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On-grid Solar PV Systems at Four Public Hospitals in Lebanon

Solar for Health (S4H)

under the kWf KfW Bankengruppe funded Solar for Health project' implemented by Earth Technologies

About Us

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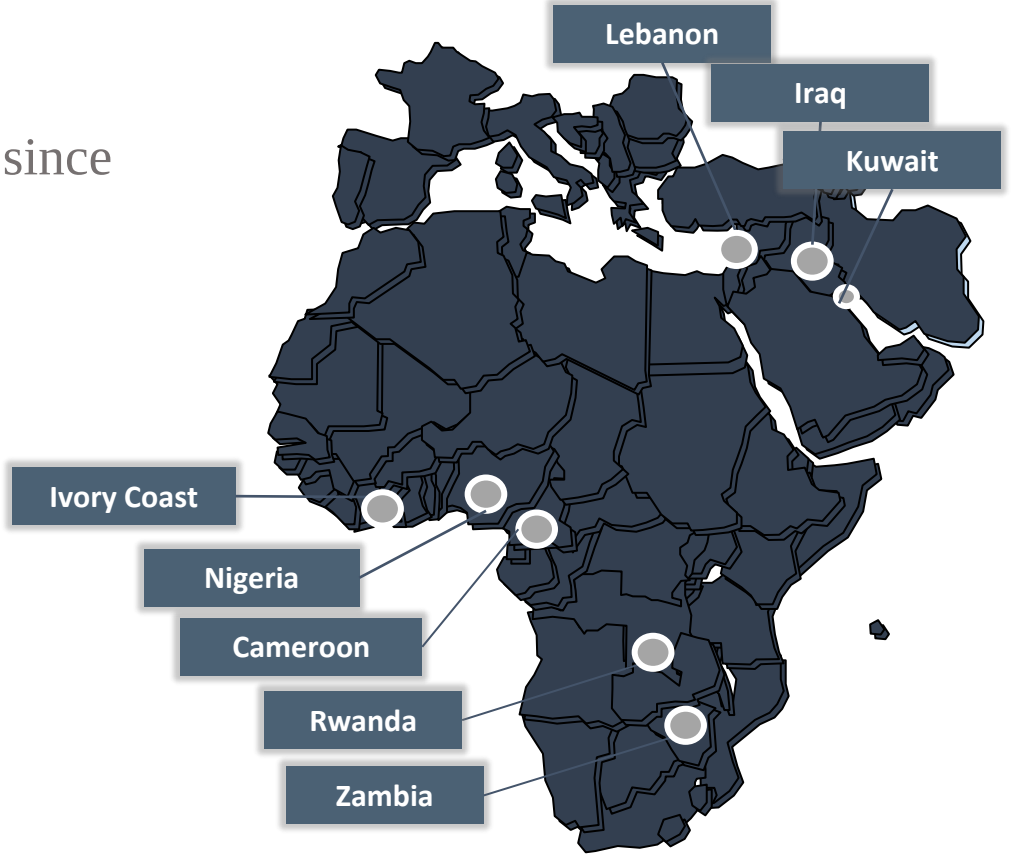
Earth Technologies is a renewable Energy and Energy efficiency company, specialized in developing, supplying, designing and installing solar PV plants, solar water heating, energy efficiency systems, solar lighting, LED lighting, solar water pumping, sustainable electrical and mechanical designs and contracting.

Earth Technologies was incorporated in January 2011, and has since then designed and installed hundreds of **solutions including:**

- PV Power Plants (off grid, on grid, grid interactive)
- Solar telecom sites
- Energy audits
- Solar thermal water heating systems
- LED lights and solar street lights



