

File No.: VIS(2023-24)-PL083-069-082

Dated: 18-05-2023

LENDER'S INDEPENDENT ENGINEER'S REPORT

OF

1.19 ($\pm 10\%$) MWp GRID CONNECTED ROOF- TOP SOLAR POWER PLANT

TO BE SET-UP AT

LALPUR, DISTRICT UDHAM SINGH NAGAR, UTTARAKHAND

&

CHAKAN, PUNE, MAHARASHTRA

DEVELOPER:

M/S OPPL ASSETS PRIVATE LIMITED

TO BE SUBMITTED AT

STATE BANK OF INDIA, SME BRANCH, SOUTH EXTENSION, DELHI

- Corporate Valuers
- Business/ Enterprise/ Equity Valuations
- Lender's Independent Engineers (LIE)
- Techno Economic Valuation Consultants (TEV)
- Agency for Specialized Account Monitoring (ASM)
- Project Techno-Financial Advisors
- Chartered Engineers
- Industry/ Trade Rehabilitation Consultants
- NPA Management
- Panel Valuer & Techno Economic Consultants for PSU Banks

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1.19 (± 10%) MWp GRID CONNECTED
ROOF-TOP SOLAR POWER PLANT

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PART A

REPORT SUMMARY

1.	Name of the Project	1.19 ($\pm 10\%$) MWp Grid Connected Roof-Top Solar Power Plant
2.	Project Location	1. Mahindra CIE Automotive Ltd. – Stamping Division, Lalpur, Kichha, District Udham Singh Nagar Uttarakhand – 263148 GPS Coordinates– 28°56'20.2"N 79°28'02.9"E 2. Mahindra CIE Automotive Ltd – Gears Division, Plot No. C-23/2, Phase-II, Chakan Industrial Area, Varale Ambethan Road, Varale, Maharashtra–410501 GPS Coordinates– 18°47'47.5"N 73°47'53.9"E
3.	Seller Company	M/s OPPL Assets Private Limited
4.	Prepared for Organization	State Bank of India, SME Branch, South Extension, Delhi
5.	LIE Consultant Firm	M/s. R.K. Associates Valuers & Techno Engineering Consultants (P) Ltd
6.	Date of Survey	Since, our scope of work includes only the verification and Review of total Project cost, CUF and Irradiation Data, site visit is not required.
7.	Date of Report	18-05-2023
8.	Details & documents provided by	Mr. Mohit Jangra; Assistance Manager Finance and Accounts M/s Oriana Power Pvt. Ltd.
9.	Report Type	Lender's Independent Engineering Report
10.	Purpose of the Report	Verification and Review of Project cost, CUF and Irradiation Data to facilitate bankers to take business decision on the Project.
11.	Scope of the Report	To review Project cost and examine the current status of installation/ Commissioning of the Project.
12.	Documents produced for Perusal	a. Copy of Power Purchase Agreements (PPAs) b. Copy of Techno-Commercial offer from OPPL to OPPL Assets Pvt. Ltd. c. Copy of Plant Layout d. Copy of PV Syst reports
13.	Annexure with the Report	<ul style="list-style-type: none">• Benchmark Cost by MNRE• Market Comparables• Global Solar Atlas by World Bank Group• Layout Plans

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PART B**INTRODUCTION**

- 1. NAME OF THE PROJECT:** 1.19 (± 10%) MWp Grid Connected Roof-Top Solar Power Plant in RESCO Model to be installed at 2 locations which are described in Part A.2 above by M/s OPPL Assets Pvt. Ltd.
- 2. PROJECT OVERVIEW:** M/s OPPL Assets Pvt. Ltd. is a SPV of M/s Oriana Power Private Limited (OPPL) which is an associate company of Trinix Impex & BCS Switchgear Industries. It is a MNRE approved channel partner and into the business of Solar EPC / Design & Supply of BoS (Balance of System – Module Mounting Structure, LT/ ACCB/ ACDB/ DCCB Panel, Weather Monitoring Sensors, LA, Earthing, Cable Tray, etc.) for PV Solar Plants in India.

M/s Mahindra CIE Automotive Limited (hereinafter referred to as "Offtaker") has signed 2 PPA agreements with M/s OPPL Assets Private Limited (hereinafter referred to as "Power Producer") in March 2023 for Design, Manufacture, Supply, Erection, Testing and Commissioning including Warranty, Operation & Maintenance of 2 roof-top solar power plants at their stamping and gears divisions at Lalpur, Kichha, District Udham Singh Nagar Uttarakhand – 263148 and Plot No. C-23/2, Phase-II, Chakan Industrial Area, Varale Ambethan Road, Varale, Maharashtra-410501 respectively having a total DC capacity of 1.19 (± 10%) MWp at basic / Floor Tariff: Rs.4.55/ KWh and Rs.4.30/ KWh for Stamping and Gears Division respectively levelised for 25 years of plant operation/ PPA tenure.

For the implementation of the subject project, M/s OPPL Assets Pvt. Ltd. has engaged its parent company M/s OPPL for the design, supply, erection, commissioning of Roof Mounted Grid Tie Solar PV plant (Subject Project)

In this respect M/s OPPL has shared a Techno-Commercial offer to M/s OPPL Assets Pvt. Ltd. which is deemed to be accepted, as per the verbal information shared by the management of the subject company. However no contract agreement has been signed between both in this regard. As per the same, the total project cost is estimated at a price of Rs.5.48 Cr. including duties and taxes.

M/s OPPL Assets Pvt. Ltd. has approached SBI for credit facility to construct these plants who have in turned appointed M/s R.K Associates Valuers & Techno Engineering Consultants Pvt. Ltd. as Lenders Independent Engineer for a specific scope of work.

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Since, our scope of work includes only the verification and Review of total Project cost, CUF and Irradiation Data, site visit is not required.

RESCO Model: -

MNRE had introduced the PPP/RESCO model policy setting tariff rates for solar to be arrived on transparent competitive bidding model through PPP route.

*The RESCO model is one of the methods of implementing rooftop solar installations. Under the RESCO model, a renewable energy service company ("**RESCO**"), (i.e., an energy service company that provides energy to consumers from renewable energy sources), develops, installs, finances, operates and owns the rooftop solar power project ("**Project**"), and supplies power generated from the Project to the consumer on whose premises the Project is set up ("**Customer**") or to the grid through net-metering.*

*'Build, Own, Operate and Transfer' (BOOT) is a special kind of RESCO model in which the RESCO constructs, owns, operates, and transfers the ownership of the Project to the Customer after the expiry of a predefined period. The RESCO and the Customer enter into a long-term power purchase agreement ("**PPA**") for an agreed tenure, which sets out, among others, the terms at which the power generated from the Project will be sold to the Customer and the tariff at which the power will be sold. Excess power from the Project (if any) could be sold by the Customer to the distribution utility through net metering system – the net metering regulations differ from state to state.*

Under the PPA, the RESCO owns the Project and is responsible for its installation as well as its operation and maintenance of the Project throughout the tenure of the Project, and at the end of the PPA term, the ownership of the Project is transferred to the Customer. Thereafter, the Customer may either choose to retain the RESCO for operation and maintenance services or engage a third-party operator.

If the entity on whose premises the Project is located does not intend to buy the power generated from the Project and does not entered into a PPA with the RESCO, that entity can either lease the rooftop premises to the RESCO by means of a lease agreement or enter into a license agreement granting the RESCO the right to use the premises for the limited purpose of setting up and operating the Project. The RESCO then operates the Project and exports the energy generated to the local distribution utility at a predetermined feed-intariff (FiT)

approved by the State Electricity Regulator under relevant schemes issued by the relevant state.

3. SCOPE OF THE REPORT: To verify and review the Project cost, CUF and Irradiation Data of the Solar Power Plants set-up/ being set-up by M/s OPPL Assets Pvt. Ltd.

- *Industry/ sector research and demand & supply trend is out of scope of the report.*
- *Financial feasibility study of the Project is out of scope of the report.*
- *Providing any kind of design report or map is out-of-scope of the report.*
- *Scrutiny of contracts, Agreements and arrangement between the parties from legal perspective is out-of-scope of this report.*
- *Location feasibility is ascertained based on the PVSyst Report provided by the client.*
- *Any kind of technical & economic feasibility of the Project is out-of-scope of this Report.*
- *Site inspection or present status of the project through site visit is out of scope.*

All the assessment carried out for the Project is done based on the documents and information provided to us and various other discussions with the Project proponents and thus forming an opinion out of it.

Component wise verification is not carried out.

4. PURPOSE OF THE REPORT: To provide fair detailed analysis report to the Bank based on the "in-scope points" mentioned above for facilitating them to take appropriate business decision on the Project.

5. METHADODOLOGY ADOPTED:

- a. To gather relevant data/ information/ documents related to Project planning, execution, current status.
- b. Study of copy of Project Planning documents/ Agreements to know the scope of work of the company.
- c. To procure, study and analysis of any additional information, data, and documents required/ provided by the company.
- d. Research about the Project/ sector from the sources in the public domain.
- e. Correlation of the provided information against Industry/ sector benchmarks/ trend.
- f. Information compilation, analysis and reporting.

