

100kW GROUND MOUNTED SOLAR PHOTOVOLTIC POWER PLANT

DETAILED PROJECT REPORT – AERO SPACE MATERIALS PVT LTD

EXECUTIVE SUMMARY

1. Location

- i) State : TAMIL NADU,
- ii) Locality : KOVILPALAYAM, POLLACHI
- iii) Latitude : 10° 45' 16.22" N
- iv) Longitude : 77° 01' 15.27"E
- v) Altitude : 296 Meter

2. Area for SPV Plant

- i) Area : 1500 Sq. Meters
- ii) Location : KOVILPALAYAM, POLLACHI

3. SPV Power Plant

- i) Capacity :100 kW
- ii) No. of modules : 418 (240Wp),
- iii) No. of inverters: 1,
- iv) No. of String Boxes : 1

4. Technical details of a SPV Module [BOSCH]

- (a) Type : Mono crystalline, Dimensions – 1660 X 990 X 50 mm
- (b) Electrical Parameters : Max Power Rating :240 Wp, Rated Current :8.32 A, Rated Voltage :30.06 V
Short Circuit Current : 8.60A, Open Circuit Voltage : 37.40 V

5. Mounting Arrangement

Mounting : Fixed Type, Surface azimuth angle of PV Module : 0°, Tilt angle(slope) of PV Module : 12°

6. Central Inverter

No.of units : 1	Rated Capacity : 100 KWp,	Input Voltage range : 450 - 820 V (Max.)
Output Voltage: 400 V AC	Frequency: 50 Hz,	Efficiency: 98.3%
		Make: Gamesa Electric

5. Grid Connection Details

Electrical parameters for interconnection : 415 V, 3Ph ,50 Hz

6. Annual Energy Generation :: 150,000 kWh

7. Construction Time : 15 Weeks

INDEX

1 INTRODUCTION

2 SOLAR RADIATION

3 PROJECT SITE DETAILS.....

4 TECHNICAL DETAILS OF SPV POWER PLANT.....

5 OPERATIONS & WARRANTY

6 PROJECT IMPLEMENTATION.....

1.0 INTRODUCTION

AERO SPACE has planned to install a 100kW Grid Interactive Solar photovoltaic Ground Mounted power plant at their factory premises located at Kovilpalayam, Pollachi Taluk, TAMIL NADU, INDIA.

The Solar PV plant will be installed on rooftop and Ground Mounted to make the best availability free spaces. According to the shadow free space available at the factory premises, a capacity of 100 kW can be installed. This 100 kW solar photovoltaic Grid Interactive Ground Mounted Power Plant will be installed to meet their essential loads.

The Project output will have an approximate generation of 150000 Units per annum and these units will utilized for their self-consumption.

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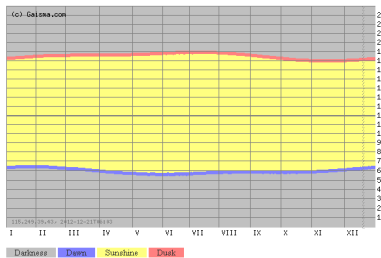
2.0 SOLAR RADIATION

2.1 SOLAR INSOLATION : (Latitude: 10° 45' 16.22" N, Longitude: 77° 01' 15.27"E)

Month	Air temp. °C	Rel. humidity %	Daily solar radiation - horizontal kWh/m ² /d	Atmospheric pressure kPa	Wind speed m/s	Earth temp °C	Heating degree-days °C-d	Cooling degree-days °C-d
Jan	23.4	0.678	4.88	96.9	2.3	25.1	0	421
Feb	25.5	0.581	5.74	96.8	2.8	28.5	0	437
Mar	27.3	0.56	6.36	96.7	2.8	31.3	0	538
Apr	26.3	0.744	5.77	96.5	2.8	29	0	496
May	25.6	0.801	5.64	96.4	3	27.3	0	493
Jun	24.7	0.814	4.61	96.4	3.2	25.6	0	447
Jul	24.5	0.795	4.4	96.5	3.1	25.5	0	454
Aug	24.7	0.776	4.74	96.5	2.9	26	0	460
Sept	25.1	0.755	5.12	96.6	2.6	27.1	0	459
Oct	24.5	0.791	4.38	96.7	2.4	25.8	0	455
Nov	23.7	0.775	4.08	96.8	2.1	24.4	0	415
Dec	23.1	0.739	4.28	96.9	2.3	24	0	412
Annual	24.9	73.40%	5	96.6	2.7	26.6	0	5487

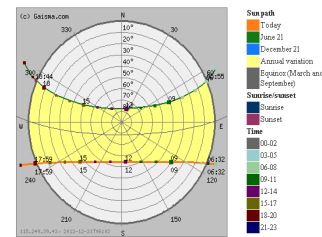
Sources: <http://eosweb.larc.nasa.gov/cgi-bin> – Fig: 2-1 – Solar Insolation data