Project Summary

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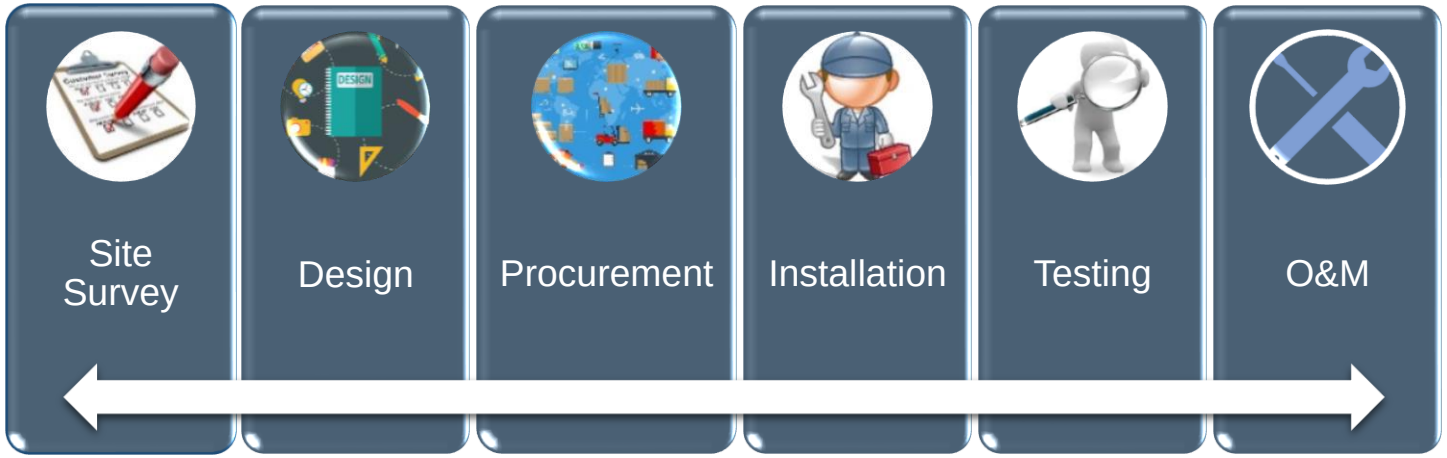
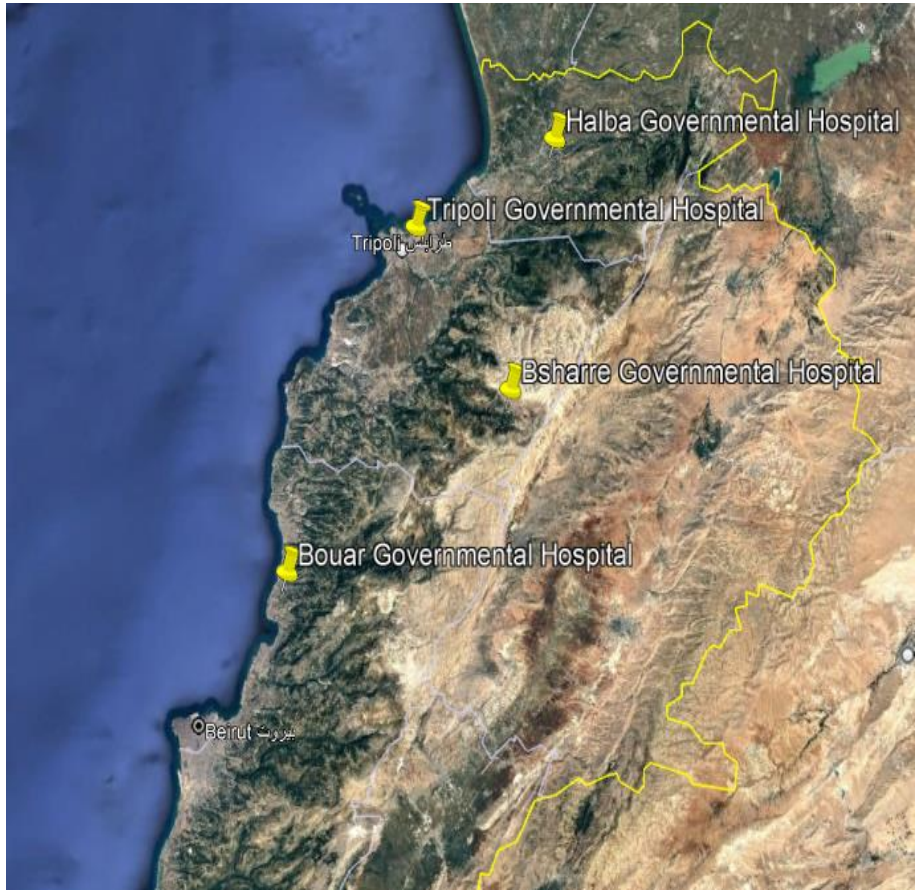
- Supply, Installation, Commissioning, Operation and Maintenance of Four On-grid Solar PV Systems at Four Public Hospitals in Lebanon