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PART C**PROJECT DETAILS AND KEY TECHNICAL PARAMETERS**

As per the information and copy of documents shared by the management of the company, details of the subject plants has been tabulated below:

S. No.	Offtaker	Capacity As per Drawing (kWp)	Capacity As per PPA (kWp)	Address
1	Mahindra CIE Automotive Ltd. – Stamping Division	650.1	650.16	Lalpur, Kichha, District Udham Singh Nagar Uttarakhand – 263148
2	Mahindra CIE Automotive Ltd. – Gears Division	540.1	539.46	Plot No. C-23/2, Phase-II, Chakan Industrial Area, Varale Ambethan Road, Varale, Maharashtra-410501
Total		1,190.2	1,189.62	($\pm 10\%$)

As per the copy of module layout plans of both the sites, Key Technical Parameters & Configuration of the projects like Modules, Inverter, tilt angle, capacity, etc. are tabulated below:

1. Mahindra CIE Automotive Ltd – Gears Division

S. No.	Particular	Figure	UOM
1	Proposed Capacity	540.1	kWp
2	Total No. of PV Modules	982	No.
3	PV Modules Capacity (Mono-Crystalline)	550	Wp
4	PV Module Dimension	2284 x 1137 x 35	mm
5	PV Module Mounting Orientation	Landscape	
6	Module Mounting Structure Angle	As PER Tin Shed	

2. Mahindra CIE Automotive Ltd. – Stamping Division

S. No.	Particular	Figure	UOM
1	Proposed Capacity	650.1	kWp
2	Total No. of PV Modules	1,182	No.
3	PV Modules Capacity (Multi-Crystalline)	550	Wp
4	PV Module Dimension	2279 x 1134 x 35	mm
5	PV Module Mounting Orientation	Portrait	
6	Module Mounting Structure Angle	As PER Tin Shed	





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Location Maps: -



Location: Stamping Division

GPS: 28°56'20.2"N 79°28'02.9"E



Location: Gears Division

GPS: 18°47'47.5"N 73°47'53.9"E

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Technical details as per Techno-Commercial offer from Orient Power

S. No.	Item Description	Technical Specifications	Quantity	Unit	Make
A PV Section					
1	Solar PV module	230Wp-550Wp Mono-PERC/Multi-Si 25yrs. Linear warranty Certifications: IEC 61215, IEC 61730 & UL 1703; IEC 62804 (PID) IEC 62716 (Ammonia Resistance), IEC 60068-2-68 (Blowing Sand) IEC 61701 (Salt Mist level 6), , ISO 11925-2 (Class E) ISO 9001: 2015, ISO 14001: 2004, OHSAS 18001: 2007	1.190	MWp.	ALMM Approved/As per Policy
2	Connectors (male & female) pair MC4	Connectors (male & female) pair, MC4 Connector Pin Copper with tin coating Insulation Voltage: 1000V	As per requirement	Nos.	Multi Contact
3	Solar String Inverter – 50/100/250kVA, 415V	50/100/250kVA, 415V output, Outdoor type-IP65, Eff. >98%	As per Design	Nos.	Sungrow/ Grow att /Equivalent
B Structures					
1	Design & Supply of Module Mounting structure supply.	Roof Mounted Ballasted Solar Module Mounting Structure. Material: MS HDG Grade: E 250 Galvanisation: 80micron Structure designed at 170kmph wind speed as per IS- 875 Ground Clearance 1 mtr.	As per requirement		Oriana Power
2	Structure & Module Mounting Accessories.	Material: SS Grade: SS 304 Structure designed at 170kmph wind speed as per IS-875	As per requirement		Oriana Power
C Remote Monitoring System					
1	Ambient Temperature sensor	PT1000 sensor element	1	Set	IMT
2	Module Back Surface Temperature sensor	PT1000 sensor element	1	Set	IMT
3	Solar Irradiation sensor for radiation measurement	Cell Based sensor with calibration certificate	1	Set	IMT
4	2 Pair Twisted Un - armoured communication cable, Cu		As per Design	Mtr	K-flex/parasheild
5	HDPE DWC Conduit, Size of 32/26mm & Accessories (PVC bends & couplers etc.)	Double Wall Corrugated HDPE Conduit for communication cable laying over shed. Conduit will be fixed with shed using GI Saddles and aluminum pop rivets.	As per Design	Mtrs	Duraline/ equivalent
6	3C 1.5Sq. mm Armored Copper Cable - Data Logger Power cable		As per Design	Mtr	Polycab
7	CAT 6 cable		As per Design	Mtr	Dlink
8	Data logger Installation and IP 65 Box	For Remote monitoring	As per Design	Nos	Webdyn



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S. No.	Item Description	Technical Specifications	Quantity	Unit	Make
9	SCADA for Solar Plant monitoring and Grid monitoring	Visual inter-facing for plant monitoring and data analysis	As per Design	Lot	Webdyn
D DC side - Cables & Accessories					
1	1 Core 4 Sq mm Cu Solar Cable	Solar DC cable, Tin-coated copper cable as per EN standard. UV protected double sheathed XLPO, Halogen free cable.	As per Design	Mtrs	Apar/Siechem/ Equivalent
2	1C 2.5 Sq mm Green Cable (for Earthing), with accessories	2.5 sqmm. Single core flexible PVC insulated cable for module to module earthing with SS-304 fasteners, teeth washer and copper thimbles.	As per Design	Mtrs	Polycab/KEI
3	DC Electrical accessories	(Consumables like Lugs, Glands, Ferrules, Cable Ties, uPVC tape, uPVC saddle, Cable clips etc.)	As per Design	Set	As per Design RFQ
4	HDPE DWC Conduit, Size of 32/26mm & Accessories (PVC bends & couplers, T Joints etc.)	Double Wall Corrugated HDPE Conduit for DC cable laying over shed. Conduit will be fixed with shed using GI Saddles and aluminum pop rivets.	As per Design	Mtrs	Apollo/ equivalent Duraline/
E AC side - Cables & Accessories					
1	4 C, 25 Sq.mm Cu PVC Flexible Cable.	1.1kV insulated, Copper conductor, PVC insulated, PVC outer sheathed cable	As per Design	Mtrs	Polycab/KEI/ Havells
2	3.5 C, 150 Sq.mm AL XLPE Arm Cable.	1.1kV insulated, Aluminum conductor, XLPE insulated, GI strip armoured, PVC outer sheathed cable as per IS-7098 Part-1	As per Design	Mtrs	Polycab/KEI/ Havells
3	Cable for earthing- 1C 10 sq.mm Cu flexible (for Inverter earthing)		As per Design	Mtrs	As per Design RFQ
4	Field ACDB for inverters output	3 phase, 415 V, 50 Hz ACCB Panel with - Enclosure material made of CRCA with Powder coated paint - 4P, MCCB's - as per requirement - 4P, Isolator - 3 phase, 4 W, AL, bus bar. - IP 65 with canopy - Panel with double door & lock - SPD Type 2 - with mounting arrangement	As per Design	Nos	Breakers Make: L&T
5	Isolator Panel near Metering Panel	3 phase, 415 V, 50 Hz ACCB Panel with - Enclosure material made of CRCA with Powder coated paint - 4P, 700A MCCB's - 3 phase, 4 W, AL, bus bar. - IP 54 with canopy - Panel with single door & lock - with mounting arrangement	As per Design	Nos	Breakers Make: L&T
4	Cable tray for AC cable laying after inverter	50mmX50mmX2mm Hot dip galvanized cable tray with cover and other accessories i.e. cable tray stand, cable tray cover clamp, cable tray	As per Design	Nos	Oriana Power

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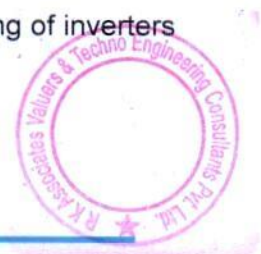
S. No.	Item Description	Technical Specifications	Quantity	Unit	Make
		coupler, M8 MS HDG Fasteners, anchor bolts etc.			
F	Civil Works				
1	As per site requirement	Civil work for Structure, electrical panel foundations, Structure Foundation, earthing pit chamber construction.	1	Set	As per RFQ
G	Safety & Protections				
1	Fire extinguisher With sand bucket (4 Kg ABC type)	4 Kg ABC type fire extinguishers with stand	As per design	Set	As per Design RFQ
2	Earthing Kit for plant AC and DC earthing	Copper Bonded rods 3m, 17.2 mm, chemical bags and other required accessories. Earthing pit chamber will be constructed and Cast iron cover will be installed	1	Set	VNT/JMV/GS Electrode
3	Lightning Arrester for protection of solar power plant	ESE Type, GI mast, 2 Earthing pit , 1 C 70 mm ² Cu PVC cable, 2 set of earthing for one lightning arrester, R-109 Meter , Stay Set support.	As per design	Nos.	VNT/JMV/Allied Power
4	GI Strip 25X3 mm for DC side	Hot dip galvanized earthing strip with minimum 80 micron. Material grade E-250	As per Site Req	Meter	As per Design RFQ
H	Services				
1	Installation, testing and Commissioning	Complete plant service work	5	MWp	As per Design RFQ
2	Module cleaning system with uPVC pipe line system and pump.	1 HP, 230V Centrifugal pump, CPVC Pipe (1/2 inch) line over roof with shut-off valves, CPVC pipe will be fixed over roof with SS saddles gitti-pench. Flexible Hosepipe (1 inch) of 40 Meter length, Wiper 1.5 Meter length, Extendable Pole Piping for Each Roof, Piping as per detail drawing	1	Set	Ashirwad/Astral/Equivalent

The above-mentioned installations/parts are provided as per best industrial practice and can be verified after commissioning of the project. The specification for the items mentioned in the above Techno Commercial Offer to be inline and with as per government guidelines.

Client's Scope of work

- Provision of permission to work on site
- Clear shadow free area / Tin shed for the installation of PV modules & equipment's.
- Entrance/working permission for local labor for loading/un-loading work.
- Electrical power point nearby to site for electricity requirement during construction.
- Water tap points (minimum 1 inch) at PV plant site for module cleanings system
- Internet / SIM card with data packs shall be provided at site for remote monitoring of inverters and other devices.
- Documents required for CEIG approval/DISCOM NOC/Bi-directional Meters.

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PART D**ENERGY YIELD ASSESSMENT**

Company has used PVSyst V7.2.21 to assess energy yield calculation which is the standard Industry practice. The yearly average of main results of irradiation and energy yield from the provided PVSyst is as under:

S. No.	Plant Location	Annual production probability (MWh)		Specific Production (kWh/kWp/year)		Expected Generation (kWh/ annum)		Performance Ratio (%)
		P50	P90	As per PPA	As per PVSyst	As per PPA (90% of expected generation)	As per PVSyst	
1	Mahindra CIE Automotive Ltd. – Stamping Division	828.0	808.9	1,300	1,274	7,60,687	8,27,994	78.58
2	Mahindra CIE Automotive Ltd – Gears Division	813.7	794.9	1,500	1,507	7,28,271	8,13,722	83.06

Analysis of Irridiation & PV Output data: In respect to Irridiation & PV Output data, company has provided to us PVSyst report V7.2.21 in which key Irridiation components and PV Output data is given as enumerated in table below. We have analysed and compared it with other data source points also such as Solar Resource by Global Solar Atlas of World Bank and ISRO Solar Calculator to confirm its legitimacy as mentioned in table below:

Particulars	Stamping Division		Gears Division	
	As per Global Solar Atlas	As per PVSyst	As per Global Solar Atlas	As per PVSyst
Global horizontal Irradiation (kWh/m ²)	1783.2	1622.2	1945.2	1815.5
Diffuse horizontal Irradiation (kWh/m ²)	874.3	894.3	898.0	760.40
Direct Normal Irradiation (kWh/m ²)	1360.8	-	1504.4	-
Specific Photovoltaic Power Output	1530.80	1274	1621.4	1507
Annual Global Insolation (ISRO Solar Calculator) (kWh/m ² /year)	1427		1722	

Observations and Remarks:

- As per the PVSyst - Simulation reports dated 21st April 2023, the estimated energy that can be produced by the subject plants and their respective performance ratio is almost equal as agreed in the PPA.
- As per comparative analysis, PVSyst Irridiation and PV Output data is in line to our analysis from Global Solar Atlas of World Bank and ISRO Solar Calculator.