2.2 : Sunrise, sunset, dawn, dusk times and graph



Date	Sunrise	Sunset	Length	Change	Dawn	Dusk	Length	Change
Today	06:32	17:59	11:27		06:09	18:22	12:13	
+1 day	06:33	17:59	11:26	00:01 shorter	06:10	18:22	12:12	00:01 shorter
+1 week	06:36	18:02	11:26	00:01 shorter	06:13	18:25	12:12	00:01 shorter
+2 weeks	06:38	18:06	11:28	00:01 longer	06:16	18:29	12:13	00:00 longer
+1 month	06:42	18:15	11:33	00:06 longer	06:20	18:37	12:17	00:04 longer
+2 months	06:37	18:25	11:48	00:21 longer	06:16	18:47	12:31	00:18 longer
+3 months	06:21	18:28	12:07	00:40 longer	06:00	18:49	12:49	00:36 longer
+6 months	05:55	18:43	12:48	01:21 longer	05:32	19:07	13:35	01:22 longer

2.3 Sun path diagram



3.0 PROPOSED SITE DETAILS

The Proposed location for 100KW GRID INTERACTIYVE GROUND MOUNTED SOLAR PHOTOVOLTAIC POWER PLANT having its location as, **Latitude: 10°45'16.22" N, Longitude: 77°01'15.27"E**. The photograph of the location is enclosed as attachment.

4.0 TECHNICAL DETAILS OF THE SPV POWER PLANT

4.1 DESCRIPTION OF MAIN PLANT EQUIPMENT

Grid connected solar power plant comprising main equipment and components as listed below:

- > Solar PV Modules
- > Central inverters
- > String boxes
- > Module mounting structure
- > Cable & connectors

4.1.1 Solar PV MODULES:

The system will be based on high quality mono-crystalline modules mounted on fixed steel constructions. The proposed solution will generate power during daytime only and will not include any power storage.

A PV Array is made up of PV modules, which are environmentally - sealed collections of PV - cells the devices that convert sunlight to electricity. Mono - crystalline solar module of 240Wp is being used in the proposed Project. The tech spec and IEC certificate of the said modules are attached.

4.1.2 CENTRAL INVERTERS:

The grid connected inverter range is state-of-the-art equipment with robust control platform, high efficiency, high availability, low maintenance and advance features built with quality components. The product is available in range of 100kW, 500kW, 630 KW & MW solutions in three phase configurations. Optimized efficiency factor, higher availability (by proven long life components), the latest control procedure are key features. 98.3% max. efficiency, high standards features innovative ventilation system that prevents unwanted heating and dust accumulation.



GAMESA Solar Inverter

100kW GROUND MOUNTED SOLAR PHOTOVOLTIC POWER PLANT

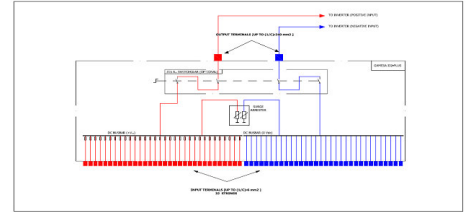
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4.1.3 STRING BOXES:-

String boxes minimize the number of DC cables that enter the central inverter in medium and high power photovoltaic installations by grouping together different chains of PV panels. These string boxes are typically enclosed in IP 65 rated polycarbonate housing.

Robustness: Boxes of the highest standard of quality, fully integrated cabling, with strong electrical protection and casings that resist the toughest of outdoor conditions; with an ingress protection of IP65.

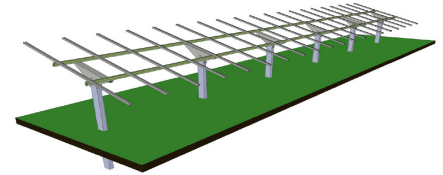
Flexibility: Standard boxes of 16, 24 and 32 strings with multiple options such as double output terminals of up to 240 mm2.



String Box

4.1.4 MODULE MOUNTING SYSTEM:-

The module mounting structure is designed for holding suitable number of modules. The frames and leg assemblies of the array structure is made of Hot Dip Galvanized materials with suitable Channel, nuts, bolts and any other section conforming to the Solar PV system to meet the design criteria. For this project, we'll use the best structure available in India, designed to provide maximum durability and longevity.



Module Mounting System – Hot Dip Galvanized

4.1.5 CABLES AND CONNECTORS:-

Cables will be extremely robust and resist high mechanical load and abrasion. High temperature resistance and excellent weatherproofing characteristics provide a long service life to the cables used. The connectors with high current capacity and easy mode of assembly are to be used for the connections of the power plant cables.

5.0 OPERATIONS & WARRANTY

The system performance can be improved as much as, by cleaning the dirt on the panels, tightening loose connections and proper maintenance in inverters.

