SCOPE OF WORKS- Annex 2

Works for Hagadera Solar Plant Repair

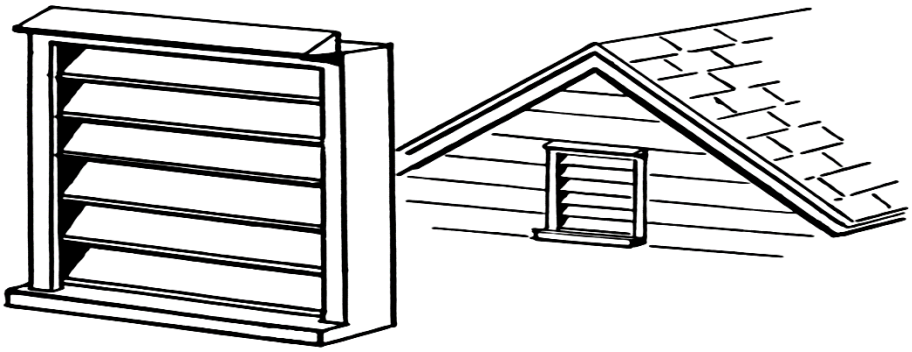
The full plant system comprises:

1. 10kW SMA AC-COUPLED SOLAR SYSTEM: This system consists of 2No. 5kW SMA Sunny Boy inverters and a 10kW Sunny Island Battery inverter. It currently serves only cafeteria loads.
2. 4.5kW SOLAR SYSTEM CONNECTED TO 2No. 3kW OUTBACK INVERTERS: This system is currently not functioning as the batteries connected to it are dead.

The Scope of Works related to the report and BoQ submitted can be divided into four elements (A to D):

A. Rehabilitation of the Outback System – This in itself will comprise of the following:
   i. Replacement of the dead batteries with the battery bank to be removed from the SMA system. These batteries have to be topped up with approximately 200liters of battery distilled water and charged with high current for about 5 hours using generator power for the batteries to be properly equalized. A proper battery rack should then be built for these batteries

   ii. Construction of a simple Power Room – Dimensions of the power room to be built will be 6 by 4 meters with a reinforced concrete slab of about 10cm. Cable trays shall be installed for cable management. The room should have adequate ventilation provided with louvers that shall have some sort of mesh to prevent animal infestation.



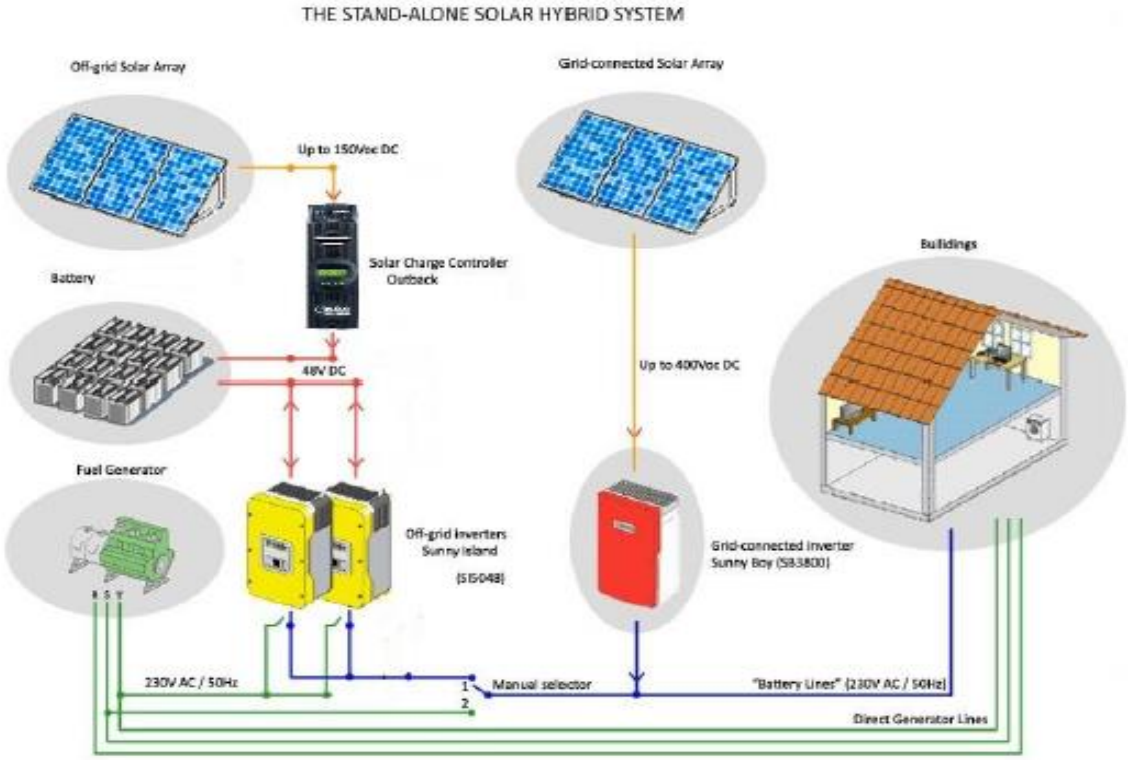
iii. The two Outback inverters are currently running independently but as per the recommendations, they should be stacked together using an Outback Hub and also connected to an Outback Mate for system monitoring.

iv. All cabling in the power room shall be in trunking and properly secured. Further, earthing and lightning protection should be installed.

B. Rehabilitation of the SMA System – This will consist of:

i. Replacement of the existing battery bank with new 24No. 1500Ah solar batteries.

ii. Connection of the idle solar array to the system using a charge controller with the final setup as shown below:



This array consists of 11No. x 240W solar panels that shall be connected to the charge controller using a combiner box and disconnect. The output of the controller will be used to charge the battery bank.

iii. Installation of an SMA Sunny Webbox for remote system monitoring

C. Refurbishment of the Solar Mounting Frames

Most of the solar mounting frames are rusting but still salvageable using high quality aluminum paints. To restore the rusted metal surfaces to their original state, the contractor shall use a brush to clean off loose rust, sand the area, and apply a high-quality rust-inhibitive primer first (e.g. Crown Zinc Chromate Metal Primer). Also known as rust converters, rust-inhibitive primers can be used to cover rusted spots and turn them into non-rusting, paintable surfaces.

Next, the Contractor will repair holes and dents, sand all areas until they reach bare metal and wipe with a degreaser mixed with mineral spirits. For small holes and dents, inject an appropriate epoxy-based composite directly into the hole and/or dent. For larger holes, apply

epoxy filler to the edge of the hole, cut a piece of fiberglass mesh approximately one inch larger than the hole, and press it into the filler. Then, cover the mesh with epoxy, working your way from the edge toward the center of the hole.
It should be noted that priming after cleaning all the surfaces before applying the aluminum paint is very crucial to prevent dust or dirt from accumulating as well as flash rust (rust that forms within hours) from forming.

D. Cable Management
As per the recommendations in the report, the following should be undertaken in regards to cable management:

- In the distribution box, spiral wraps as depicted below should be used to group the cables properly

- The cables from some of the solar panels shall be replaced with proper 6.0mm solar cable that is UV resistant. They shall be properly and neatly secured inside flex conduits.
- Due to degradation, all the battery cables should be replaced with new ones.
- To increase charging efficiency, the existing cables from controllers to batteries shall be replaced with 25mm battery cables.