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Techno Economic Viability Report

1.2 GW Solar Cell Manufacturing Plant + 1.0 GW Module Plant (Under execution) + 0.6 GW (Existing) Solar PV Module Manufacturing plan

Oswal Solar Energy Private Limited

Table of Contents

Executive Summary **6**
Key Technical Assessment Parameters 8
Key Financial Assessment Parameters 9
Risk Analysis & Mitigation 17
SWOT Analysis 26
Report **28**
Scope of Work **29**
Date of Inspection 29
Team of Consultants 29
Methodology **31**
Project Overview **32**
Company's Background **33**
Brief Background of Directors 33
Brief Background of Key Management Team 34
Historical Financial performance 35
Technical Assesment **39**
Land 39
Location 39
Current Status / Site Visit Observations 40
Implementation Schedule 42
Status of Statutory License / Registration / Approvals 42
Project Configuration 43
Cell Manufacturing Process 44
Plant and Machinery incl. Utilities 50
Electrification and MFA 55
Supplier Credentials 56
Building and Civil Works 56
Plant Layout 58
Installed Capacity 60
Raw Materials 60
Utilities 61
Manpower Requirement 63
Standards for Solar Cells 64
Market Assessment **66**
Industry Profile 66
India Macroeconomic Analysis **70**
Historical GDP and GVA Growth Trend 71
Annual and Quarterly: Investment & Consumption Scenario 74
Private Consumption Scenario 75
Growth Outlook **78**

Insight into type of solar power installations: 80
Ground Mounted Solar Plant, Grid Connected Solar Rooftop, Hybrid Projects, Off-Grid Solar 80
Electricity Demand Scenario in India 81
Solar power: Installed capacity & historical growth capacity in India9F 82
Renewable Energy Landscape in India 84
Solar Power Generation Scenario in India 88
Solar PV Segment in India: Current Scenario 91
Solar Cell Consumption Pattern and Demand – Supply Gap 94
Foreign Trade 95
Regulatory Framework 97
Solar Industry Growth Drivers 105
Project Cost 108
Land Cost 108
Building & Civil Works 108
Plant and Machinery including Utilities 110
Electrification and MFA 111
Contingency 111
Preliminary & Pre-operative Expenses 111
Interest during construction 112
Project Cost Rationale 112
Means of Finance 114
Promoter Contribution 114
Debt 114
Proposed Term Loan 114
Economic Viability 116
Capacity and Production 116
Operating Costs 118
Projected Financial Highlights (Standalone 1.2 GW Cell Plant) 128
Financial Analysis 130
Margins 130
Debt Equity Ratio 130
Debt Service Coverage Ratio 130
Internal Rate of Return 131
Economic Life 132
Weighted Average Cost of Capital 132
Breakeven Analysis 132
Interest Coverage Ratio 134
Sensitivity Analysis 135
Risk Analysis & Mitigation 136
SWOT Analysis 145
Conclusion 147

Market Assessment Summary 147
Technical Assessment Summary 148
Financial Assessment Summary 151
Critical Success Factors 152
Annexure 1: Projected Profitability Statement – Standalone 1.2 GW Cell Plant 154
Annexure 2: Projected Balance Sheet – Standalone 1.2 GW Cell Plant 156
Annexure 3: Projected Cashflow Statement – Standalone 1.2 GW Cell Plant 158
Annexure 4: Term Loan Schedule 160
Annexure 5: Projected Profitability Statement – Consolidated (1.2 GW Cell + 1.0 GW Module + 0.6 GW Module) 164
Annexure 6: Projected Balance Sheet – Consolidated (1.2 GW Cell + 1.0 GW Module + 0.6 GW Module) 167
Annexure 7: Projected Cashflow Statement – Consolidated (1.2 GW Cell + 1.0 GW Module + 0.6 GW Module) 170
Annexure 8: Projected Financial Highlights – Consolidated (1.2 GW Cell + 1.0 GW Module + 0.6 GW Module) 172
LIMITING CONDITIONS 174
Terms relating to use of this report 176

Executive Summary

Executive Summary

Company Information	
Name of the Company	**Oswal Solar Energy Private Limited** ('OSEPL' or the 'Company')
Date of incorporation	January 21, 2022
Constitution	Private Limited Company
Registered Office	Oswal Estate, NH-1, Kutail Road, P.O. Kutail, Karnal, Haryana, India, 132037
Credit Rating	ICRA A+
CIN	U29200HR2022PTC100779
Nature of Activity	Manufacturer of Solar PV Modules and Solar PV Cell

Management Team		
Directors	Mr. Vivek Gupta	Mr. Amulya Gupta
	Mr. Shivam Gupta	Ms. Kanchan Vohra

Project Details	
Project Type	Brownfield
Industry / Sector	Solar
Project Brief	OSEPL is a wholly owned subsidiary of Oswal Pumps Limited (OPL) and is engaged in manufacturing and selling photovoltaic (PV) modules along with balance components such as inverters, etc. The parent Company Oswal Pumps Limited manufactures and sells a wide range of pumps and motors, such as submersible pumps, monobloc pumps, solar pumps, electric motors etc. OSEPL currently operates a solar PV module manufacturing facility at Karnal, Haryana, with an installed capacity of 600 MW. To enhance its production capabilities, the Company is undertaking the expansion of its module manufacturing operations through the installation of an additional 1.0 GW PV module production line adjacent to the existing facility. As informed by the Company, the 1.0 GW solar PV module manufacturing plant is expected to commence its commercial production post Q3 FY 2027. Post the completion of under execution solar module plant of 1.0 GW, the total solar module capacity of the Company will be 1.60 GW.

