heat sinks per manufacturer's warranty requirements	Annual
6	Replace inverter fan motor	When required
7	Replace inverter data acquisition card	When required
8	Turn off and on logging and communications to ensure they are communicating and ensure battery backups are working	Annual
Mounting Structure		
1	Inspect mounting structure for abnormal movement and tighten as necessary	Annual
2	Inspect roof penetrations to ensure sealant is applied properly and not degrading	Annual
3	Check metallic structure for signs of corrosion, remove rust, and re-paint if necessary	Annual
DC and AC Wiring Systems		
1	Open each combiner box and check that no fuses have blown and that all electrical connections are tight. Check for corrosion or intrusion of water or insects. Seal boxes if required.	Annual
2	Inspect combiner boxes and tighten connections to manufacturer's torque specification. Report broken terminal blocks	Annual
3	Look for any signs of intrusion by pests such as insects and rodents. Remove any nests from electrical boxes (junction boxes, pull boxes, combiner boxes) or around the array.	Annual
4	Check proper position of DC disconnect switches and fuses and replace failed fuses.	Annual or when required

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Item	Preventive Maintenance Service Description	Frequency
5	Check the AC disconnect box and the position of AC disconnect switches and breakers	Annual
6	Inspect cabling for signs of cracks, defects, pulling out of connections, overheating, short or open circuits, and ground faults	Annual
7	Test the disconnect switches to ensure they are not jammed	Annual
8	Test system grounding	Annual
PV System Documentation		
1	Document details of preventive maintenance work, such as condition observations, work performed, meter readings, and system testing results	As performed
2	Include non-conformance reports to identify potential short-term and long-term power production issues	Annual

Unscheduled/ Corrective Maintenance

Unscheduled maintenance is carried out in response to failures. As such, the key parameter when considering unscheduled maintenance is diagnosis, speed of response and repair time.

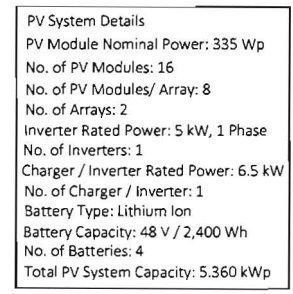
The majority of unscheduled maintenance issues are related to the inverters. This can be attributed to their complex internal electronics, which are under constant operation. Other common unscheduled maintenance requirements include:


















1. Tightening cable connections that have loosened
2. Replacing blown fuses
3. Repairing lightning damage
4. Repairing equipment damaged by intruders or during module cleaning
5. Rectifying monitoring system faults
6. Repairing mounting structure faults

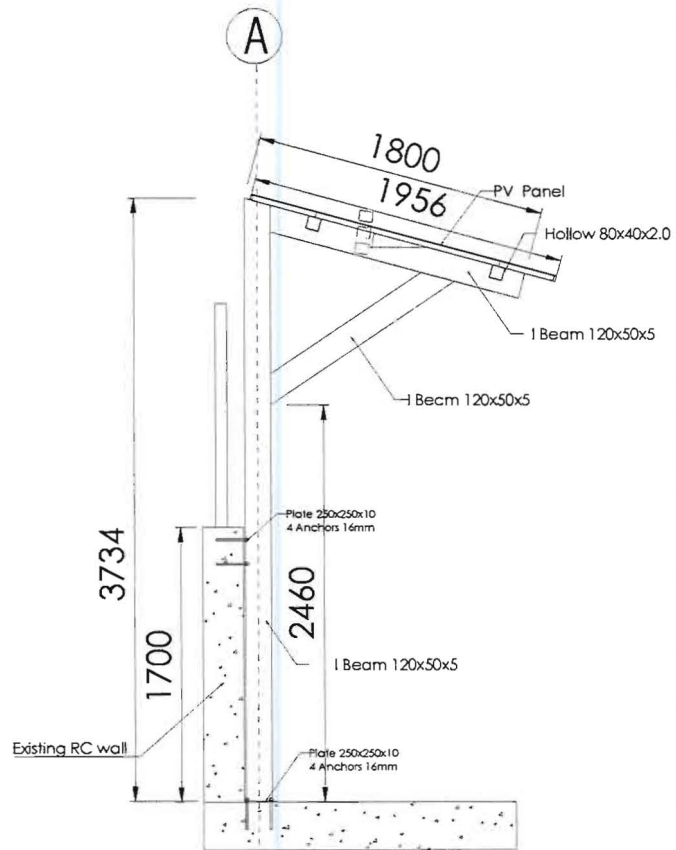
As Built drawings are attached

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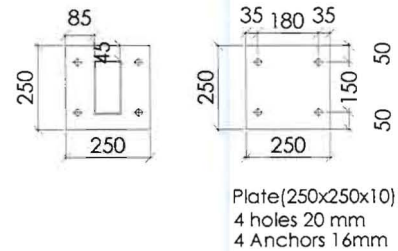
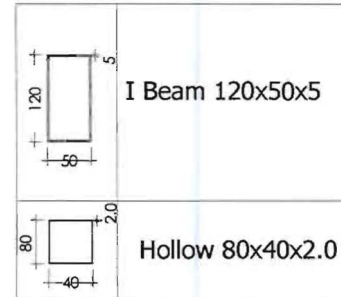
Annex 02- As Built Drawings