- Full System Warranty from GAMESA 1 year
- Solar Panels (BOSCH)
 - 10 YEARS PRODUCT WARRANTY
 - 0 - 10 YEARS FOR 90% OF RATED POWER
 - 10 - 25 YEARS FOR 80% OF RATED POWER
- Inverters (GAMESA ELECTRIC) 5 years
- Module Mounting structure 5 years

6.0 PROJECT IMPLEMENTATION

The project is planned to be implemented in the Factory of AERO SPACE at KOVILPALAYAM, POLLACHI.

The most essential aspect regarding the implementation of this project is to ensure that the project will completed within the schedule, spanning 15 weeks from the receipt of In-Principle approval from MNRE.

A good planning, scheduling, and monitoring program is imperative to complete the project on time and without cost overruns.

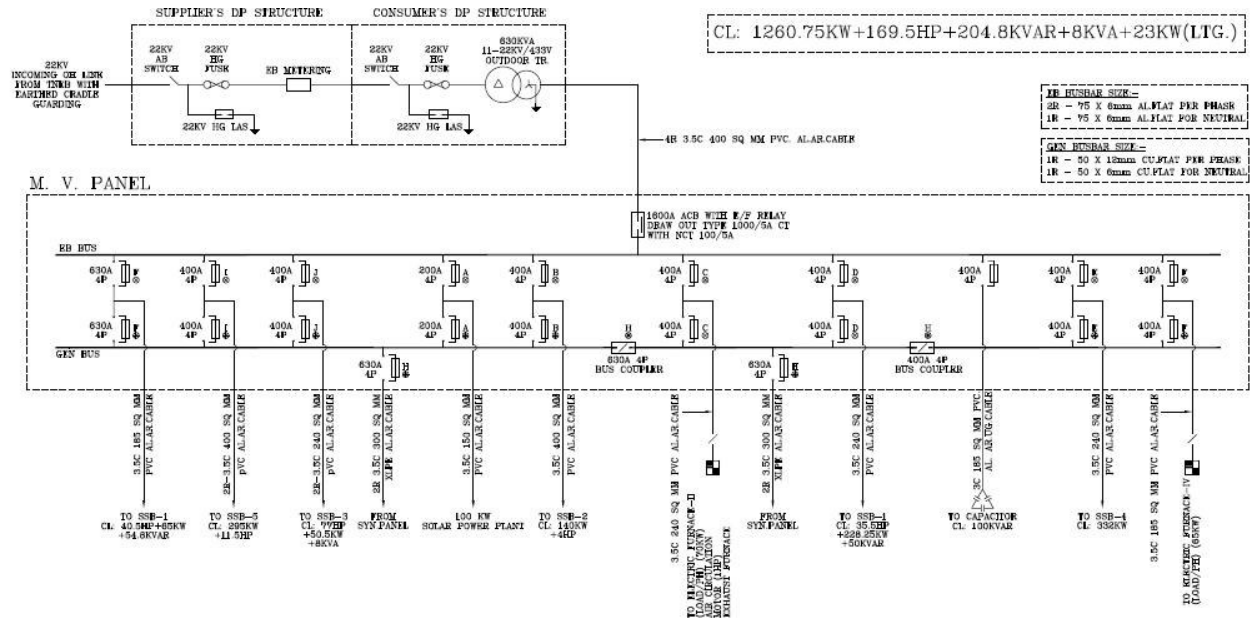
PROJECT SCHEDULE:-

100kW Ground and Rooftop Solar PV Grid Interactive - Project Schedule																	
Project Milestone Chart	Week No.																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
PO with Advance	█																
Submission of Detailed Project Report	█	█															
Approval of Design Aero Space			█														
In Principle approval from MNRE	█	█	█	█	█	█	█	█	█	█							
Procurement of BOM & Delivery at Site				█	█	█	█	█	█	█							
Handover of site by Aero Space								█	█	█							
Mechanical & Civil Installation											█	█	█	█			
Electrical Installation													█	█	█	█	
Commissioning																█	
Testing, Certification & Handover																	█

Site photos – Roof top & Ground



Connection Diagram of SPV power plant



CL: 1260.75KW+169.5HP+204.8KVAR+8KVA+23KW(LTG.)

DR BUSBAR SIZE-
 2R - 75 X 6mm AL.FLAT PER PHASE
 1R - 75 X 6mm AL.FLAT FOR NEUTRAL

GEN BUSBAR SIZE-
 1R - 50 X 12mm CU.FLAT PER PHASE
 1R - 50 X 6mm CU.FLAT FOR NEUTRAL

<u>CONTRACTOR'S SIGNATURE</u>	 SHARAVANA ENGINEERS 5/180, SIVALINGAM LAYOUT, S.V. MILLS POST, UDUMALPET - 642 126.
<u>CLIENT'S SIGNATURE</u>	
M/s. AEROSPACE MATERIALS (P) LTD., METTUPALAYAM VILLAGE, KOVILPALAYAM, POLLACHI TK. SCHEMATIC LAYOUT	