

## PROJECT PROPOSAL

### 20MWP PV SOLAR POWER PLANT GHANA SOLAR PARK

The implementation of this project for a 20MWp plant will annually lead to a net CO<sub>2</sub> carbon emission reduction of 7,202 tons, with an overall 144,040 tons over a period of 20 years.

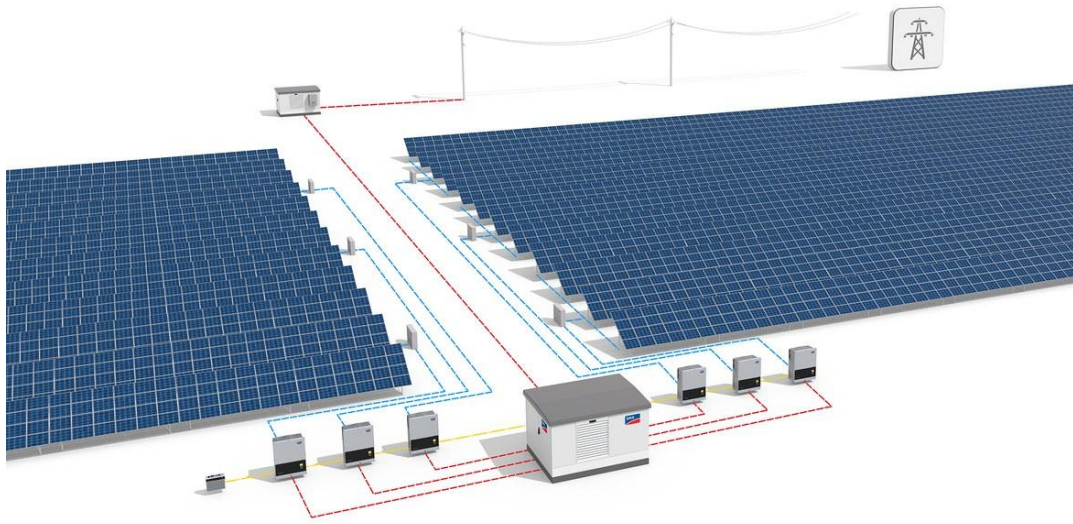
A study conducted by the National Renewable Energy Laboratory of USA on the Solar Energy potential in Ghana highlighted the potential areas suitable for Solar Energy development .



#### Available infrastructure in the area :

The project location is in a non- urban area which is currently under general agricultural activity. The land is essentially flat, cleared and fenced for the implementation of the project, The nearest grid substation is in 33kV Grid Substation. The provided infrastructure includes the following included into project cost :

1. 33kV Lynx Double Circuit line grid substation
2. The installation of a new 33kV grid substation
3. HT metering equipment would be installed at the power house premises.



## Proposed Plant Design

The preliminary plant design of a 20MWp Solar PV power plant on a fixed tilt basis, targeting an on-grid solar PV system is as follows :

1. 250Wp modules – Quantity 96,000
2. To build a solar power plant of 20 MW is required building area of 50ha
3. 60 kWp String inverters – Quantity 356, or 11 central system inverter
4. 6 mm<sup>2</sup> DC cable connected between panels and string inverters
5. Galvanized C-cross section tubing and cemented mounting structure with cross pattern
6. 33kV supply line connection
7. 11 X 2 MVA Transformers
8. Medium voltage connection box for electricity board connection with auxiliary connections
9. 33kV Double circuit cable and metering equipment
10. SCADA system/online monitoring system
11. Fence for PV power plant(approx. 50 ha) and video surveillance



## Design Parameters

### Centralized solutions –SMA

Quantity - 11 central system inverter

DC System size – 22MWp

AC System size – 20MWP



In the new SMA Utility Power System, the transformer optimized for outdoor deployment is the perfect partner for the new Sunny Central inverters. The busbar-connection between the inverter and transformer is included as standard. The MV transformer is modularly extensible with medium voltage switchgear, oil containment and tracker transformer. As a turnkey solution, the inverters and medium voltage block are tested and delivered as a single unit, resulting in reduced on-site expenses.



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2. Hours of Sunlight in Ghana per day – 6.8 hours average
3. Average production Rate – 41.69 GWh/ year
4. Average production per month – 3,474,000 KWh



### Product Warranty

1. Solar modules – 25 years energy production warranty, 10 year manufacturer warranty. First 10 years at over 90% of rated power output, and more than 80% rated power output in the subsequent 15 years up to the 25th year
2. Inverters – 20 year manufacturer warranty. The replacement cost is estimated to be 4% of the total project cost at the 20th year.

### Planned buildings on site (optional)

1. Two separate quarters for onsite security personal and staff/labor each 50 m<sup>2</sup> in floor area
2. Installation of a maximum 800Wp solar off grid electricity power supply to the onsite staff quarters generating max 106KWh per month.

### Cost Factors :

Before the start of the project it is necessary to make the following documents:

1. Project feasibility document
2. Environmental studies
3. Project design documentation
4. Produce technical documentation
5. Work on preparing the ground for the construction of PV power plants
6. Construction of access road and location for transportation equipment

**ESTIMATED TOTAL PROJECT COST = US\$ 50,700,000**

1. Contracted electricity purchase price = US\$ 0.17 / KWh ( As per Standardised Power Purchase Agreement)
2. Gross Monthly income based monthly average output is 3,474,000 KWh = US\$ 590.580,00
3. Estimated maximum O & M cost per month at 3 %= US\$ 24.970,00
4. Net Monthly Income = US\$ 590.580,00
5. Net year Income = US\$ 7.086.960,00
6. Simple payback period= 6.6 years

**Note :**

This calculation is made on based on available data , the actual value project will be determined after the development of project documentation and cost estimate , therefore it is possible that actual price will be different from above .

For the purposes of design, environmental impact studies and project preparation, it is necessary to pay in advance 20% from the reference value of the project.