Halba: 93.62 kWp
Bouar: 94.16 kWp
Tripoli: 67.41 kWp
Bsharre: 19.26 kWp





Halba Hospital

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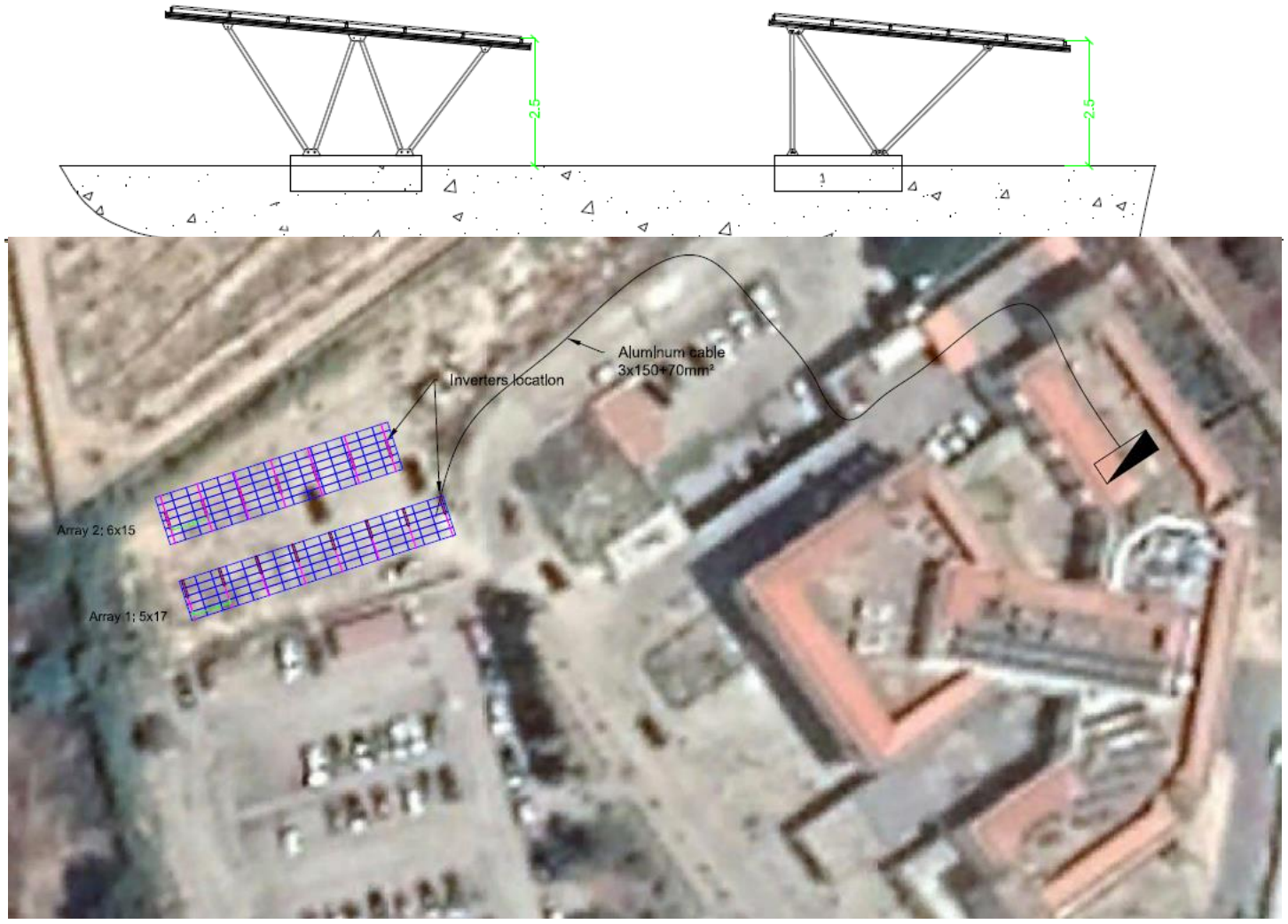
- PV size: 93.62 kWp
- Number of panels: 175
- Mounting structure: Carport
- On-grid inverters: 4 units SMA STP25000TL