	Under the current project, the company has proposed setting up a 1.2 GW solar cell manufacturing plant to strengthen its integrated renewable energy capabilities. The solar cells produced will primarily be used for captive consumption in its 1.60 GW PV module plant. ***The current TEV Study is for the proposed 1.20 GW Solar Cell project of the Company.***
Proposed Solar Cell Unit Address	Khewat No. 55, Rect. No. 63 Killa Nos. 12, 13, 18, 19, 20, 21, 22 & 23; Rect. No. 64 Killa Nos. 16, 17, 22, 23, 24, 25 & 21 Min North; and Rect. No. 65 Killa No. 25/1 Min North, situated near Sawariya Overseas, Karnal-Munak Road, Village Munak, Sub-Tehsil Ballah, District Karnal, Haryana.
Products Offered / Activities Engaged	Solar PV Modules and Solar PV Cells
Current Status / Site Visit Observations	D&B India conducted site visit of the proposed project location on 7th October 2026 to obtain a first-hand view of site including basic infrastructure facilities such as water, power, approach roads, and manpower etc. available at the location and to review the current status of plant. The site visit observations are as follows: • The Company has already secured the required land for the proposed project through a long-term lease arrangement. • The project site is strategically located adjacent to State Highway (SH)-115, providing direct connectivity between Karnal and Munak. • Construction of the boundary wall was observed to be in progress at the time of the site visit. • Civil construction activities related to the proposed factory building had not commenced as of the site visit date. • To meet the process water requirements of the manufacturing facility, the Company proposes to develop a dedicated borewell at the project site. • The Company has already obtained quotations for the major project components, including plant and machinery, utilities, electrification works, and factory building and civil construction works.

Key Technical Assessment Parameters

Following is the summary of key technical and operational assessment parameters considered for the purpose of this TEV study for the Project under consideration:

Technical Parameter	As Identified	D&B India Assessment
Land	Approx. 14.29 acres	OSEPL has entered into a registered lease agreement with Radhika Gupta for acquiring **114 Kanal 7 Marla (approximately 14.29 acres)** of land located at **Khewat No. 55, Rect. No. 63 Killa Nos. 12, 13, 18, 19, 20, 21, 22 & 23; Rect. No. 64 Killa Nos. 16, 17, 22, 23, 24, 25 & 21 Min North; and Rect. No. 65 Killa No. 25/1 Min North**, situated near Sawariya Overseas, Karnal-Munak Road, Village Munak, Sub-Tehsil Ballah, District Karnal, Haryana, for establishment of the proposed solar cell manufacturing facility. The lease has been executed for a period of **99 years** commencing from **06 October 2026** at an annual lease rental of **INR 97.24 lakh**. The lease deed grants the Company the right to construct buildings and project infrastructure on the leased land, while obtaining statutory approvals and bearing applicable taxes, duties and utility charges. The deed further permits creation of mortgage/hypothecation over the leasehold rights and structures in favour of recognized lenders for project financing purposes. The lessor has represented that the land is free from encumbrances, litigation and third-party claims and has assured peaceful possession of the leased premises throughout the lease tenure.
Location	Karnal, Haryana	The project location is at Khewat No. 55, Rect. No. 63 Killa Nos. 12, 13, 18, 19, 20, 21, 22 & 23; Rect. No. 64 Killa Nos. 16, 17, 22, 23, 24, 25 & 21 Min North; and Rect. No. 65 Killa No. 25/1 Min North, situated near Sawariya Overseas, Karnal-Munak Road, Village Munak, Sub-Tehsil Ballah, District Karnal, Haryana. The project location is within 30 km distance from the company's solar PV module manufacturing plant location.
Technology	Advanced new High-Density TOPCon cells	This is among the latest technology and concurrent in the present market situation, as it is efficient and cost effective. The technology in the solar industry is dynamic hence looking at the future requirement of technology upgradation of the proposed project.

Technical Parameter	As Identified	D&B India Assessment
Capacity	Cell Line: 1.2 GW	The Cell line capacities have been validated basis the line-balancing, corresponding calculation provided and supporting supplier information.
Equipment	Presented in Respective Section	The plant & machinery, utilities, miscellaneous fixed assets have been discussed in detail in Technical Assessment section of this report. The identified equipment are sufficient to manage the proposed operations.
Approvals	Relevant Statutory Bodies	As Project is in its initial stage, the Company is in the process of obtaining required approvals such as Consent to Establish, Factory Plan approval, NOC for construction, Obtaining additional power connection among others. A detailed list of various approvals required for the Project is provided in the Statutory Approvals under Technical Assessment section of this report.
COD	01st April 2028	OSEPL has proposed that commercial production of the Cell Manufacturing Line would commence from 1st April 2028 which seems reasonable, provided the Company will obtain all necessary / statutory approvals and permissions in time and would procure all critical plant and machineries including delivery of all plant and machineries as indicated in the implementation schedule.

The Company has identified adequate infrastructure to set up and operate the project.

