Description of Service: Supply, Delivery, and Installation of A single phase 8 kWp Grid-Tied Solar PV System at Tompi Seleka College of Agriculture and 3.33kWp Solar PV System at Seotlong agriculture and hotel school

TECHNICAL SPECIFICATIONS

Supply, delivery and installation of a single phase 8 kWp Grid-Tied Solar PV System at Tompi Seleka College of Agriculture, for supplying power to a Green House and a 3.33kW Solar PV System and solar pump inverter at Seotlong agriculture and hotel school, for supplying power to an existing 2.2kW single phase pump.

Part 1: A single phase 8 kWp Grid-Tied Solar PV System at Tompi Seleka College of Agriculture, for supplying power to a Green House

Background: The greenhouse is currently accessing power from the nearest transformer rated at 22kV/420V 200kVA. The 8 kWp inverter must be grid-tied for cost saving.

Specifications Item	Specifications Details
Solar Modules	• Supply and install 500Watt Monocrystalline solar PV modules x 16, to yield a maximum power output of 8-kilowatt Peak(kW_p). • Solar modules will be mounted on poles (use steel structure, painted, minimum of 4 poles), The steel structure stand for solar modules must be covered with **two layers of paint,** one made with a rust-proof paint and the other made with a thick paint finish or galvanized.

	• Solar modules: Jinko Solar, Canadian Solar, JA solar, RenewSys, Trinasolar , SunPro, Risen ,Haitai Solar, Astroenergy or **Equivalent** • Solar PV modules must comply with the SANS/ IEC standards. Compliance of solar modules to the following standards is mandatory: o ISO9001:2015: Quality Management System o ISO14001:2015: Environment Management System o ISO45001:2018: Occupational health and safety management systems
DB Box electrical loads	Electrical loads to be powered by solar energy: 2 x 2.2kW surface water pumps, 2.2kW submersible pump and 4 x 1.1kW Fan motors. **Lightning Protection and Earthing for Solar PV** Apply measures to prevent catastrophic damages and failures of the installed PV system due to lightning. South Africa is in a highly 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, **installing lightning protection specific to the installed solar PV system.** Proper grounding, surge protection, and adherence to safety guidelines are crucial to minimizing the potential damage caused by lightning strikes. Grounding involves connecting 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**.
Training	The system provider must offer comprehensive training on how to effectively use mobile and desktop applications for monitoring and managing the solar PV system. This training should cover all key functionalities, including

	tracking energy generation, battery performance, and system health, as well as setting alerts and optimizing energy usage. Additionally, the provider should offer ongoing support for at least 12 months post-installation, ensuring users have access to assistance in case of any technical issues or questions regarding the app or system operation. This support will help ensure smooth adoption and optimal use of the system.
Commissioning	• Installation must have been performed under the supervision of a qualified electrician according to the approved design, signed off-by professional electrical engineer • The qualified installer/electrician must be a registered electrical contractor • The electrician must sign a certificate of compliance (COC) for the installation. • As part of a hand over, Solar PV Electrical system design, as-built drawings and line diagram must be submitted to ARC.
The pictures below show the outside and inside of the House	

Figure 1 Green House Facility

Figure 2 Inside the Green House

Part 2: A single phase 2.2kW and Solar PV System at Seotlong agriculture and hotel school, for supplying power to an existing 2.2kW single phase pump

Background: An estimated medium sized 2.2kW submersible pump installed in the borehole is currently supplied from the single-phase power supply. However, the power supply cable has been cut during construction activities. To maintain water supply, a solar system (Composed of solar modules and solar pump inverter) is sought to supply power to the submersible pump. An appointed service provider will be required to test the pump to determine its actual size before finalizing the size of the solar system.

Specifications Item	Specifications Details
Installation of a solar pump inverter in the existing pump	• Supply and install 555Watt Monocrystalline solar PV modules (3.33kW) or equivalent • **Solar modules brand**: Jinko Solar, Canadian Solar, JA solar, RenewSys, Trinasolar , SunPro, Risen ,Haitai Solar, Astroenergy or Equivalent

	• Solar modules will be mounted on poles (use steel structure, painted, minimum of 4 poles), The steel structure stand for solar modules must be covered with **two layers of paint,** one made with a rust-proof paint and the other made with a thick paint finish or galvanized. • Employ the services of a Geomatics Professional (GPr) or Geomatics Technologist (GTg) before steel structure stand for solar modules is erected. Optimum tilt angle must be from 20 to 35 degrees. • Supply and install a **solar pump inverter** to supply power to the existing borehole submersible pump • Supply and install a protection cabinet which will serve a purpose of protecting equipment from overload (fuses), switch off the installation to perform maintenance via a main switch ON / OFF, protect the installation from lightning strikes and surges (surge arresters - SPD), as well as creating a central point of grounding • Typical required solar pump inverter specifications: Drive rating 5.5kW, Max. motor rating 2.2kW, Output voltage 220V, Phase Single, Max. input voltage 450V, Optimal range 360V-430V, Rated output 20A

All solar pump systems must be grounded via a ground rod. Equipment to connect to the ground network are:

Equipment to be grounded	**Size and type of wire to connect to the ground rod**
Solar panels	Same size as solar panels cables
Solar panel support/stand and metallic frames	16 mm^2 / Insulated or Bare Copper
Lightning arrestor inside the protection cabinet	16 mm^2 / Insulated

Metal frame of pump controller or inverter if in a metal frame	16 mm^2 / Insulated
Pump controller or solar pump inverter	Same size as power supply cables
Submersible pump	Same size as power supply cables

Figure 3 Pump Control Box and DB for Submersible Pump (The current power source is to be replaced by solar PV system)

Warranties

All equipment (Inverters, solar modules, solar pump inverter etc) installed must have a manufacturer's warranty. The service provider shall provide a 12-month guarantee on the workmanship of 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.

All electrical equipment must be installed by a qualified electrical wireman (Proof of qualification to be provided with proposal) with a valid registration with the Department of Labour. A valid electrical certificate of compliance must be issued once installed, specific to the installation of the solar system. The installation must be compliant with SANS 10142 and all its parts. The installation must comply with all warranty claim processes specific to each brand of equipment. The service provider must hand over all documents related to warranties.

Warranties Periods:

- Hybrid Inverter: 5-Year warranty
- Solar modules: 12 Year product warranty and 25 Years linear power performance Warranty
- Solar pump inverters: 1 year

Experience

Qualified service providers are required, but more than that, experience is required. Service providers must provide reference letters for 3 recently completed projects with similar size specifications (At least one of the projects must a be grid-tied system with a minimum capacity of 5kW in size) and traceable contact details of at least three past clients.