Bouar Hospital

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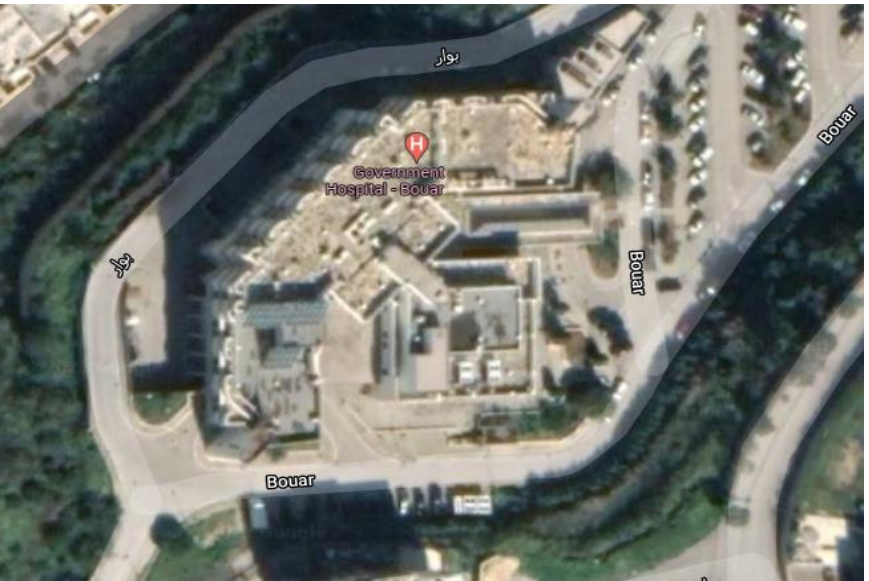
- PV size: 94.16 kWp
- Number of panels: 176
- Mounting structure: Elevated structure on roof
- On-grid inverters: 4 units SMA STP25000TL



Tripoli Hospital

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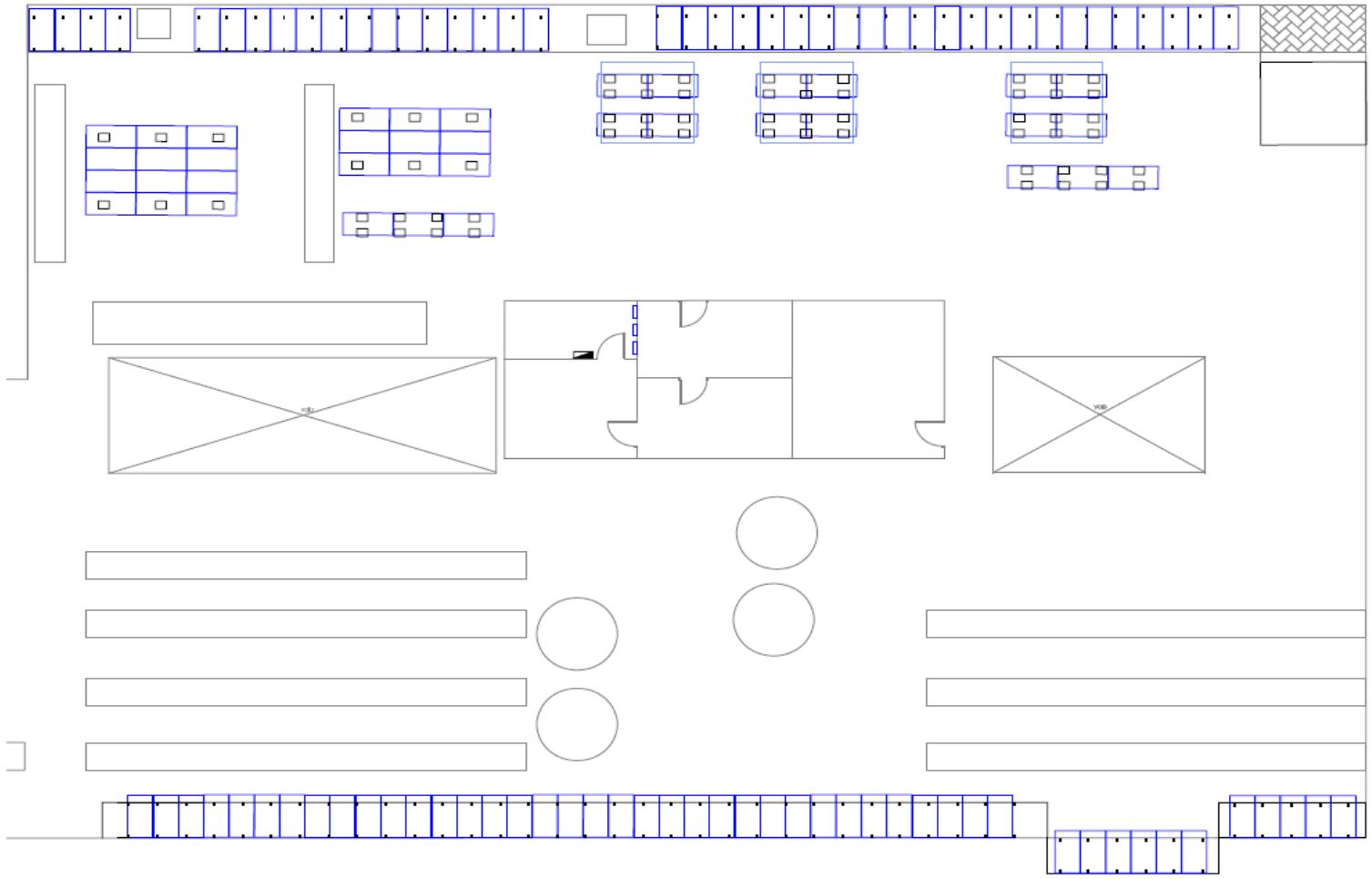
- PV size: 67.41 kWp
- Number of panels: 126
- Mounting Structure: aluminum structure fixed on curbstones and direct bolting on peripheral parapet
- On-grid inverters: 3 units SMA STP25000TL