Key Financial Assessment Parameters

Following is the summary of key financial assessment parameters considered for the purpose of this TEV study for the Project under consideration:

Project Cost & Means of Finance	
Estimated project cost	INR 455.85 Cr
Proposed DE ratio	**1.85:1**
Proposed Term Loan	INR 296.00 Cr

Promoters' Contribution	INR 159.85 Cr (includes Equity from IPO proceeds)

Particulars	As identified	D&B India Assessment
Land Cost	Acquired on lease	OSEPL has entered into a registered lease agreement with Radhika Gupta for acquiring **114 Kanal 7 Marla (approximately 14.29 acres)** of land located at **Khewat No. 55, Rect. No. 63 Killa Nos. 12, 13, 18, 19, 20, 21, 22 & 23; Rect. No. 64 Killa Nos. 16, 17, 22, 23, 24, 25 & 21 Min North; and Rect. No. 65 Killa No. 25/1 Min North**, situated near Sawariya Overseas, Karnal-Munak Road, Village Munak, Sub-Tehsil Ballah, District Karnal, Haryana, for establishment of the proposed solar cell manufacturing facility. The lease has been executed for a period of **99 years** commencing from **06 October 2026** at an annual lease rental of **INR 97.24 lakh**.
Building & Civil Works Cost	INR 89.20 Cr.	The cost of factory building and civil works is estimated at INR 89.20 crores as per the estimate of M/s ECR Buildtech Pvt. Ltd. submitted by the Company. The estimated Factory Building & Civil Works cost for the proposed built-up area of **30367 sq. meters** translates to **INR 2729 per sq. ft.**, which is slightly higher than the prevailing market rates. ***The proposed civil cost of INR 73.64 Cr per GW seems to be slightly on the higher side compared to industry benchmark range of INR 55 Cr to 70 Cr per GW subject to project-specific factors such as terrain characteristics, soil profile, foundation requirements, structural design specifications and the proposed built-up area.***
Plant & Machineries and Utilities Cost	P&M incl. Utilities cost: INR 248.95 Cr Electrification & MFA cost: INR 63.21 Cr	The Company has proposed P&M and Utilities cost of INR 248.95 Cr (for 1.2 GW Cell line) and Electrification & MFA cost of INR 63.21 Cr. Further, the Company has already obtained quotations for the main cell line equipment,

Particulars	As identified	D&B India Assessment
		Utilities, Electrification and MFA. The Cell line supplier has adequate experience and expertise in providing after sales service. *As per D&B-India's assessment of similar projects in the past, the proposed P&M and Utilities cost incl. MFA for the proposed project seems to be on the lower side as the per GW cost of P&M including Utilities, Electrification and MFA for the proposed project comes to around INR 257.71 crores against the industry average of INR 425.00 crores to INR 500.00 crores.* ***The same is mainly on account of procurement of pre-owned Plant and machinery***. The key process equipment and automation systems for Texturing, Boron Diffusion, BSG Removal, Alkaline Polishing, PE-Poly, Annealing, PSG Removal, RCA, Front PECVD, Rear PECVD, Printing and associated production processes are of Year of Use: 2023, while the ALD system is proposed to be sourced as new system. ***The Company has submitted an independent Chartered Engineer's Certificate issued by Vinod Kumar Goel dtd. 06th October 2026, certifying the identification, valuation, condition and residual useful life of the proposed pre-owned plant and machinery. The Chartered Engineer has assessed the residual useful life of the key production equipment at not less than 10 years from the proposed COD and has opined that the machinery is suitable for the proposed TOPCon solar cell manufacturing facility.*** ***Further, the draft turnkey supply agreement incorporates performance commitments relating to the proposed 1.2 GW production capacity, cell efficiency, line yield, equipment uptime, warranty obligations, training and post-commissioning technical support. The agreement also provides for liquidated damages at the rate of 0.5% per week of delay, subject to a maximum cap of 10% of the Purchase Order value, along with termination rights in case of prolonged delays. However, D&B India advises the Company to seek confirmation regarding the mechanism for compensation, if any, in the event of non-achievement of guaranteed production capacity, cell efficiency, yield and equipment availability parameters during*

Particulars	As identified	D&B India Assessment
		operational performance testing. As informed by the Company, discussions with the OEM are currently underway, and the Company expects to execute the supply agreement by the end of October 2026.
Overall Cost	INR 401.36 Cr (excluding land)	***The estimated project hard cost (Building, Plant and Machinery & Utilities incl. Electrification and MFA cost excl. land) of INR 401.36 Cr (i.e., INR 331.35 Cr per GW) seems to be lower compared to industry benchmark range of INR 500 Cr to 550 Cr per GW.*** ***As informed by the Company, the lower project cost is primarily attributable to the favorable commercial terms negotiated with the equipment supplier and the proposed procurement of pre-owned/used plant and machinery for the solar cell manufacturing line. The Company expects to achieve substantial savings in capital expenditure using refurbished mother tools and associated equipment as compared to a greenfield facility based entirely on new machinery.***
Offtake	Yet to enter into Off take Arrangements for upcoming module plant sales	OSEPL proposes to use the cells for captive consumption through their Module Manufacturing Facility of 1600 MW in Karnal, Haryana. Hence, the company will have reasonable cell requirement for its own operations. Further, OSEPL proposes to use the modules for captive consumption by their parent company namely M/s Oswal Pumps Limited which holds a dominant position in the domestic solar Pump Market. Hence, the company will have reasonable module requirement from its parent company. The future demand for solar PV components (including modules & cells) is directly dependent on the pace of growth in solar power generation capacity. With Indian Government's stated goal of setting up 293 GW of solar PV installed capacity by 2030, with overall renewable capacity set to reach 500 GW, the future demand for PV components is strong. As per MNRE, the solar power potential in India is estimated to be approximately 750 GW. Apart from Government policy measures on climate change, factors like increasing electricity demand in the country and