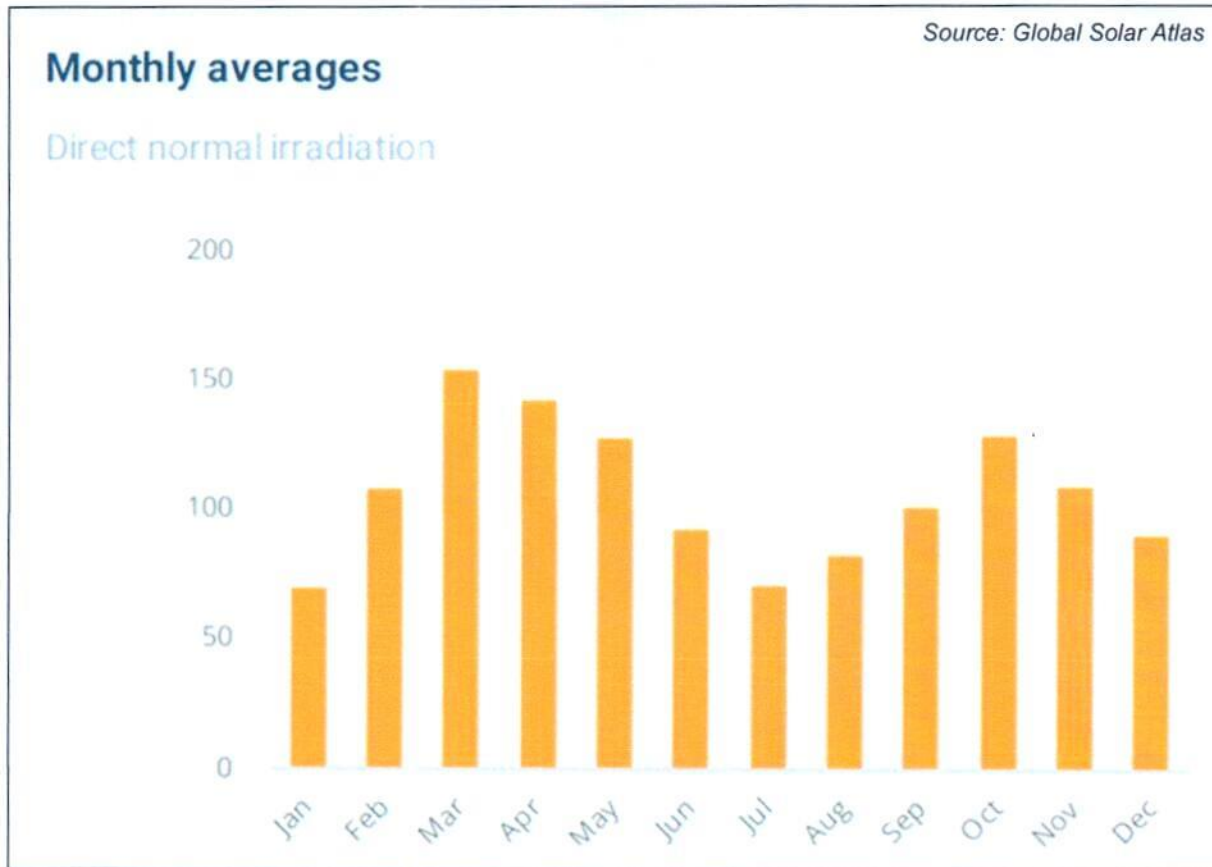

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3. As per the information provided by the management of the company, the estimated Plant Load Factor (CUF at P90) is 14.20% and 16.80% for Stamping and Gears Division respectively.

Monthly averages- Direct normal irradiation (kWh/m²)

1. Mahindra CIE Automotive Ltd. – Stamping Division



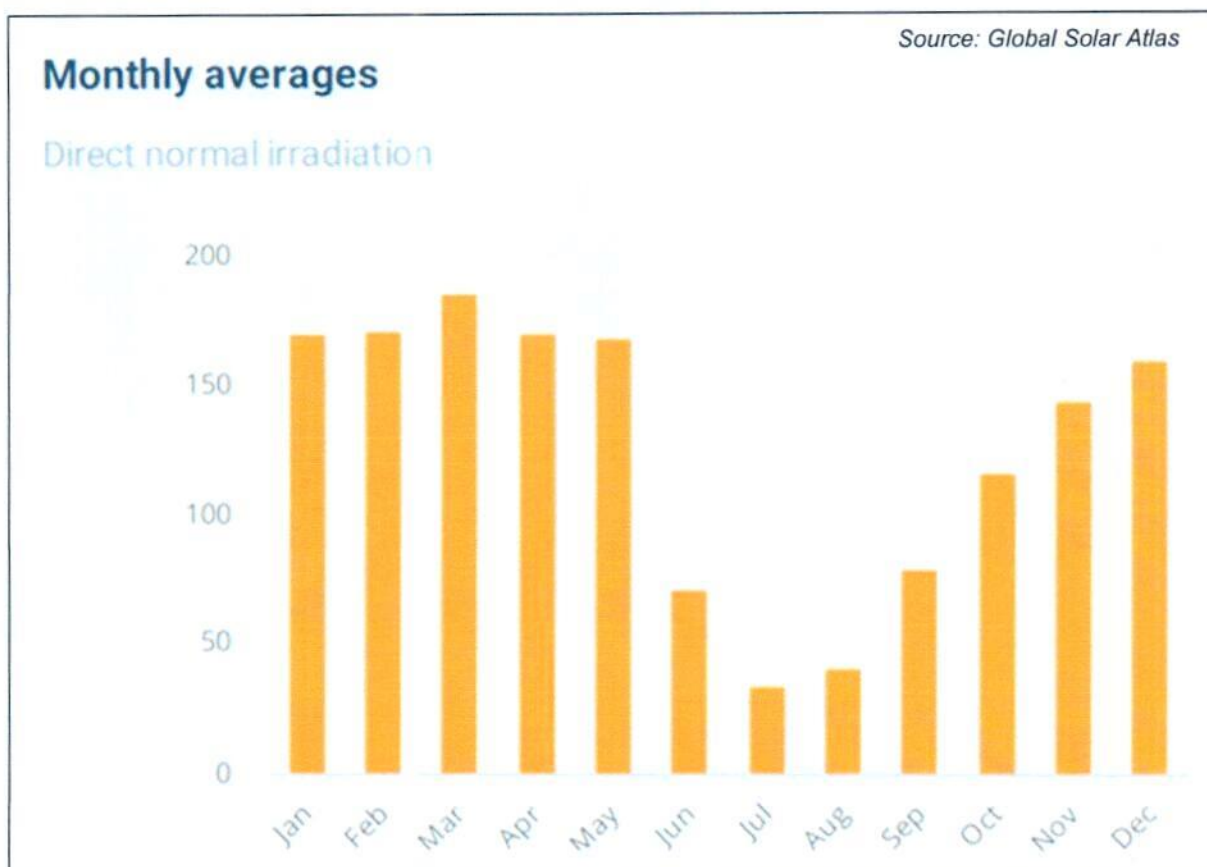
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2. Mahindra CIE Automotive Ltd – Gears Division

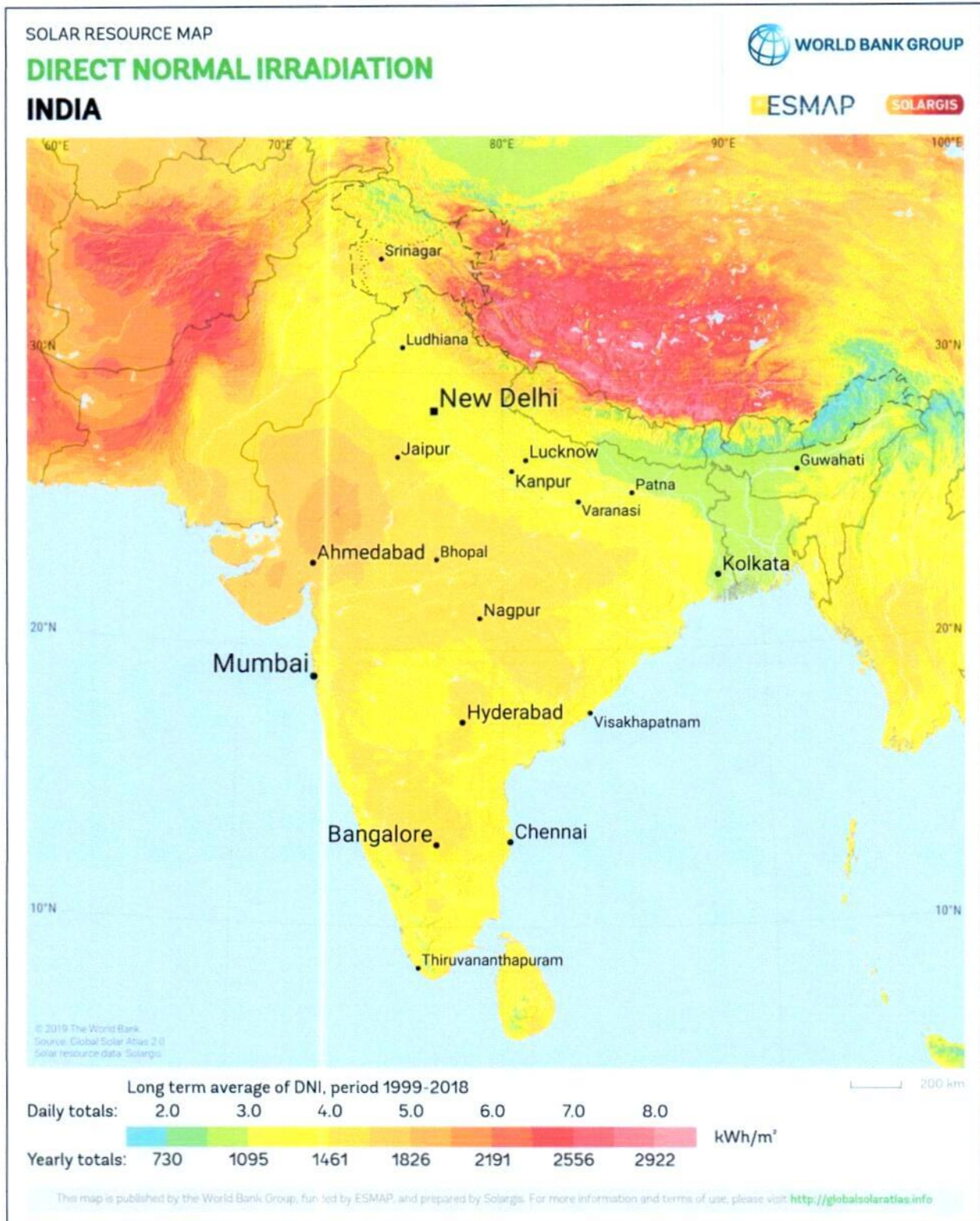


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Stamping Division lies just below 4.0 daily (1461 annually) Kwh/m².