Bsharre Hospital

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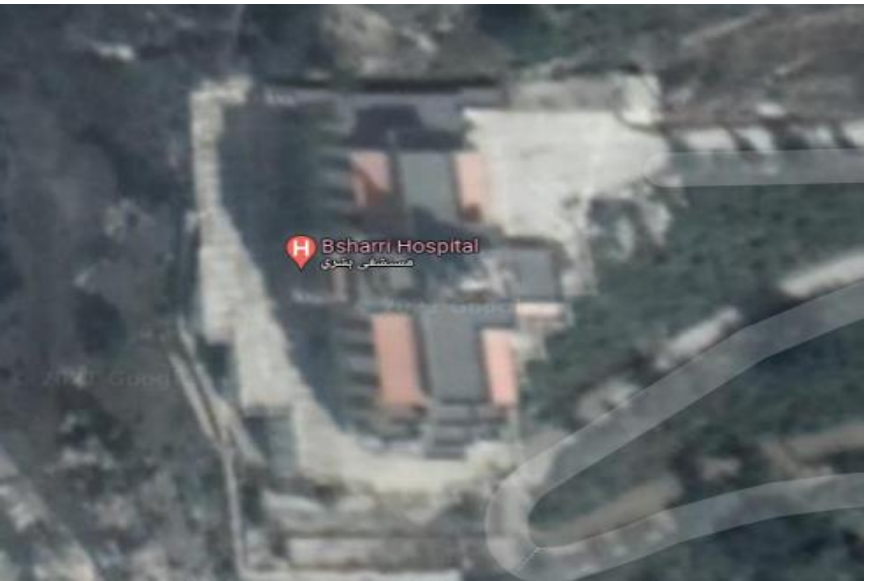
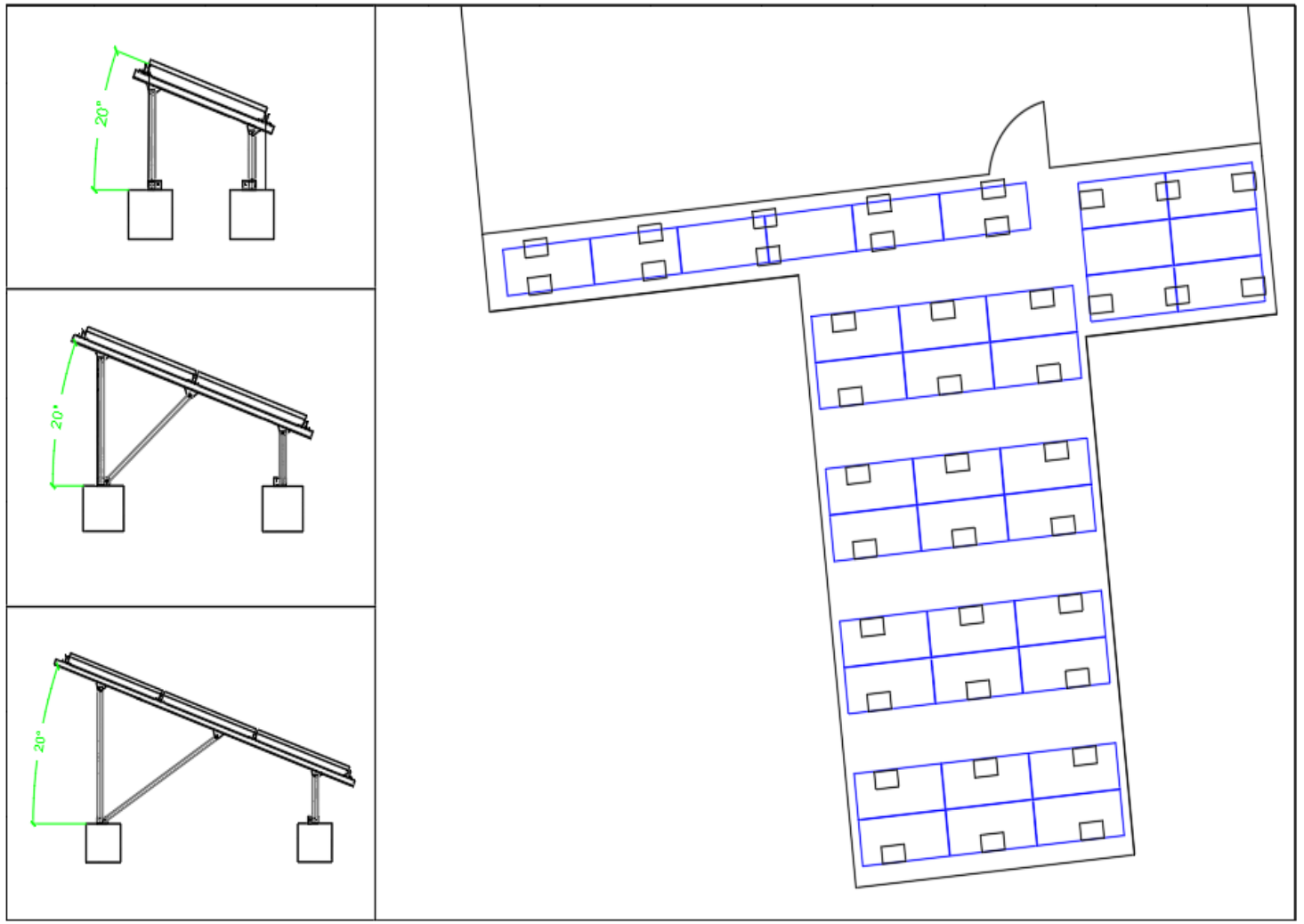
- PV size: 19.26 kWp
- Number of panels: 36