Particulars	As identified	D&B India Assessment
		abundance of solar power generation potential also plays key roles in developing solar power generation capacity in the country. Following are the details of installed capacity in the country. • India's annual solar module and cell production capacity stood at 261.7 GW and ~36.5 GW, as of Aug 2026 • Cell Manufacturing capacity will likely exceed 100 GW by FY2028. The Company has achieved solar PV module production of appx. 400 MW in FY 2025-26 at its existing 600 MW Solar PV module manufacturing facility, whereas the additional 1.0 GW module manufacturing capacity is expected to be commissioned post Q3 FY 2027. Hence, D&B India insists the Company to deploy a dedicated marketing and sales team to look after the sales and marketing activity of solar PV modules manufactured by them.
Sales Price	INR 17.97 Wp – DCR Module from FY 2028-29 Onwards	The Government of India's move to impose a Basic Customs Duty (BCD) of 20% plus 7.5% *Agriculture infrastructure and development cess (*AIDC) on imported solar PV cells and BCD of 20% plus 20% AIDC on imported solar PV modules, with effect from April 01, 2025, has offered support to domestic Original Equipment Manufacturers (OEMs), who in turn could compete with international players with respect to solar (cell & module) tariffs. The development follows the government announcing a production-linked incentive (PLI) scheme that offers manufacturers in 10 sectors, including those of high-efficiency solar modules. The imposition of BCD on imported solar cells and modules is expected to improve the competitiveness of domestic cell/module manufacturers but the extent of benefit would also depend upon the imported PV module

Particulars	As identified	D&B India Assessment
		prices, especially from China. Presently, India's solar sector, just like in any other country, is reliant on imports of solar equipment. **The Company proposes to utilize the solar cells manufactured for captive consumption in 1.60 GW module plant.** The current prevailing market price of DCR Modules is in the range of INR 20 to 23 per Wp however, with the ongoing aggressive expansion in cell manufacturing capacity, prices are expected to stabilize and going forward, the market price for DCR modules is likely to settle in the range of INR 16 to 19 per Wp, across both domestic and export segments *(subject to various factors in the domestic and international markets)*. Hence, in view of the above average, for the purpose of this TEV report the DCR Module Price is considered at INR 17.97 per Wp for the financial projections. For the proposed Project, the Company is coming-up with N-type G12R (182.2 x 210 mm) TOPCon cell. OSEPL proposes to sell the modules under DCR, wherein the Company can charge premium as against the current prevailing foreign cell-based modules prices. It is important to note that the module prices in international market are primarily influenced by Chinese suppliers and regulations of the importing country; and under the Indian market it holds good considering regulatory support on duties & tariff barriers. Under the Solar PV industry, considering the dynamic nature of the pricing, though elastic in nature, D&B India has carried out Sensitivity Analysis, wherein it can be observed that even with 3% reduction in the annual revenue, the Project is expected to meet debt service obligation.
Raw Material Availability	Wafers	Polysilicon – Ingot wafer is the main raw material for the proposed project. No company manufactures solar wafers in India currently. Solar wafers, usually made using silicon, are in great demand all over the world as governments are looking to switch to renewable ways of producing electricity.

Particulars	As identified	D&B India Assessment
		Based on available latest data, the total Polysilicon production stands at approx. 1.7 MT in 2024 of which **China** continues to dominate with **94% of global capacity** in 2024, led by six major producers. In 2023, the estimated Polysilicon production was approx. 1.6 MT, which is enough to make 524 GW of Modules against the estimated demand of 355 GW globally. The planned new capacity outside China includes a 0.03 MT plant in Malaysia by OCI Group *(South Korea's leading chemical and green energy conglomerate), 0.06 MT plant in Germany by Wacker and 0.03 MT plant in USA by Hemlock, REC*. Hence, it is to be noted that Polysilicon – Ingot wafer is reasonably available for the proposed project. The Company will have to strategically plan wafer procurement depending on the demand of module. **Moreover, the end product prices generally move in tandem with the raw material price, and the industry is able to pass on the price hike, albeit, with a time lag.**
RM Cost	Average RM to Sales Ratio approx. 66.26% (excluding first year of operation)	The RM to Sales Ratio ranges between 60% to 67% (excluding first year of operation, due to inventory movement impact); The overall raw material cost proposed for the project seems to be competitive. Under the Solar PV industry, considering the dynamic nature of the pricing, though elastic in nature, D&B India has carried out Sensitivity Analysis, wherein it can be observed that even with 3% increase in the raw material cost, the Project is expected to meet debt service obligation.
Power	15,000 KVA	The total power requirement is estimated at 15,000 KVA for the proposed project. The Company has proposed to obtain requisite power connection from Uttar Haryana Bijli Vitran Nigam Limited in due course for operating the plant.