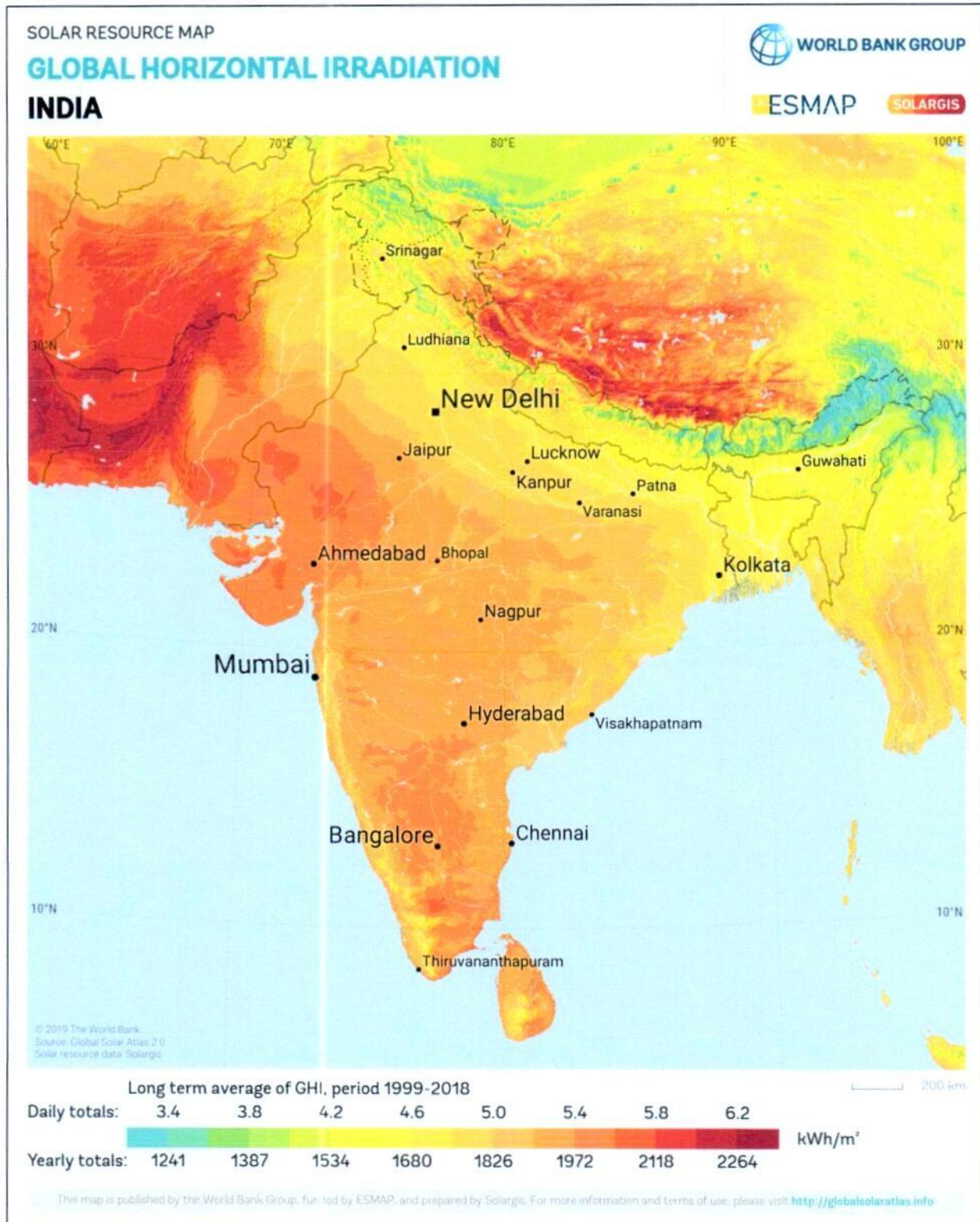
Gears Division lies just above 4.0 daily (1461 annually) Kwh/m².

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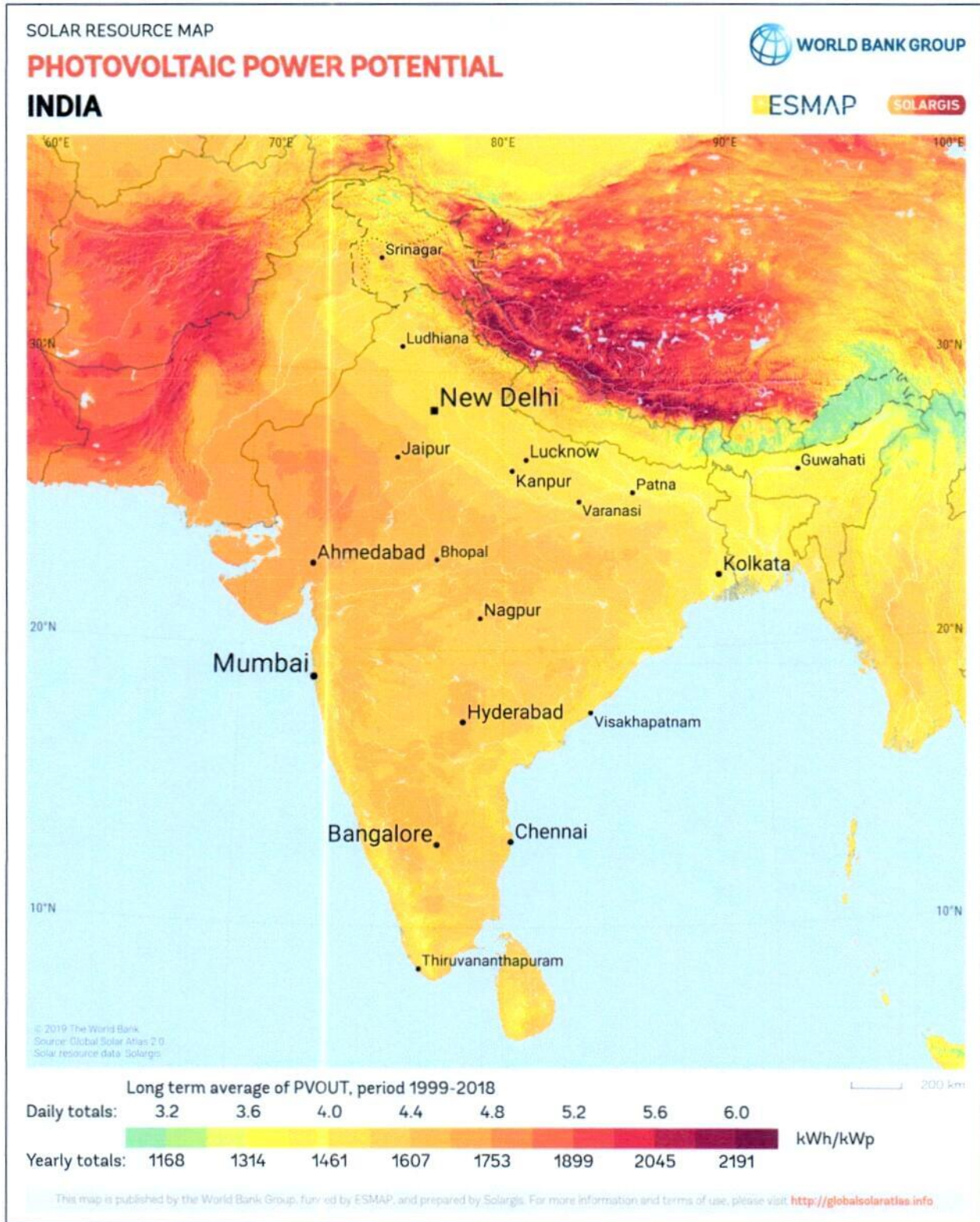


Stamping Division lies just below 5.0 daily (1826 annually) Kwh/m².

Gears Division lies just above 5.0 daily (1826 annually) Kwh/m².

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Stamping Division lies just below 4.4 daily (1607 annually) Kwh/kWp.

Gears Division lies just above 4.4 daily (1607 annually) Kwh/ kWp.

Signature



PART E**POWER PURCHASE AGREEMENT TERMS**

As per the information provided by the company, the total proposed capacity of the subject roof-top solar power plant is 1.19 MWp (± 10%). As on date, company has signed 2 no. of PPAs to install the power plant and supply power at both the project sites. Details of the same are tabulated below:

S. No.	Offtaker	Capacity (kWp)	Tariff (Rs./kWh)	PPA Date
1	Mahindra CIE Automotive Ltd. – Stamping Division	650.16	4.55	March-2023
2	Mahindra CIE Automotive Ltd. – Gears Division	539.46	4.30	
Total		1,189.62		

Source: PPAs

Important Clauses: Both the PPA's are signed for a period of 25 years with fixed tariff as stated above. Some of the important clauses from the signed PPAs are as follows:-

Clause-3: Term**3.2. Initial Period**

The Initial Period of the agreement will start on the "Effective Date" mentioned in the Power Purchase Agreement (PPA). It will end either on the Commercial Operation Date or if the agreement is terminated as outlined in Clause 4.4. The Power Producer is responsible for ensuring that the Plant is commissioned within 120 days from the Effective Date, which is referred to as the "Scheduled Commissioning Date."

If the Power Producer fails to commission the Plant by the Scheduled Commissioning Date and the delay continues for 30 days, the Power Producer will be required to pay liquidated damages to the Offtaker. The rate of liquidated damages will be Rs.10,000/- per day/MW of delay.

