



MEGATECH MGT TECHNICAL PAPER

Documents

Technical Paper

Technical Paper Summary

MGT Solar (Pty) Ltd team and partners develop, build, finance, own and operate solar power plants with battery storage thereby delivering renewable (“green”) energy at competitive prices to “blue chip” energy off-takers. We work closely with customers to:

- Address renewable portfolio requirements with flexible solutions
- Hedge costs of energy iii) Provide green energy (solar, wind, biomass, waste to energy). Our core competencies and key advantages i) Internal R&D to optimize system design and production ii) Leading monitoring technology maximizing uptime and production
- Financing capabilities to enable project growth, +R1 Bil in projects iv) Regulatory support enabled for energy markets. Our experience in SA, is derived from collaboration with our key partners having developed over 400 MW’s worth of Renewable Energy Projects.

Financials

The CO2 reduction contributes greatly to South Africa’s Climate Response Paper targets for Corporate Companies.

The Solar Generator will be connected to the ESKOM Grid and metered in kWh at the point of evacuation of the energy into the grid and the relevant PPA tariff applied. Upon commissioning in early 2023, the kWh PPA rate will be pegged at a NERSA (National Energy Regulator) approved tariff and escalated annually at a rate as agreed with the energy Off-taker.

The maintenance of the generator (project) will be subcontracted to a reputable partner (as risk mitigation) on an EPCM (Engineering, Procurement, Construction & Management) contract for the duration of Life of Project.

Here is our technical proposal for a 60MWp (initially a number of staggered 10 MW DOCUMENTS PV with ESS projects) Photovoltaic generator and required Energy Storage (Arbitrage function) Hybrid Solution that will be built, commissioned and operated by MGT Solar on land leased for up to 30 years from the Landowner with the resultant power generated, evacuated into an Eskom substation for distribution by Eskom SOC.

We propose to use a single axis ground-mounted system designed to operate optimally for at least 25 years. The arrays will follow the gradient of the land and oriented to the north, tilted between 22 and 30 degrees from the horizontal azimuth for optimality of energy production for the lifetime of the project.

Our portfolio has its own PV components that have been tried and tested for two decades. For this project, we will use Tier 1, 440w modules (PV Panels). The modules come with a standard 10-year manufacturers’ warranty as well as a 25 year performance warranty; in the 25th year of operation, the module is warranted to perform at a minimum of 90% efficiency.

Pyranometers, module temperature sensors and compact weather stations will be installed at strategic points to measure the ambient conditions prevailing during operations. The data generated is used to assess the performance of the built plant. It provides a means of comparison to ensure that the plant is working optimally.

We will be using an Energy Management System (EMS) with proprietary AI (Artificial- intelligence) software to monitor and control the plant remotely in Real Time - a server will be installed on site from where data will be uploaded to a cloud server. The grid connection design and construction will be undertaken by a National Utility (Eskom) approved High Voltage Engineering Design company in line with Eskom’s Grid Code and specific approved Budget Quote. An international engineering, design and advisory company specializing in RE Projects in Southern Africa will serve as Owners Engineer to MGT Solar and manage the full procurement, construction and commissioning of the project.

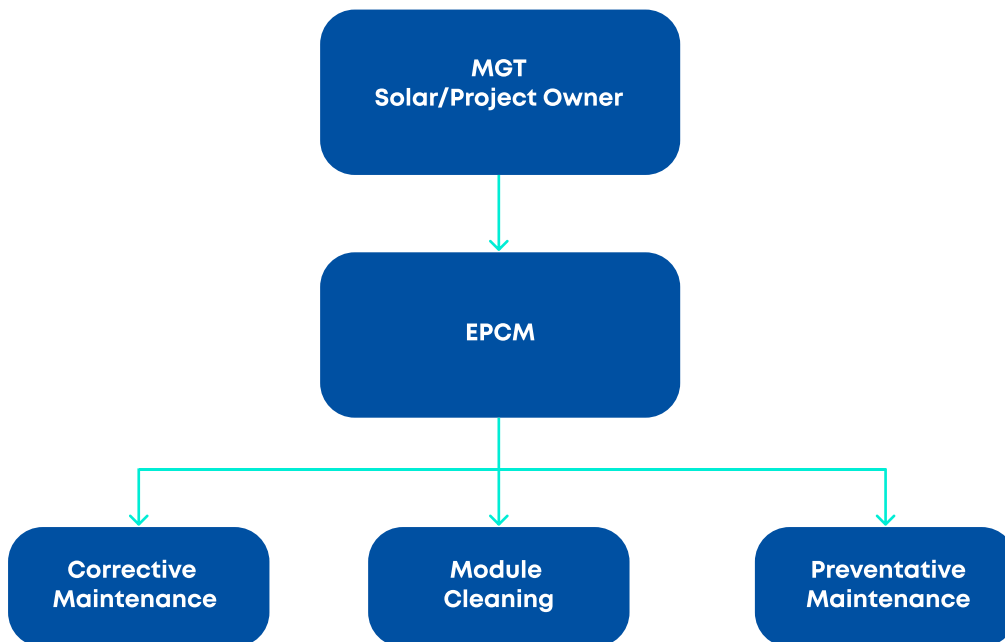
An analysis has been undertaken for this project to determine the energy yield at the site using our proposed system. Solar GIS was used for this study. Note that Solar GIS is an internationally used tool that uses data from several international weather sources including NASA, INREL, etc., where weather data has been recorded for the past 20 years.