Particulars	As identified	D&B India Assessment
Manpower	Presented in Respective Section	The Company has proposed the function-wise manpower requirement for proposed project. The same is discussed in detail in the Technical Assessment section of this report.
Standalone EBITDA	Average: 20.33%	The projected average EBITDA margin of approximately 20.33% over the forecast period appears reasonable. ***It is important to note that the aforementioned EBITDA margins are considering the standalone solar cell manufacturing unit with reasonable scale and size of operations considering the solar cells will be sold in the open market.***

Risk Analysis & Mitigation

Details of Risk Analysis & their mitigation is given below:

Key Risks	Risk Carrier	Proposed Mitigation of Risk
Experience & Capability	OSEPL	The promoters of the Company possess prior experience in Solar PV module manufacturing. The Company currently operates an existing 600 MW solar module facility, with an additional 1 GW of module line expected to commission post Q3 FY 2027. The utilization levels of the Company have progressively improved, standing at ~40% in FY 2025, ~70% in FY 2026, and >70% in FY 2027 till Aug 2026 as informed by the Company. Between April and August 2026, the Company has already achieved a topline exceeding INR 400 crore. The existing key management team and staff possess expertise in various aspects of Solar PV module manufacturing. However, it is noteworthy that this will be the Company's first venture into solar cell manufacturing. Moreover, the Company already hired experienced professional related to sector to oversee the project operations. D&B notes that the promoters of the Company are considered to have the required experience and understanding of the dynamics of the sector. *However, it should suitably plan to further recruit & retain professionals who can assist in implementation & operations of the project.*
Time Over-run	OSEPL	The Company has already acquired the land admeasuring 14.29 acres for setting up the proposed project on long term lease. Further, the Company has also obtained quotations for the main cell line equipments incl. Utilities, Building & Civil works and Electrification and MFA. OSEPL has estimated an implementation period of **18 months** for the proposed **1.2 GW solar cell manufacturing facility**, with project execution envisaged to commence in **October 2026**. Considering the current stage of project development, the status of project planning, and the activities pending for completion, the proposed **Commercial Operation Date (COD) of 1 April 2028** appears achievable, provided the Company will obtain all necessary / statutory approvals and permissions in time and would procure all critical plant and

Key Risks	Risk Carrier	Proposed Mitigation of Risk
		machineries including delivery of all plant and machineries as indicated in the implementation schedule. **D&B India advises the Company to strictly adhere to the implementation schedule, obtain necessary approvals, funds on time to avoid any time over-run.**
Cost Over-run	OSEPL	Cost overrun could arise on account of three principal factors: a) Escalation in the estimated capital cost b) Unforeseen additional capital cost c) Time over-run. The Company has already acquired the land for setting up the proposed project. The total building and civil construction works cost is estimated at INR 89.20 crores as per the estimate of M/s ECR Buildtech Pvt. Ltd. submitted by the Company. Further, the Company has estimated a cost of INR 248.95 crores for the plant and machinery including utilities for the proposed project. Considering the current status of the project and discussions with key management personnel of the Company, a contingency of 3.00% on the project hard cost has been factored in to address potential cost escalations due to unforeseen circumstances. In case of any overrun above the Project Cost due to any unforeseen circumstances or substantial delay, the lenders may insist on the promoters to meet the cost over-run out of promoters' contribution from the existing net worth of Individual promoters.
Technology Risk	OSEPL	TOPCon Solar cell technology is the state of art cell technology apart from being latest one in the Indian market. As per the machinery proposal submitted by the Company, a significant portion of the core production equipment (mother tools) proposed for the 1.2 GW TOPCon solar cell manufacturing line comprises pre-owned/used machinery. The proposal indicates that most of the key process equipment and automation systems for Texturing, Boron Diffusion, BSG Removal, Alkaline Polishing, PE-Poly, Annealing, PSG

Key Risks	Risk Carrier	Proposed Mitigation of Risk
		Removal, RCA, Front PECVD, Rear PECVD, Printing and associated production processes are of Year of Use: 2023, while the ALD system is proposed to be sourced as new system. The supplier has also separately issued an option to upgrade certain tooling and fixtures from used to brand-new condition at an additional cost. Accordingly, the proposed project implementation is expected to be based substantially on refurbished/used production equipment, the performance and reliability of which would be contingent upon the residual life, operating condition, refurbishment quality, and successful recommissioning of the machinery. ***The Company has submitted an independent Chartered Engineer's Certificate issued by Vinod Kumar Goel dtd. 06th October 2026, certifying the identification, valuation, condition and residual useful life of the proposed pre-owned plant and machinery. The Chartered Engineer has assessed the residual useful life of the key production equipment at not less than 10 years from the proposed COD and has opined that the machinery is suitable for the proposed TOPCon solar cell manufacturing facility.*** ***Further, the draft turnkey supply agreement incorporates performance commitments relating to the proposed 1.2 GW production capacity, cell efficiency, line yield, equipment uptime, warranty obligations, training and post-commissioning technical support. The agreement also provides for liquidated damages at the rate of 0.5% per week of delay, subject to a maximum cap of 10% of the Purchase Order value, along with termination rights in case of prolonged delays. However, D&B India advises the Company to seek confirmation regarding the mechanism for compensation, if any, in the event of non-achievement of guaranteed production capacity, cell efficiency, yield and equipment availability parameters during operational performance testing. As informed by the Company, discussions with the OEM are currently underway, and the Company expects to execute the supply agreement by the end of October 2026.***