If the delay extends beyond 3 months and it is not caused by an "Offtaker Event of Default," both Parties will discuss the next steps together. If they fail to reach a mutual understanding within 15 days, the Offtaker has the right to terminate the Agreement without notice. The Offtaker will not be held liable, including any liability under Clause 20.3 of the Agreement.

3.3. Operation Period

- The Operations Period will commence on the Commercial Operation Date and will terminate on completion of 25 (twenty-five) Years from the date of the Commercial Operation Date.




Clause-4: Planning, Installation and Operation of Plant:

Subject to and on the terms and conditions of this Agreement, the Power Producer shall, at its own cost and expense, procure finance for and undertake the design, engineering, procurement, construction, operation and maintenance of the Plant and observe, fulfil, comply with and perform all its obligations set out in this Agreement or arising hereunder.

The Power Producer will be responsible for the design, implementation, operation and maintenance of the Plant as detailed in SCHEDULE F. In order to ensure timely completion of the Plant by the Commercial Operation Date, the Offtaker shall be responsible for fulfilling its scope of work as more categorically defined in SCHEDULE F attached below:

S. No.	Scope of Work	Power producer's Scope	Offtaker's Scope
1	Designing, Engineering, Supply, Erection and the Commissioning of Solar System for Rooftop and selection of component for Roof top solar project	Yes	-
2	Checking the existing roof structure stability for taking additional load of Roof top solar project and issuing Structural Stability Certificate before commencement as per clause 4.8.	Yes	-
3	Issuing the structure stability certificate after erection of solar structure along with requisite mounting arrangement for panels.	Yes	-
4	Access Ladder for roof access where required for metal shed across campus.	-	Yes
5	Supply Walkway along with required safety provisions	Yes	-
6	Provision of Lifeline on Rooftop.	Yes	-
7	Water Access Points of Roof as required across campus and quality of water shall be less than 200 PPM.	-	Yes
8	Laying of water pipeline for Plant Roof top Solar. Project from access points provided on the roof	Yes	-
9	Changeover switch (ACB/VCB) of appropriate Amperage with (EDO with UV coil) and change over switch along with all necessary safety and electrical standards to meet the voltage/ current requirement.	Yes	-
10	Provision for Reverse power Protector for DG and Grid side reverse flow protection and Synchronization.	Yes	-
11	Discom approved Net meter (ABT/ bi-directional Meter)	Yes	-
12	Discom approved change / replacement of CT/PT (Isolation Transformer)	-	Yes
13	CEIG Liaisoning and Approvals for solar power plant	Yes	-
14	Net Metering liaisoning and approval for solar power plant.	Yes	-
15	Plant O&M including panel cleaning and preventive and breakdown maintenance for 25 years	Yes	-

Source: PPAs

h) Building infrastructure related construction, rectification, repair, replacement requirements and like any change in shed e.g. skylights, vents or damaged sheet, waterproofing, water drainage shall be in the scope of the Offtaker after the installation and commissioning of Plant till expiry or earlier termination of this Agreement. Due to natural deration / wear and tear any damage on the tin shed and its components shall be repaired and replaced by Offtaker, however any damage due to O&M activities undertaken or omitted to be undertaken by Power Producer shall be

repaired and replaced by Power Producer at its own cost within Sixty (60) days of occurrence of damage or intimation from the Offaker, whichever is earlier.

4.3. Major Components of the Plant

As of the date, the Power Producer anticipates that the Plant shall consist of the major components as set forth in SCHEDULE C. During the project execution due to reasons not attributable to Power Producer, if there is a requirement to change the major components for the benefit of the project will be notified to the Offtaker by the Power Producer. However, cost and expense required for such change shall be attributable to the Power Producer.

Schedule C: Major Components of Solar Power Plant

- i. Solar Modules - Mono Crystalline
- ii. Module Mounting Structures with adhesive bonding solution
- iii. Array Junction Box
- iv. Solar Power Inverter
- v. AC distribution board/LT Panel
- vi. Cables & Accessories.
- vii. Monitoring System
- viii. Earthing/ Lightning Arrestors.
- ix. Net Metering

Point of Delivery: LT Panel of Respective Buildings

4.4. Termination of Development Activities

Notwithstanding anything contained in this Agreement at any time during the Initial Period, the Power Producer shall have the right to cease development of the Plant on the Premises, for reasons only dealing with changes in law or government regulations coming into effect after the Effective Date, which would render the Plant unviable. If the Power Producer gives the Off- taker notice of such determination, this Agreement shall stand terminated effective as of the delivery of such notice without any further liability of the Parties to each other, provided that:

4.4.1. The Power Producer, at its own cost and expenses, shall remove any equipment or materials which the Power Producer has placed on the Site

4.4.2. The Power Producer, at its own cost and expenses, shall restore any portions of the Site disturbed by the Power Producer to its pre-existing condition, i.e., condition prior to the commencement of construction



Clause-5: Sale of Electric Energy**5.1 Sale of Electricity**

Throughout the Operations Period, subject to the terms and conditions of this Agreement, the Power Producer shall sell only to Offtaker and Offtaker shall buy from Power Producer all electric energy produced by the Plant, whether or not the Offtaker is able to use all such electric energy. Title to and risk of loss with respect to the energy shall transfer from Power Producer to Offtaker at the Point of Delivery.

5.2 Expected Energy Supply

- a. The Power Producer estimates the amount of electric energy to be produced by the limits on the Plant on annual basis subject to Global Horizontal Irradiation ("GHI") based on following broad assumptions:

Stamping Division

- Expected Energy Generation /annum = 8,45,208 kWh for 1st Year, please refer to SCHEDULE D for Expected Year on Year Energy Production
- Module Degradation Factor = 2.5% for 1st Year and 0.7% thereafter
- Global Horizontal Irradiation = 2,250 kWh/m²
- Size of the Plant = 650.16 kWp
- Grid Availability

Expected Solar Generation per annum: 1300 kWh/KW (including deemed generation) i.e. 8,45,208 kWh for 1st year at the point of generation for 650.16 kWp. Minimum Guaranteed Generation per annum (90% of expected generation): 1,170 kWh/kW. (including deemed generation) i.e. 7,60,687 kWh for 1st year at the point of generation for 650.16 kWp. Annual Degradation Factor: 2.5% in first year and 0.7% per year after that.

Gears Division

- Expected Energy Generation /annum = 8,09,190 kWh for 1st Year, please refer to SCHEDULE D for Expected Year on Year Energy Production
- Module Degradation Factor = 2.5% for 1st Year and 0.7% thereafter
- Global Horizontal Irradiation = 2,250 kWh/m²
- Size of the Plant = 539.46 kWp
- Grid Availability

Expected Solar Generation per annum: 1500 kWh/KW (including deemed generation) i.e. 8,09,190 kWh for 1st year at the point of generation for 539.46 kWp. Minimum Guaranteed



Generation per annum (90% of expected generation): 1,350 kWh/kW. (including deemed generation) i.e. 7,28,271 kWh for 1st year at the point of generation for 539.46 kWp.
Annual Degradation Factor: 2.5% in first year and 0.7% per year after that.

- b. The Power Producer shall ensure that the 90% Expected Energy Generation (as outlined in SCHEDULE D) including deemed generation is supplied on annual basis. However, if there is any reduction in generation due to reasons attributable to or due to actual GHI, the same should be reduced from the Expected Energy Generation. In case of supply lower than 90% of Expected Energy Generation (as outlined in SCHEDULE D), the Power Producer should compensate the Offtaker for the difference in Variable Charge charged by MSEDCL and applicable Tariff as per this Agreement for Shortfall Units for that year.

Explicit understanding of 5.1 and 5.2 clause has been indicated in tabulated below:

SCHEDULE D

S. No.	Stamping Division		Gears Division	
	Expected Energy from Solar Plant (in kWh)	Guaranteed Generation (90% of Expected Generation) in kWh	Expected Energy from Solar Plant (in kWh)	Guaranteed Generation (90% of Expected Generation) in kWh
1	8,45,208	7,60,687	8,09,190	7,28,271
2	8,24,078	7,41,670	7,88,960	7,10,064
3	8,18,161	7,36,345	7,83,296	7,04,966
4	8,12,245	7,31,020	7,77,632	6,99,868
5	8,06,328	7,25,696	7,71,967	6,94,771
6	8,00,412	7,20,371	7,66,303	6,89,673
7	7,94,495	7,15,046	7,60,639	6,84,575
8	7,88,579	7,09,721	7,54,974	6,79,477
9	7,82,663	7,04,396	7,49,310	6,74,379
10	7,76,746	6,99,072	7,43,646	6,69,281
11	7,70,830	6,93,747	7,37,981	6,64,183
12	7,64,913	6,88,422	7,32,317	6,59,085
13	7,58,997	6,83,097	7,26,653	6,53,987
14	7,53,080	6,77,772	7,20,988	6,48,889
15	7,47,164	6,72,447	7,15,324	6,43,792
16	7,41,247	6,67,123	7,09,660	6,38,694
17	7,35,331	6,61,798	7,03,995	6,33,596
18	7,29,414	6,56,473	6,98,331	6,28,498
19	7,23,498	6,51,148	6,92,667	6,23,400
20	7,17,582	6,45,823	6,87,002	6,18,302
21	7,11,665	6,40,499	6,81,338	6,13,204
22	7,05,749	6,35,174	6,75,674	6,08,106
23	6,99,832	6,29,849	6,70,009	6,03,008
24	6,93,916	6,24,524	6,64,345	5,97,911
25	6,87,999	6,19,199	6,58,681	5,92,813

- Global Horizontal Irradiation: 2,200 kWh/m²
- Yearly Degradation: 2.5% in 1st Year and 0.7% thereafter yearly
- Settlement Period: One Year
- Guaranteed Power Supply 90%




Other Schedules of PPA**Schedule A: Energy Purchase rates (Year 1-25)**

1. Mahindra CIE Automotive Ltd. – Stamping Division: Rs. 4.30/ kWh
2. Mahindra CIE Automotive Ltd – Gears Division: Rs. 4.55/ kWh

Above Tariff exclusive of all Regulatory Charges that may become applicable on consumption of energy during the subsistence of this Agreement.

Offtaker shall be responsible to bear all Regulatory Charges that may become applicable on consumption of energy during the subsistence of this Agreement.

