

ARC-AE TECHNICAL SPECIFICATIONS FOR THE INSTALLATION & COMMISSIONING OF THE 20kWp GRID TIED SOLAR PV SYSTEM (With BESS of 30kWH) at ARC-AE)

TECHNICAL SPECIFICATIONS

Goal

Supply and install Solar PV system to supply power to computers and servers, including lights. There are currently 189 lights (T8,5ft,4ft lights, etc). These lights need to be replaced By LED lights during the time of installation and must be quoted (supply and installation to form part of this project). This project is inclusive of the Solar PV systems Design and as-built drawing which must be handed to ARC-AE.

Solar panels

- **Supply and Install Mono-Crystalline PV modules**, each solar module must be a maximum power output (P_{max}) of 550 W or more.
- Supply and Install 20 kW Peak, High Voltage, 3 Phase Inverter, thus the 550 W panels must be able to supply 20kWp on a good sunny day.
- The selected Mono-Crystalline PV should be finalized in consultations with ARC-AE personnel who supervise the construction.

Install all the necessary items including but not limited to:

- Combiner Box
- DC Fuses
- Roof Mounting structure
- Distribution Board with Breakers, and 3 breakers for Lights
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Wiring

- Cable Solar 4 mm RED
- Cable Solar 4 mm Black
- Above sizes are guidelines. Wire sizes to be finalized as per final design

Battery bank

- Install lithium-Ion battery bank for a backup power of 30 kWh.
- The PV system must be well balanced to supply enough capacity to charge battery to full capacity within the small time possible.
- The installer to consider Depth of Discharge of batteries when sizing the appropriate battery bank

Lightning Protection and earthing for solar PV

Apply measures to prevent catastrophic damages and failures of PV systems due to lightning. South Africa is in a high lightning dense region when compared to the rest of the world. Therefore, lightning strikes can still pose a risk to any electrical system, including solar panels. Proper grounding, surge protection, and adherence to safety guidelines are crucial to minimizing the potential damage caused by lightning strikes.

Grounding involves connecting the solar panels, inverters, and other electrical components to the Earth's surface, creating a path for electrical currents to safely dissipate into the ground. Use earthing, electrical configurations and protection products based on standard compliance and protection.

Decommissioning

The new Solar PV system will replace the 60kVA UPS system. The 60kVA UPS, together with its batteries is currently supplying power to computers and servers. The appointed service is expected to decommission the existing system. Decommissioning will include the removal of 60kVA UPS, all batteries, and inverters that are currently in the UPS room. New lithium-Ion batteries must have their own support, for example battery cabinet or whatever is fit for purpose. All the decommissioned assets will remain property of ARC and must be stored by the service provider within the ARC premises as per the technician/facility personnel instruction. In the case of batteries, service providers must contact the onsite technician to find out if batteries need a complete disposal outside of ARC premises.

Special notes: The 450kVA diesel generator is also integrated with UPS system, therefore, when the UPS system is removed, the diesel generator must be able to work together with the new Solar PV system.

Commissioning

- The Solar PV system to be signed off by Professional Electrical Engineer (Pr. Eng.) or Professional Electrical Engineering Technologist (Pr. Tech.)
- PV solar system design must be approved by Pr. Eng. or Pr. Tech
- Letter of installation and commissioning approval from Eskom or municipality.
- Installation must have been performed under the supervision of a qualified electrician according to the approved design
- Electrician has to sign a certificate of compliance (CoC) for the installation, thus a qualified electrician with wireman's license is required
- Pr. Eng. signs off an as-built drawing, after system works as specified
- Installer or supplier provides any additional documents and reports for commissioning the PV system to client (ARC)
- All compliance certificates/Municipality registration/permission and requirements according to current government regulations at time of commissioning
- Installation to be in Compliance with **SANS 10142 (Special Condition)**
- The Solar PV system installation will not be approved to proceed until municipal approval is secured.

- The Solar PV system service provider must be qualified PV Green Card installer; thus, a PV Green Card must be issued when the installation is complete.

Miscellaneous

All preliminary work, including draft technical drawings must be discussed with ARC personnel before construction begins.

Any down-time when connecting new solar power to existing grid should be done after normal working hours (08:00 – 16:30), Monday

Warranty

All equipment (Inverters, solar panels, batteries, etc) installed must have manufacturer's warranty. The service provider shall provide a 12-month guarantee on the workmanship on the work undertaken at no cost to the ARC. If during this period the equipment is not in good working order, or not working satisfactorily owing to faulty material, design or workmanship, the service provider will be notified and immediate steps must be taken by the service provider to rectify the defects and/or replace the affected parts on site, at no cost to ARC.

Maintenance and Operation

Provide a 12 months operation and maintenance of solar PV systems, after which, ARC will employ a long-term service provider for operation and maintenance.

Place of installation

Agricultural Research Council 141 Cresswell Rd Weavind Park, Pretoria, 0184

Notes: The Servers and Computers are currently tapping power from the 60kVA UPS, as well as the 450kVA Diesel Generator during loadshedding. The 60kVA UPS system is being replaced by Solar, and the generator will stay(not replaced).The current usage of 60kVA UPS system is 11% of 60KVA.

Contact person

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