LEGEND	
Symbol	Description
	PV Module
	Inverter
	DC Fuse
	Surge Arrester for Over Current Protection
	Circuit Breaker
	Disconnect Switch
	Load Break Switch
	Differential Switch
	Earthing Switch
	Voltage Indicator
	Genset Measurement Extension
	Fronius Current Sensor
	AC Cable
	DC Cable
	Earth Wire
	Communication Cable
Date	01/03/2021
Revision No.	00
Approved by	
Prepared by	
Client	Royal Scientific Society Jdaidet Al Chouf Municipality
Location	Jdaidet Al Chouf Municipality
Project Title	Solar PV System for Sports Facility (5 kWp)
Project Reference	12/2021



Frame Section



Item	Profile	Unit	Qty	Unit weight (KG/Unit)	Total weight (KG)
1	I Beam 120x50x5	M	42	10.6	445.20
2	Hollow 80x40x2.0	M	36	4.25	153.00
3	Plate 250x250x10	PCS	6	4.9	29.40
				Sum	627.60

Project Ref: FD.02.21

Sheet Number:

S.01

Part Number

Total QTY Left Right

Key Section

Rev:00 Date:28-02-2021

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Project Ref: FD.02.21

Sheet Number:

S.00

Part Number

Total QTY Left Right



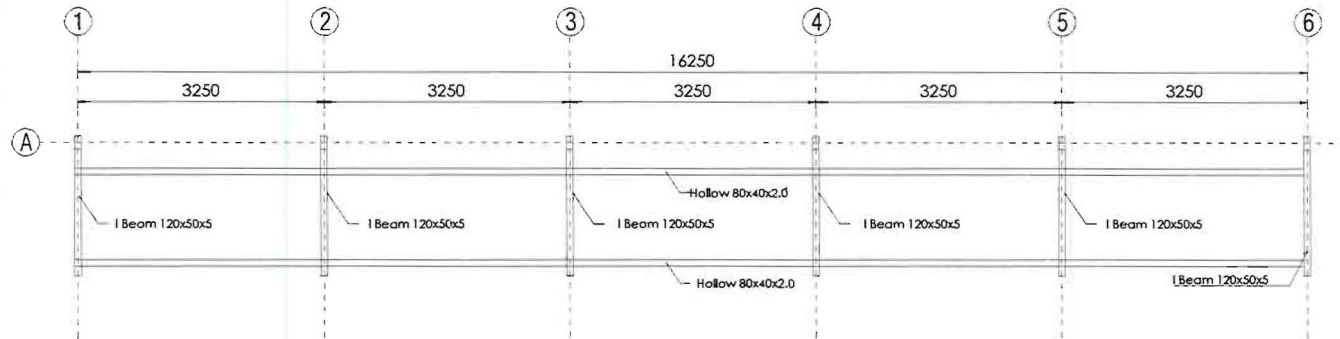
i Beam 120x50x5



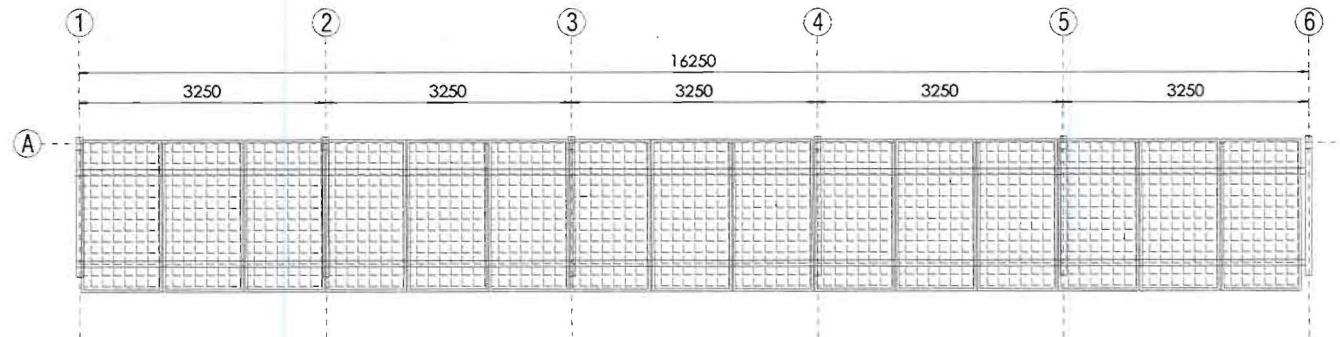
Hollow 80x40x2.0

Key Section

Rev:00 Date:28-02-2021



Structural layout



POLYCRYSTALLINE SOLAR
MODULE Layout QTY = 16