Schedule B: Buy Outs

No purchase for a period of (5) years from the Commercial Operation Date of the Plant unless in the case of termination of this Agreement on account of default by Offtaker. Buyout Values at the end of different years are provided below:

Year	Buyout Value end of the Year (in Rs.)	
	Stamping Division	Gears Division
1	3,57,58,800	2,96,70,300
2	3,43,28,448	2,84,83,488
3	3,28,98,096	2,72,96,676
4	3,14,67,744	2,61,09,864
5	3,00,37,392	2,49,23,052
6	2,86,07,040	2,37,36,240
7	2,71,76,688	2,25,49,428
8	2,57,46,336	2,13,62,616
9	2,43,15,984	2,01,75,804
10	2,28,85,632	1,89,88,992
11	2,14,55,280	1,78,02,180
12	2,00,24,928	1,66,15,368
13	1,85,94,576	1,54,28,556
14	1,71,64,224	1,42,41,744
15	1,57,33,872	1,30,54,932
16	1,43,03,520	1,18,68,120
17	1,28,73,168	1,06,81,308
18	1,14,42,816	94,94,496
19	1,00,12,464	83,07,684
20	85,82,112	71,20,872
21	71,51,760	59,34,060
22	57,21,408	47,47,248
23	42,91,056	35,60,436
24	28,60,704	23,73,624
25	14,30,352	11,86,812
26	Transfer @ Re. 1/-	Transfer @ Re. 1/-

The Offtaker will also need to bear all taxes as may be applicable for the purchase of the Plant from the Power Producer including but not limited to indirect and direct taxes and any and all other taxes that may be applicable upon the Offtaker. After the end of the Term, the Plant will be transferred to the Offtaker at Rs.1/-.



Schedule E: Deemed Generation

Deemed generation shall be charged to Offtaker (in case of events specified under Clauses 3.2; 6.1; 7.1; 11.1; 11.3.2; 11.4 of the Agreement i.e. Grid failure/DG Operation at low load side/ Low load demand/ weekly off/ Holiday/ Any internal electrical breakdown etc./Solar Plant relocation/ in any case solar plant is ready to deliver the power and consumer unable to utilize). The applicable Tariff (under clause 7.1) shall be charged for Deemed Generation.

"Deemed Generation" for the year of operation, will be calculated based on methodology as explained below. Deemed Generation settlement will be done on Yearly.

Methodology

Deemed Generation = Downtime x Expected Units Generation

Whereas:

Downtime = Duration of Downtime, as recorded by plant performance monitoring system, in hours excluding the Plant Shut Down as provided in Clause 11

Expected Units Generation = Value of energy production in kWh/Hour. Derived as in table 1

Energy Production Yearly = 8.09 lacs kWh for 1st Year of operation, for 2nd year and rest of the Term of this Agreement **Energy Production** values will be summation of billed units including Deemed Generation Units in preceding year factoring the degradation for that year.

- Table-1: Methodology to Derive Expected Units Generation**

Description		Values		Unit
		Stamping Division	Gears Division	
Energy Production-Yearly (EPY)	Yearly Generation	8,45,208	8,09,190	kWh/Year
Monthly Production (MP)	MP = EPY/12	70,434	67,433	kWh/Month
Daily Production (DP)	DP = MP/30	2,348	2,248	kWh/Day
Expected Units Generation (EUP)	EUP = DP/5.5	427	409	kWh/Hour

Please note that the above main clauses of PPA are mentioned only for illustration purpose of the convenience of the lenders to analyze the Project in terms of technicality. However, this shall not be construed as professional opinion on the contract legality which is out of scope of this report.




PART F**CURRENT STATUS OF WORK**

As per information and documents shared by the company's representative, following are our observations and remarks on the current status of the project:

- a. As per the verbal information received from the management of the subject company, only some project related material/ equipment has been brought to the sites and no installation work has been done yet.
- b. Some of the project related equipments have been purchased and are lying at the site, the same have not been verified as the scope of work includes the verification and Review of total Project cost, CUF and Irradiation Data only.
- c. The proposed COD of the entire project is scheduled in the month of September 2023. Timelines is aggressive but can be met provided work is not halted in between and not disrupted due to monsoon during July-August.



PART G**PROJECT COST & EXPENDITURE**

- 1. PROJECT COST:** Project cost has been taken from the Copy of Techno-Commercial offer from M/s OPPL to M/s OPPL Assets Pvt. Ltd. dated 15th March 2023, for the installation of Roof Mounted Grid Tie Solar PV plant located at 7 sites in Rajasthan. The terms of engagement are tabulated below:

S. No.	Description	Amount (Including duties and taxes)
1	Solar Panel: multi/Mono-Si, IEC certification, BIS certification and other relevant standard as per Government	Rs. 29,916,000/-
2	Solar Inverter: String inverter with multiple MPPT provision, Outdoor Mounted, IP65 Protection and all relevant standards as per Government	Rs. 44,32,000/-
3	BOS: Module Mounting Structure, DC Cable, AC Cable, LT Panel, Civil material, Conduit, MCS, RMS, Earthing and Protection Systems, Lightning Arrester, Weather Sensor and monitoring system, Metering Unit, DISCOM approvals etc.	Rs. 16,620,000/-
4	I&C: Supply of civil material, Installation, testing and commissioning of Solar Power plant as per site requirement	Rs. 38,77,174/-
Total		Rs. 5,48,45,174 /-

- Freight & Transit Insurance: Inclusive
- Taxes GST- as per government norms
- Net-metering fee will be paid by consumer
- Any changes in Tax/Duties shall be borne by the Purchase
- Excludes-
Any approval
Anything out of BOQ

Observations and Remarks:

1. Project cost calculated on the basis of the Benchmark Cost provided by the MNRE has been tabulated below:

S. No.	Particulars	Benchmark Cost (In Rs./kW)	Project Capacity (In MW)	Total Project Cost (Excluding GST) (In Rs.)	Total Project Cost (Including ~14% GST) (In Rs.)
1	As per Ministry of New & Renewable Energy	35,886*	1,190.20	4,27,11,517	4,86,91,130
			1.19 MWp		~Rs. 4.87 Cr.

*Benchmark cost for 2021-22




2. Project cost calculated on the basis of market comparable:

S. No.	Particulars	Excluding GST	Including GST	Remark
		Per KW Cost (In Rs.)	Per KW Cost (In Rs.)	
1	Subject project installation cost	-	46,081	as per Techno-Commercial offer from OPPL
Market Research Details				
2	MNRE Benchmark Cost	39,080	-	Refer Annexure-1
Market Research				
3	Quotation-1	48,700	55,400	Refer Annexure-2
4	Quotation-2	37,740	42,500	
5	Quotation-3	45,000	51,200	
6	Quotation-4 (Tata Solar)	60,000	68,300	

3. As per our analysis and market research, the installation cost of Rooftop Mounted Solar Power Plant varies from Rs. 45,500/- per KW to Rs. 68,300/- per KW. For the smaller setups the price is higher and for large set-up, price is less.
4. The project cost is solely depends upon the project location, contractors profit, type of module and its supporting structures, etc.
5. Based upon the above mentioned details, the project cost amounting to Rs. 5.48 Cr. inclusive of GST for the installation of subject rooftop solar power plant seems to be reasonable.
6. As per the verbal information received from the management of the subject company, only some project related material/ equipment has been brought to the sites and no installation work has been done yet.

Note:

- Project cost is analyzed based on lump sum cost only and not item wise.
 - Project cost is assessed for the date of this report only and due to price fluctuations it may vary from time to time.
2. **Expenditure:** As per information/details shared by the company, the installation work related to power plant is yet to start. Thus, the expenditure incurred till date on the project is NIL.




LIE REPORT

1.19 ($\pm 10\%$) MWp GRID CONNECTED
ROOF-TOP SOLAR POWER PLANT

PART H

PHOTOGRAPHS

Since the installation work related to solar panels is yet to start and this is just a Desktop LIE based upon documents provided. Thus, Photographs are not available.

Adi



PART I**OTHER DOCUMENTS & REFERENCES****Annexure-1: Benchmark Cost by MNRE:**

No. 32/24/2020-SPV Division
 Government of India
 Ministry of New & Renewable Energy

Block No. 14, CGO Complex, Lodhi Road,
 New Delhi, Dated 27th October 2021

ORDER

Subject: Amendment in Benchmark costs for Grid-connected Rooftop Solar PV systems for the financial year 2021-22 -reg.

Vide Order no.318/38/2018-GCRT dated 18.08.2021 dated 18.08.2021, benchmark costs including taxes, were issued for FY 2021-22 by the Ministry. Subsequently, applicable Goods & Services Tax (GST) rates have been revised by GST Council for identified renewable energy equipment. In order to address the recent changes in GST rates and also any further changes in GST rates in future, it has been decided to issue benchmark costs excluding GST. For the purpose of calculating CFA available under MNRE Scheme, applicable GST rates may be added to these benchmark costs. Accordingly, undersigned is directed to convey the approval of competent authority for issuing the benchmark costs, excluding GST, for Grid-connected Rooftop Solar PV systems applicable for MNRE Scheme for the year 2021-22. Rooftop solar system capacity-wise benchmark costs are given below:

(A) For General Category States/ UTs:

RTS System Capacity range	Up to 1 kW	> 1 kW upto 2 kW	>2kW Upto 3kW	> 3kW upto 10 kW	>10 kW upto 100 kW	>100 kW upto 500 kW
Benchmark cost (Rs./kW) excluding GST	46923	43140	42020	40991	38236	35886




Market Comparables:**Annexure-2**

Installation Cost of 1MW Power Plant	
For better understanding of investment in 1 megawatt solar power system, we have break down the overall cost in fragments. You can now compare and analyse the cost of solar panels, solar inverters and other accessories individually.	
Particulars	Estimated Cost
Solar Panels	3 Cr.
Solar Inverter	1 Cr.
Combiners + Junction Boxes	20 Lakh
Protective Gears Arrangement	10 Lakh
SCADA & Data Logger System	7 Lakh
Land Bank	*5 Acre
Erection of Project	50 Lakh
Total Project Cost	4.87 Cr. (Approx.)
<ul style="list-style-type: none"> *Land value of 5 acre is not included in this table. All the figures in above table are just to provide a rough idea. Don't consider it as an exact and final cost of 1MW solar power plant. 	


Project Cost (Mono-Crystalline) included GST

S. No.	Description	On Tin Roof
1.	Turnkey EPC prices for Design, Supply, Erection, Testing & Commissioning of 250 KW Solar Power Generating System	94,35,000
2.	GST	11,90,000
Total (GST Included)		1,06,25,000 /-

➤ Discom Legal & Liasioning Fees included above.