Key Risks	Risk Carrier	Proposed Mitigation of Risk
Off take/ Demand Risk	OSEPL	OSEPL proposes to use the cells for captive consumption through their Module Manufacturing Facility of 1600 MW. Hence, the company will have reasonable cell requirement for its own operations. Currently, the company is utilizing almost ~75% of the installed capacity of its existing 600 MW Solar PV module manufacturing line. This is evident from the fact that company has already achieved sales of more than INR 400 Crs during April 26 – Aug 26. Apart from existing production line, company has also received enquiries for the new Solar PV module line currently under installation and expected to be commissioned post Q3 FY 2027. However, the Company has not shared any confirmed order book, executed supply agreements, off-take arrangements, or customer commitments pertaining to the output from the proposed 1.0 GW module manufacturing facility for independent verification by D&B India. As informed, the company will confirm orders with potential customers for new production line post erection and commissioning of new production line. Moreover, its existing sales team are continuously targeting new customers and because of an established brand, the company expects good response from the market. Aggressive push for clean technology for sustainable development adopted by the Government to achieve the twin objective of reduction of carbon footprint as well as to reduce dependency on hydrocarbon-based power generation will continue to augment growth of the renewable energy sector. The Govt. has committed to reduce carbon emissions by 30% to 35% and increase renewables to 40% of the energy mix by 2030. Progressing with bullish approach on renewables, India has raised 500 GW of renewable energy by 2030. Moreover, a significant portion of new power installations will continue to come from renewables led by solar. Of the FY 2030 target, 293 GW of total 500 GW would come from solar power. To achieve the pledged target, around 32 GW of solar energy capacity is needed to be installed every year, till 2030.

Key Risks	Risk Carrier	Proposed Mitigation of Risk
		However, considering projected demand of solar power generation and investment plan in module manufacturing capacity in coming years, domestic market may be oversupplied considering demand supply gap. However, the company has advantage in such kind of adverse scenarios due to – • The Company has proposed TOPCon technology, which is comparatively new and efficient technology and estimated to have a longer tenure compared to poly silicon and PERC. • The Company can explore export market considering location and experience of group in EPC across the globe. ***D&B India notes that there might be significant impact on the project viability if the company is not able to achieve the projected sales.***
Operational Risk	OSEPL	The proposed manufacturing unit enjoys the advantage of being well located, having good linkages with state and national highways thus ensuring an uninterrupted movement of raw materials and finished products. Apart from the above requirements, other considerations such as water availability, good transportation facilities for receipt of goods are also met. Further, the Company must continuously evaluate options to reduce its production cost and achieve the economies of scale. The Company has already recruited experienced & well qualified personnel for implementation and day-to-day operation of plant post COD.
Marketing Risk	OSEPL	The proposed manufacturing unit of the Company is planned to operate at a specific capacity utilization level, in order to achieve the projected production and subsequently the sales value for the respective operational year. Any significant deviation from the planned capacity utilization and sales over the projected year, will affect the overall operations of the plant and subsequently the financials of the Company. The proposed capacity utilization levels are critical to the project so in

Key Risks	Risk Carrier	Proposed Mitigation of Risk
		order to achieve the same, the Company has to make proper marketing arrangements to maintain the regular off-take of finished products and considering stiff competition in the market robust sales and marketing plan would be required. The Company should augment the sales team and develop robust distribution network to capture the market share. The Company can also make its presence felt participating in exhibitions, conferences, social media, direct contact with buyer & contract manufacturing for other brands. Progressing with bullish approach on renewables, India has raised 450 GW of renewable energy by 2030. Moreover, a significant portion of new power installations will continue to come from renewables led by solar. Of the FY 2030 target, 293 GW of total 500 GW would come from solar power. To achieve the pledged target, around 32 GW of solar energy capacity is needed to be installed every year, till 2030. The proposed Project of the Company is expected to benefit from the aforementioned growth in the Solar energy sector in India.
Pricing level and sustainability	OSEPL	The Government of India's move to impose a Basic Customs Duty (BCD) of 20% plus 7.5% AIDC on imported solar PV cells and BCD of 20% plus 20% AIDC on imported solar PV modules, with effect from April 01, 2025, has offered support to domestic Original Equipment Manufacturers (OEMs), who in turn could compete with international players respect to solar (cell & module) tariffs. The development follows the government announcing a production-linked incentive (PLI) scheme that offers manufacturers in 10 sectors, including those of high-efficiency solar modules. The imposition of BCD on imported solar cells and modules is expected to improve the competitiveness of domestic cell/module manufacturers but the extent of benefit would also depend upon the imported PV module prices, especially from China. Presently, India's solar sector, just like in any other country, is reliant on imports of solar equipment.