The system will have a monitor and control unit with artificial intelligence and operable from the Operations Centre including a video recording facility feeding data to a cloudbased server.

While the plant will be monitored, any Corrective and Preventive Maintenance will be carried out by skilled locally appointed onsite personnel. Full time personnel will be employed to undertake the cleaning of modules to ensure that the performance ratio is optimally maintained.

24-hour energy forecasts will be provided daily so that ESKOM is able to plan its distribution schedules. Monthly performance reports will always be available.

Job creation is one of the most important imperatives of the SA economy. With the experience gained from previous such projects we can quantify the jobs that will be created specifically by this project. Each job is based on 1 person working 5 days per week for 45 hours each week. For this project, most of the jobs would be carried out by South Africans, directly in support of policy.



*Illustrative only - Courtesy of the Nidec Technologies

The Energy Storage Solution (BESS) that will be implemented, is manufactured by Nidec Technology Solutions (ranked in top 3 globally), in collaboration with ZPN Energy and offers up to 100 MWh installed storage capacity. The BESS Unit consists of batteries, a power and energy management system, power conversions systems based on active front end inverter technology, along with transformers, cooling systems and protective circuit devices. Batteries can be configured in modules of up to several megawatts for use in different battery topologies according to performance requirements. Robust, modular solutions based on proven industrial technology that minimizes installation and maintenance times, prolongs system life and enhances safety.

Power Conversion Systems are designed and built in-house using the same components as their industrial product line, which means spare parts and upgrades will be available for the life of the equipment. Rugged and robust, these products have a proven track record for performance and efficiency. It boasts a proprietary, real-time integrated Power and Energy Management System which operates on standard hardware platforms.

The solutions team remains responsible for the O&M over 25 years and ensures this technology remains sustainable throughout the life of the project.

Power Plant Method Statement and Outputs

The Operating cost of this project is embedded into a Project Management Company, MGT and the Operations and Maintenance Contract is agreed with a top tier EPC to uphold all Warranties and Performance Guarantees of the Power Plant. The calculation towards OPEX also considers, Insurance, Business Risk, Charging Costs from the grid, and most importantly, re-capexing of Invertor replacements at year 12 and ongoing maintenance of the Battery Cells.

The installed capacity of the PV plant delivers an AC output of 60MW, with the BESS facility with a 100MWh installed capacity.

At the Grid connection point, 60 MWp renewable energy is evacuated into the grid via a 'step-up' transformer. The exported power is to be consumed by the grid at POC (Point of Connection) and is metered by the Utility (ESKOM) at the time of kWh and quantity. The virtual power is "wheeled" to the off taker and credited to his consumer utility bill at quantity of kWh and tariff band.

Compliance Requirements

60 MW PV & 100 MWh Storage connected to Eskom Grid for wheeling energy to an off-taker for offset:

- Eskom GAU Permission process (Grid Connection Acceptance)
- RE Generator Registration - NERSA
- EIA Legislation for RE projects.

Renewable Energy Basic Assessment Requirements under GNR 544 Classified Activity 1 Activity 1: The construction of facilities or infrastructure for the generation of electricity where: i) the electricity output is more than 10MW but less than 20MW; or the output is 10MW or less but the total extent of the facility covers an area in excess of 1 hectare. Solar, Wind, Biomass and Hydro Basic assessment report in terms of the Environmental Impact Assessment Regulations, 2010, promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.

The proposed project will involve the construction and operation of a solar PV facility, with supporting infrastructure such as power lines and connection points and will produce a total generation capacity of not more than 20MW, occupying a total footprint of approximately 17 ha. In terms of the EIA Regulations published in Government Notice R543 of 2 August 2010 in terms of Section 24 (5) of the National Environmental Management Act (Act No. 107 of 1998), certain listed activities as set out in Government Notice 1, GN R544 require an environmental authorization, through a Basic Assessment (BA) process, before they can proceed.

The EIA and Empire will be submitted to the Competent Authority for a Decision within the legislated 90-day timeframe.