Shubham Agarwal & Praveen Mehta
SOLAR NATION
M- +91 9461846401,9829227948 Email – solarnationbusiness@gmail.com





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You can later on also buy this plant from the vendor.

Cost of 1 MW solar plant

Now, let us discuss the cost of 1 MW solar plant. There is no fixed number for the final 1 MW solar plant cost. However, we have a tentative figure – between 4 to 5 crore.

This price range is subject to increase or decrease depending on various factors. Here are some factors affecting the overall 1 megawatt solar power plant cost.

- Type of solar panels selected – **monocrystalline or polycrystalline panels**
- Manufacturing technology and efficiency of the solar inverter selected
- Solar brand opted
- Type of solar power plant – on-Grid, off-grid, or hybrid

Concerning the 1 MW solar power plant subsidy 2020, the **government provides subsidies** on solar plants for residential setups and housing societies. No subsidy is offered for solar systems being installed for commercial purposes.



Tata Solar Power Plants

₹ 60,000/ KW [Get Latest Price](#)

Country of Origin	Made in India
Minimum Order Quantity	10 KW

We Design, Supply and Erect Tata Solar Power Plants

[View Complete Details](#)

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Abh



Data by Global Solar Atlas by World Bank Group

1. Mahindra CIE Automotive Ltd – Stamping Division

GLOBAL SOLAR ATLAS

BY WORLD BANK GROUP

Lalpur

28.938944°, 079.467472°

unnamed road, Lalpur, Uttarakhand, India

Time zone: UTC+05:30, Asia/Kolkata [IST]

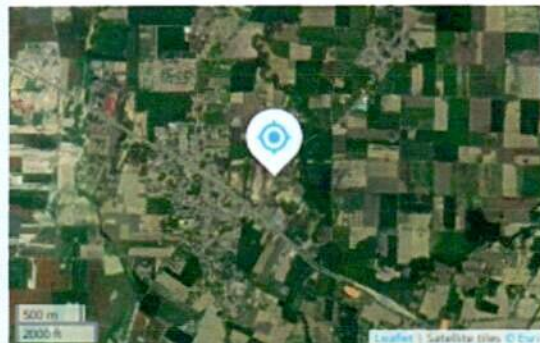
Report generated: 17 May 2023

SITE INFO

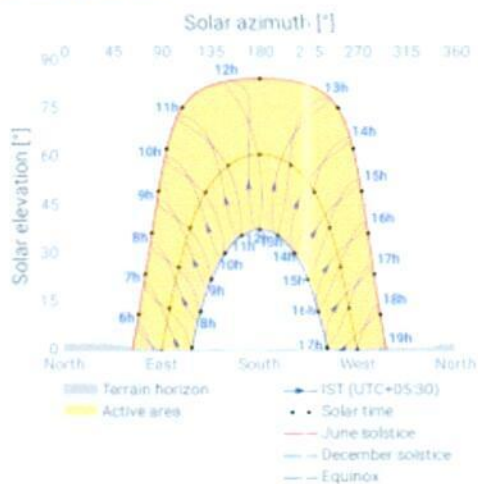
Map data

		Per year
Specific photovoltaic power output	PVOUT specific	1530.8 kWh/m ² /yr
Direct normal irradiation	DNI	1360.8 kWh/m ² /yr
Global horizontal irradiation	GHI	1783.2 kWh/m ² /yr
Diffuse horizontal irradiation	DIF	874.3 kWh/m ² /yr
Global tilted irradiation at optimum angle	GHI opta	1952.0 kWh/m ² /yr
Optimum tilt of PV modules	OPTA	27 / 180
Air temperature	TEMP	24.6 °C
Terrain elevation	ELE	208 m

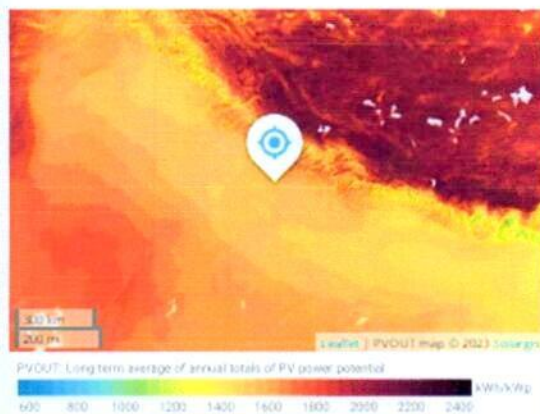
Map



Horizon and sunpath



PVOUT map



GLOBAL SOLAR ATLAS BY WORLD BANK GROUP

PV ELECTRICITY AND SOLAR RADIATION

Annual averages

Direct normal irradiation

1278.7

kWh/m² per year

Monthly averages

Direct normal irradiation



Average hourly profiles

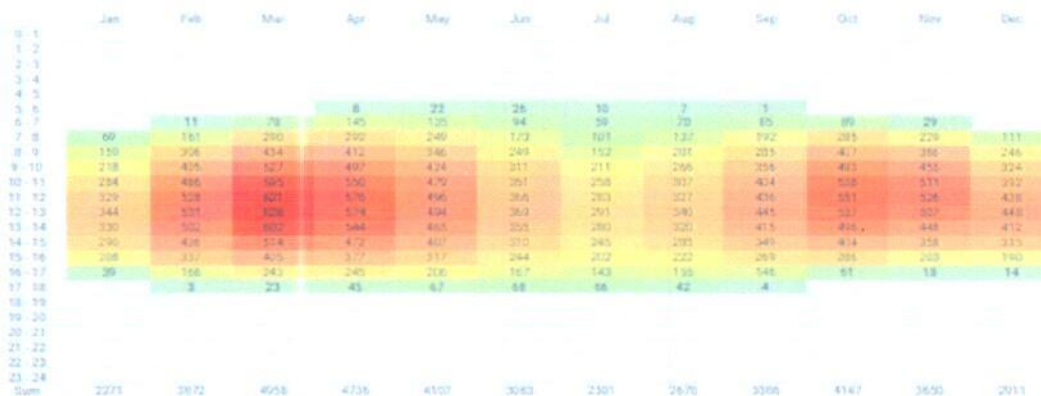
Direct normal irradiation [Wh/m²]



LTCv05.20

Average hourly profiles

Direct normal irradiation [Wh/m²]



2. Mahindra CIE Automotive Ltd – Gears Division

GLOBAL SOLAR ATLAS BY WORLD BANK GROUP

Bhamboli

18.796528°, 073.798306°

unnamed road, Bhamboli, Maharashtra, India

Time zone: UTC+05:30, Asia/Kolkata [1: 1]

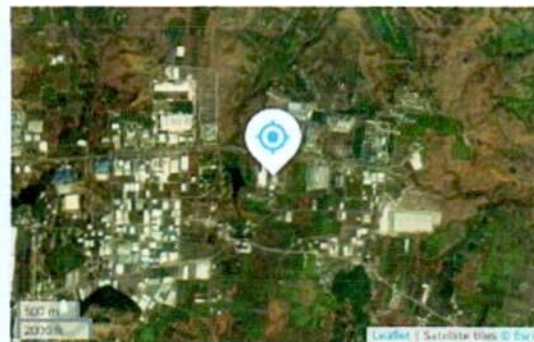
Report generated: 17 May 2023

SITE INFO

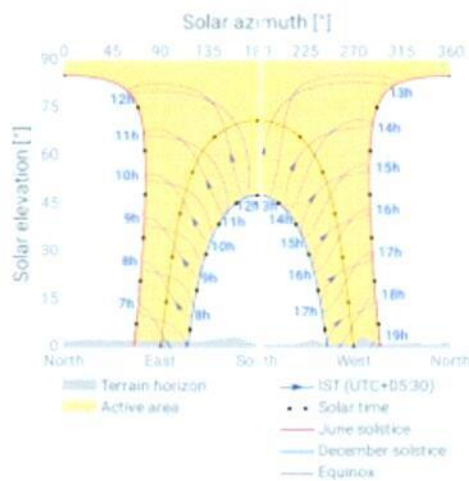
Map data

		Per year
Specific photovoltaic power output	PVOUT specific	1621.4 kWh/kWp
Direct normal irradiation	DNI	1504.4 kWh/m ²
Global horizontal irradiation	GHI	1945.2 kWh/m ²
Diffuse horizontal irradiation	DIF	898.0 kWh/m ²
Global tilted irradiation at optimum angle	GHI opti	2070.6 kWh/m ²
Optimum tilt of PV modules	OPTA	23 / 180
Air temperature	TEMP	24.1 °C
Terrain elevation	ELE	679 m