- Mounting structure: Elevated structure on the roof
- On-grid inverters: 1 unit SMA STP25000TL





Project Timeline

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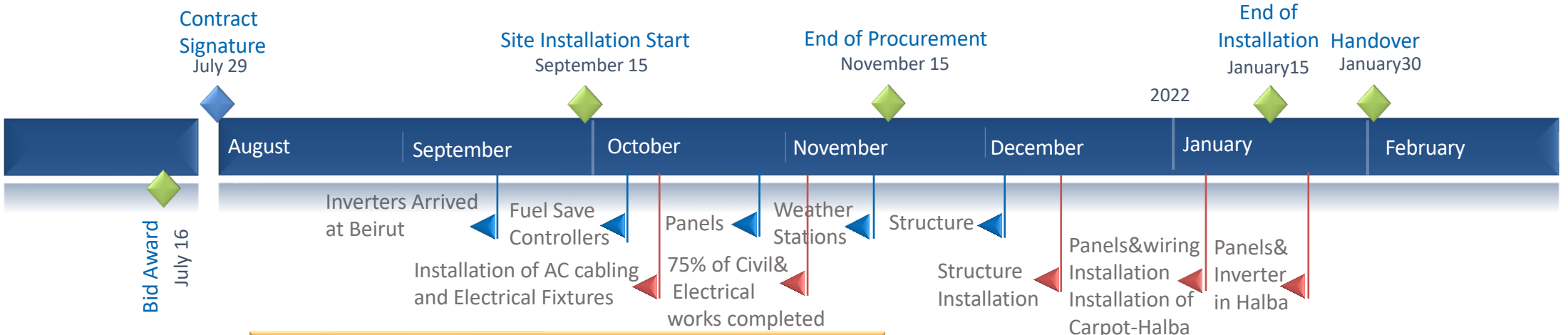