Key Risks	Risk Carrier	Proposed Mitigation of Risk
		In past the prices of modules fluctuated along with raw material prices considerably. PV solar cell will constitute the major percentage of the total cost of production for the Project. The Company needs to focus on product innovation and higher efficiency products to mitigate the pricing risk to some extent. The finished goods pricing has been projected based on market rates anticipated to prevail after the next 2–3 years. This assumption considers the ongoing aggressive expansion in cell manufacturing capacity, which is expected to lead to price stabilization in the medium term. Further, the downside impact, if any, on the pricing level or capacity utilization of the proposed Project has been captured in terms of Sensitivity Analysis section of this report. The selling price of Solar Cell is considered at INR 9.50 per Wp for the proposed project, which is reasonable basis the D&B India's secondary research. The Company has to maintain adequate pricing to meet the projected revenue. **The price of key raw material i.e. wafers and sale price of solar cell is volatile in nature. The Company should make proper arrangements to minimize the price volatility effect on the profitability of the project.**
Raw Material Availability	OSEPL	For the manufacturing of Solar Cells, wafers are the principal raw material which the company has proposed to import. China is leading supplier of wafers and availability of the same is not challenge in domestic market. No company manufactures solar wafers in India currently. Solar wafers, usually made using silicon, are in great demand all over the world as governments are looking to switch to renewable ways of producing electricity. The cell manufacturing capacity in the country is currently insufficient to meet the demand created by programs mandating DCR. In February 2019, the government introduced the Kisan Urja Suraksha Evam Utthaan Mahabhiyan (KUSUM) program. The program has been divided

Key Risks	Risk Carrier	Proposed Mitigation of Risk
		into three components and aims to add a solar capacity of 25.75 GW by 2022 (which is still on-going to due to slow implementation) and subsequently 34.8 GW by 2026. In March 2019, the second phase of the Central Public Sector Undertaking (CPSU) program was launched to set up 12.00 GW of grid-connected solar power projects for self-use or use by government entities. These programs have a domestic content requirement mandate and are mainly driving the demand for locally manufactured solar cells. Module manufacturers are unable to participate in some tenders due to the shortage of cells that meet the DCR specifications. Accordingly, the Company has planned to setup a facility for manufacturing solar cell. The solar cells will be consumed internally. The Company proposes to procure the material from established and well-known raw material suppliers, however the Company is yet to identify potential raw material suppliers for the proposed project. The Company will have to strategically plan raw material procurement in order to mitigate the price volatility. Moreover, the end product prices generally move in tandem with the raw material price and the industry is able to pass on the price hike, albeit, with a time lag.
Competition Risk	OSEPL	Relative to the globally installed production capacity of solar PV cells/modules, India's share in the same is minuscule. Domestically, as of August 2026, India has about 36.5 GW of cell and 261.00 GW of module manufacturing capacity. Here, for domestic manufacturers, majority of the business comes from Central and DISCOMS and undertakings, with the non-government retail market constituting the balance portion of the total sales. Further, successive capacity addition in recent years has led to increasing demand for companies offering a multitude of products – solar PV cells/modules. Mundra Solar, Websol Energy System, Waaree Energies Ltd, Jupiter International Ltd, RenewSys, Premier, Tata Solar are some of the major companies operating in the sector. The solar manufacturing industry faces competition from imports from

Key Risks	Risk Carrier	Proposed Mitigation of Risk
		various countries like China, Malaysia etc., which are able to offer their products at cheaper prices with compromise in quality. However, the Government is supporting the sector by imposing safeguard duties and other protective measures.
Statutory Approvals	OSEPL	It is to be noted that the Company is yet to apply for majority of the approvals required for the project. The Company has planned to obtain all relevant approvals at appropriate stages as per the requirement. Detailed note on the status of Statutory Approvals has been provided in the Technical Section of this report. D&B India, advice the Company to complete the process in timely manner to avoid any adverse impact on project. Lenders may insist on the Company to obtain critical approvals required for establishment of the plant before disbursement of funds.
Foreign Exchange Fluctuation	OSEPL	The proposed project is exposed to forex risk during both implementation phase (while procuring P&M from foreign suppliers) and operational phase (while purchasing raw material from foreign suppliers). The Company proposes to import part of the raw material required for the project. Unfavourable fluctuation in exchange rate may affect the profitability of the project. OSEPL may consider entering into appropriate forward contracts as required and hedge its position to mitigate the risk. Generally, the end-product prices generally move in tandem with the raw material price and the industry is able to pass on the price hike albeit with a time lag.
Force Majeure Risk	OSEPL /Insurers	The lenders may insist upon the Company to take adequate insurance cover for insurable Force Majeure risks.