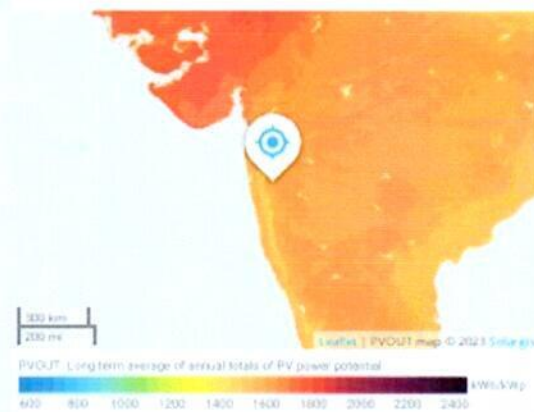
Map



Horizon and sunpath



PVOUT map



GLOBAL SOLAR ATLAS BY WORLD BANK GROUP

PV ELECTRICITY AND SOLAR RADIATION

Annual averages

Direct normal irradiation

1508.3

kWh/m² per year

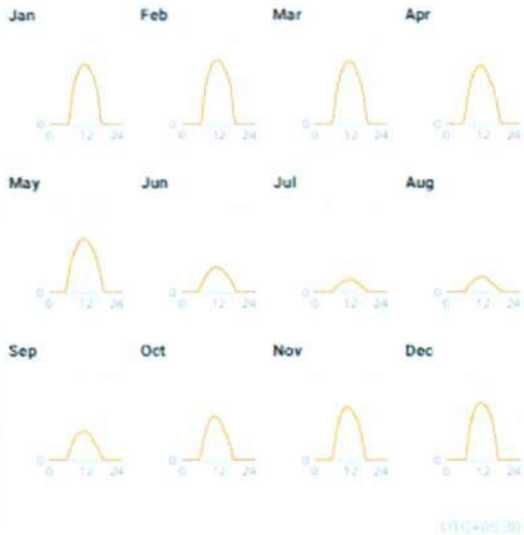
Monthly averages

Direct normal irradiation



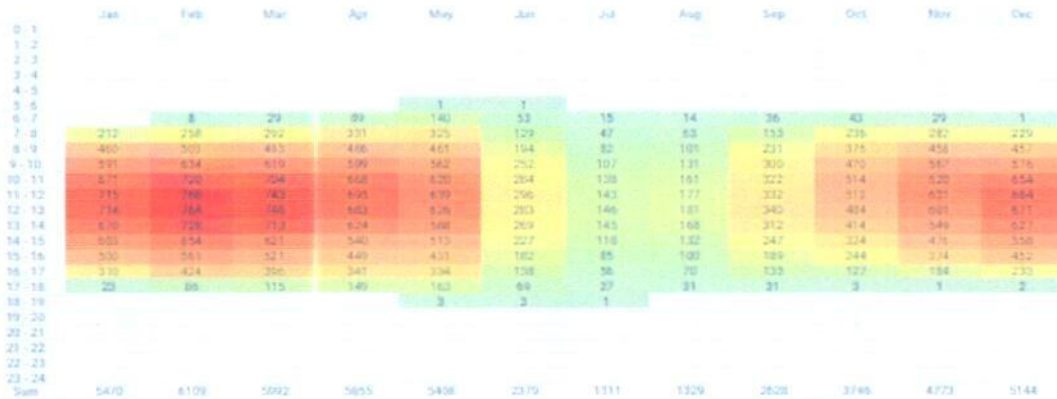
Average hourly profiles

Direct normal irradiation [Wh/m²]



Average hourly profiles

Direct normal irradiation [Wh/m²]

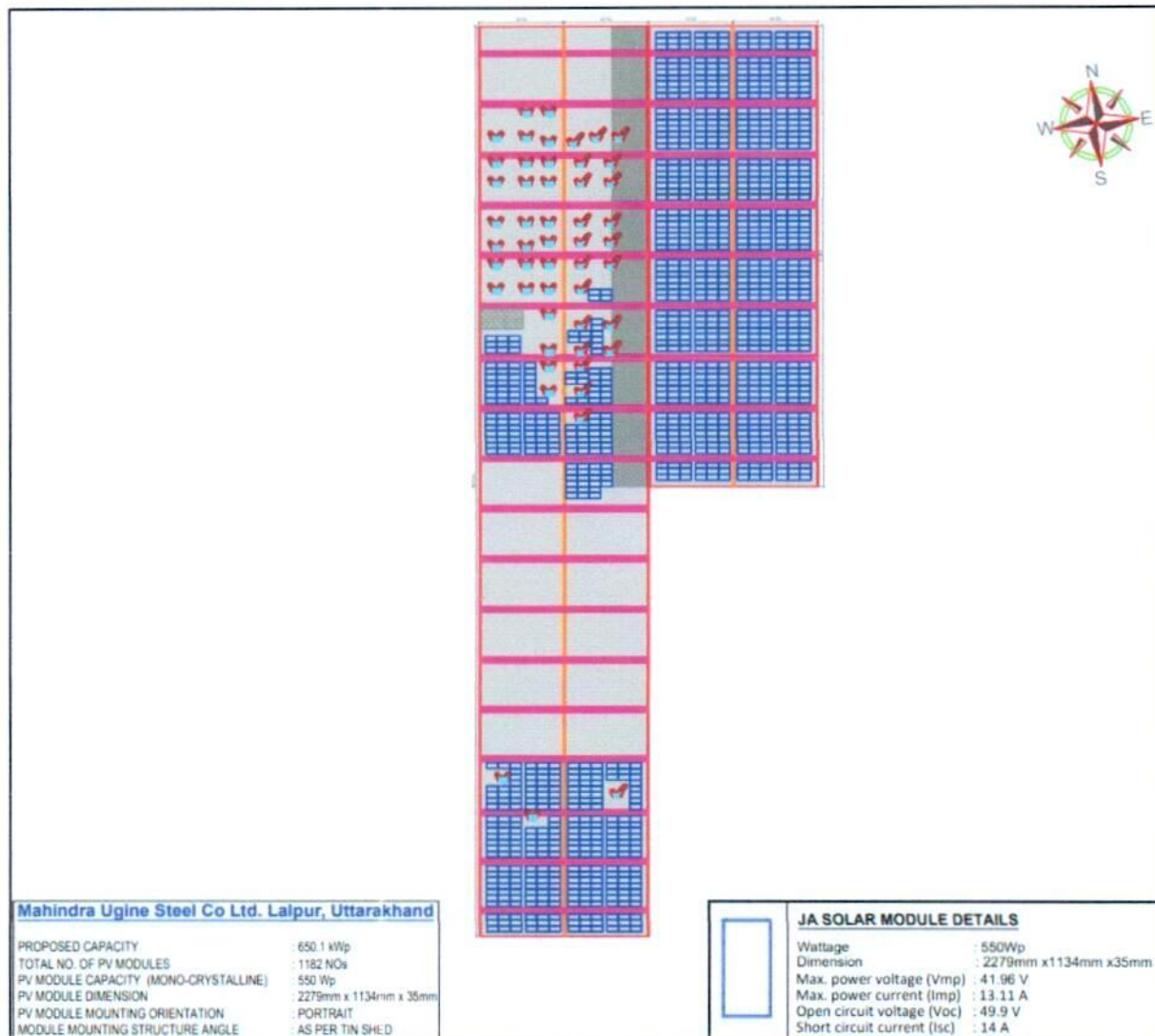


LIE REPORT

1.19 (± 10%) MWp GRID CONNECTED
ROOF-TOP SOLAR POWER PLANT

Layout Plans

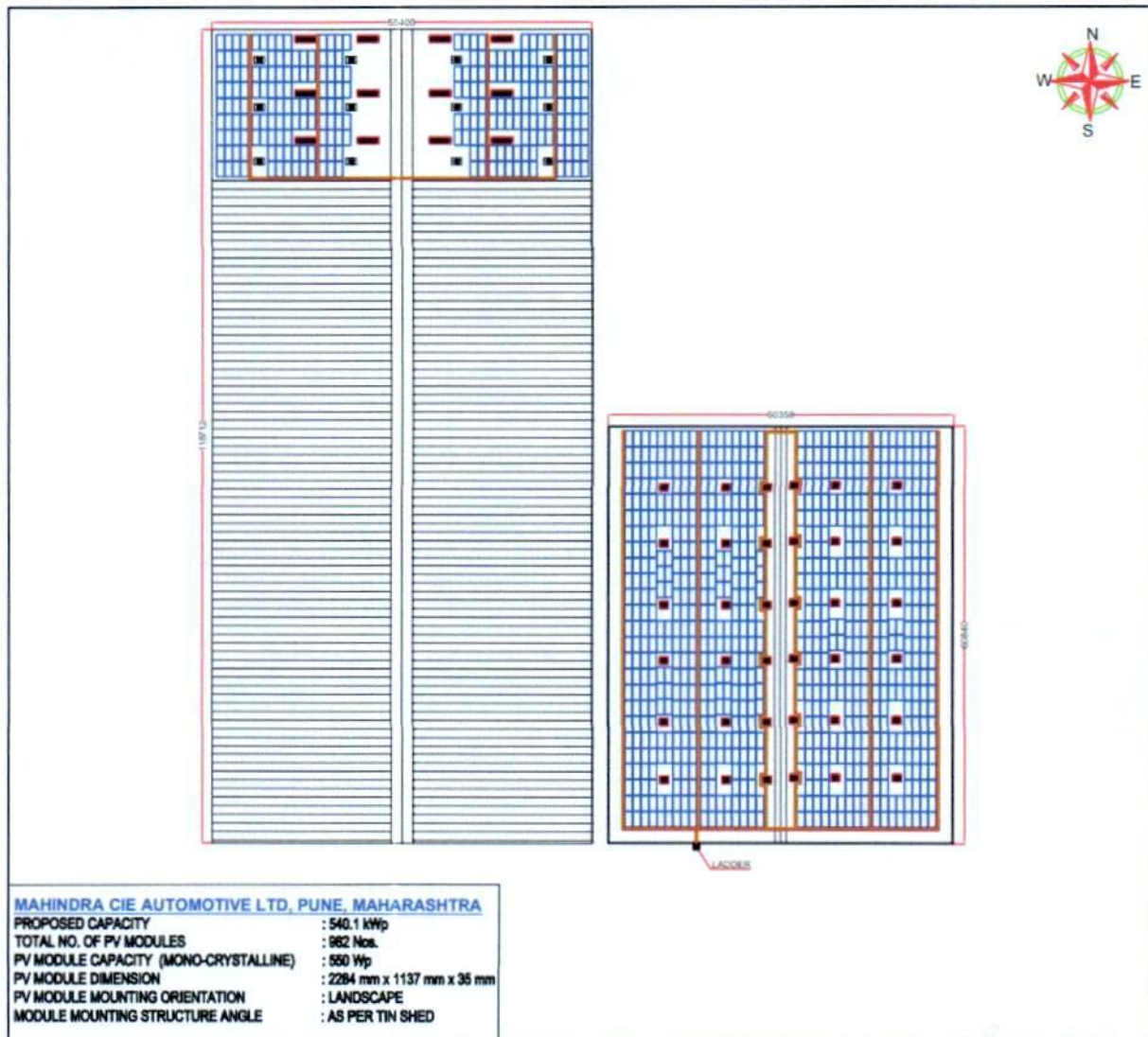
1. Mahindra CIE Automotive Ltd. – Stamping Division



LIE REPORT

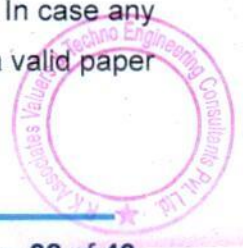
1.19 (± 10%) MWp GRID CONNECTED
ROOF-TOP SOLAR POWER PLANT

2. Mahindra CIE Automotive Ltd – Gears Division



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1.19 (± 10%) MWp GRID CONNECTED
ROOF-TOP SOLAR POWER PLANT

FOR INTERNAL USE

Place : Noida
Date : 18.05.2023
Note : This report contains 40 pages

SURVEYED BY: NA as Desktop LIE
PREPARED BY: Abhinav Chaturvedi
REVIEWED BY: Sr. V.P. Projects

For R.K Associates Valuers & Techno Engineering Consultants (P) Ltd.

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