Procurement

Achieved

1. Panels
2. Inverters
3. Cables and Electrical Fixtures
4. Fuel Save Controllers
5. Weather Stations

Pending

1. AC and DC Combiner Boxes
2. Elevated and Carport Structure

Installation

Achieved

1. AC Cables, conduits, cable trays
2. Installation of inverters in Tripoli Hospital
3. Concrete foundation for elevated structure in Bsharre and Bouar Hospitals
4. Concrete Curbstones for Tripoli Hospital
5. Land Preparation and leveling for Halba Hospital

Remaining

1. Installation of structure and panels at Bsharre, Tripoli and Bouar Hospital
2. Halba land reinforcement and compaction
3. Installation of carport and panels at Halba Hospital
4. Installation of inverters on the structure

T&C

Project Progress Update

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- 75% of Electrical Works were completed in Halba, Bsharre, Tripoli and Bouar Hospitals

Halba

Bsharre

Tripoli

Bouar

Project Progress Update

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- 75% of Civil Works were completed in Halba, Bsharre, Tripoli and Bouar Hospitals

- In Halba, the land turned out to be unsuitable for the structure installation (landfill), additional works are being taken to be able to install the carport










Operation and Maintenance

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The Operation and maintenance activities are part of Earth Technologies Contract with UNDP:

- ✓ **Regular Checkup on the system to make sure the system remains fully functional**
- ✓ **Regular cleaning of the panels from debris and dirt**
- ✓ **Checking of the PV mounting system, to make sure the components remain properly installed**
- ✓ **Close checkup to identify loose connection, cables, MC4 connectors, joints, etc.**
- ✓ **Inspect and clean inverters fan filters, panel boards grills and other accessories**
- ✓ **Inspection of all electrical devices including SPDs, circuit breakers, fuses, etc. and replacing defective ones**

Main Issues

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1 Material Procurement

Several difficulties were faced in material procurement due to disturbance in the supply chain

Examples:

1. **Change in PV modules production line (Technical and financial impact)**
2. **Shortage in supply of inverters (Schedule and financial impact)**
3. **Shipping rates increase (Financial impact)**
4. **Production delay due to Chinese power shortages and holidays (Schedule impact)**

2 Logistics

Unforeseen difficulties in performing some works on site which caused extra delays and cost

Examples:

1. **Increase in transportation and fuel costs (Financial impact)**
2. **Some hospitals locations were difficult to easily pour concrete by pump- alternative methods were used (Schedule and financial impact)**
3. **Delays are being faced in customs clearance at Beirut Port (Schedule impact)**

3 Technical

Some Technical issues were faced during the execution of the works

Examples:

1. **Unclear requirements for cable routing in Halba (Technical and financial impact)**
2. **Lack of soil study for parking area and arising issues after excavation (Schedule and financial impact)**
3. **Lack of structural study for roofs (Schedule and technical impact)**

Lessons Learned

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✓Safety margin for material fluctuation

In the current situation of instability of the supply chain, some safety margin should be taken for materials cost and for project scheduling

✓Performing structure and soil analysis

In places where PV support structure is required to be elevated and to support high wind loads (140km/h) a profound structural and soil analysis should be performed beforehand to make sure the existing area where the structure will be installed can withstand the load

✓Proper Planning and contingency measure is essential

Beside having a clear plan and schedule for performing the work, it is very important to assess the risks that may cause delays and prepare contingency plans to counter them

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Thank you!

We are ready to answer your questions


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