SWOT Analysis

Strength	Weakness
• The promoters of the Company have been operating in the solar PV Energy sector/segment for the past few years with a combined Module Manufacturing Facility of 1600 MW (600 MW operational and 1000 MW under implementation) in Karnal. • The proposed project is coming up in Karnal Haryana, which is having access to basic infrastructure pertaining to connectivity, utilities and skilled manpower, which will lead to economies of scale. • The Company has identified the required raw material sources (multiple suppliers) and is assured of the continuous supply.	• The Company will have to implement a comprehensive sales & marketing plan for the sale of its proposed products to achieve the projected sales levels. • The Solar power generation industry is also evolving hence it is undergoing frequent technological changes so any major technological change may lead to additional capex which may impact the overall financials of the Company. • The price of key raw material i.e. wafers is volatile in nature and the Company is dependent on China for the same. *(The Company should make proper arrangements to minimize the price volatility effect on the profitability of the project.)*
Opportunity	**Threat**
• In the renewable energy basket (including large hydro) as of March 2026, solar energy accounted for a share of ~50%. Growth in the solar power sector over the last five years has been robust. • India's solar module manufacturing capacity increased nearly 7x from 38 GW in March 2024 to 261.7 GW in Aug 2026. PV cell manufacturing capacity increased 4x from 9 GW to ~36.5 GW during the same period. • Indian Solar Module consumption market has grown over 35% CAGR in FY2024 and is all set for an accelerated growth over the next 4 years. In volume terms, Consumption of Modules in FY 2026 was appx. ~45 GW, ~38 GW in FY2025 compared to 28.3 GW in FY 2024.	• Capacity additions by other players, or new entrants in the market, are expected to lead to increased competition. • The industry is characterized by the volatility in the prices of inputs and finished products impacting profitability of the manufactures. • Any adverse changes in Government incentives & policies would affect the financials of the Project. • Change in the duty structure by the Government of India (GOI), for the imported solar panel products or components. • Limited availability of upstream supply chain in India and total dependence on foreign sources.

• The Indian solar industry's growth is fuelled by a combination of factors, including supportive government policies, declining solar panel costs, favourable weather conditions, and rising energy demand. Government initiatives like the National Solar Mission and Solar Park Scheme, coupled with competitive tariffs, are key drivers. Additionally, technological advancements, increased flexibility of solar systems, and growing private investment further contribute to the sector's expansion.	

Techno-Economic Viability	**Yes.** *Subject to assessment as detailed in the report and mitigation of risks associated with the project, critical success factors and limiting conditions as mentioned in the report.*

Report

Scope of Work

D&B India has been appointed for conducting a techno-economic viability (TEV) study for the Project through a detailed techno financial analysis of the proposed venture, evaluation of the constraints and future potential for setting up the facility.

The scope of work is as under:

- D&B India will physically visit the Company's site and undertake technical assessment of the Project.
- Vetting of projected financials/assumptions/EBIDTA validation, acceptability of estimated revenue generation, cash accruals and projected financials of the Company as a whole and its relevance in present day scenario.
- Assessment of other financial parameters and viability to see that Banks' loan is serviced, considering the present economic scenario.
- Comments on identified risk and its mitigation. Any other risk and its mitigation may also be detailed out in the vetting.
- Various tools, such as debt service coverage ratio, IRR, sensitivity analysis will be used to arrive at a conclusion on the viability of the Project.
- Assessing the proposal from a technical feasibility and economic viability points of view.

Date of Inspection

D&B India conducted site visit of the proposed project location on 7th October 2026 to obtain a first-hand view of site including basic infrastructure facilities such as water, power, approach roads, and manpower etc. available at the location and to review the current status of plant.

Team of Consultants

The team of consultants who have worked on the project has been mentioned below –

Mr. Aniket Dalbanjan – A PGDM-Finance and BTECH-Mechanical with an overall Professional Experience of 10 years. He has more than 7 years of experience in Management Consulting and Project Appraisal Services. Experience in Project Appraisal and Project Finance domain covering aspects related to technical feasibility, commercial and financial viability, risk & mitigation mechanism for Greenfield and Brownfield projects. Appraised projects across manufacturing & service sectors covering industries such as Ethanol, Steel, Textiles, Renewables, Food Processing, Real Estate, Packaging, Pharmaceuticals and Waste to Energy projects etc.

Mr. Viral Soni - A Chartered Accountant with 10 years of Professional Experience in Management Consulting and Project Appraisal Services. Experience in Project Appraisal and Project Finance domain covering aspects related to technical feasibility, commercial and financial viability, risk & mitigation mechanism for Greenfield, Brownfield and Distressed/Restructuring projects. Appraised projects across manufacturing & service sectors

covering industries such as Textiles, Mining, Steel, Paper, Cement, Food Processing, Power, Hotel, Hospital, University, Real Estate, Road construction, PPP Passenger Transportation project etc.

Methodology

The techno-economic viability study assigned to D&B India was carried out in the following sequence:

1. Verification of the documents provided by the client, identification of missing information, and requesting the revised list of documents required from the client.
2. Visit to the proposed location.
3. Assessment of the project cost reasonableness for the proposed project
4. Assessment of revenue and cost estimates of the project
5. The technical assessment comprised of review of the proposed plot layout, building plan, plant and machinery and other related aspects.
6. Secondary research to understand industry specific benchmarks.
7. Assessment of financial projection and to derive various financial ratios to assess viability of the financial project.
8. To carry out sensitivity analysis & SWOT analysis and to identify risk & its mitigation pertaining to the project.

Project Overview

OSEPL is a wholly owned subsidiary of Oswal Pumps Limited (OPL) and is engaged in manufacturing and selling photovoltaic (PV) modules along with balance components such as inverters, etc. The parent Company Oswal Pumps Limited manufactures and sells a wide range of pumps and motors, such as submersible pumps, monobloc pumps, solar pumps, electric motors etc.

OSEPL currently operates a solar PV module manufacturing facility at Karnal, Haryana, with an installed capacity of 600 MW. To enhance its production capabilities, the Company is undertaking the expansion of its module manufacturing operations through the installation of an additional 1.0 GW PV module production line adjacent to the existing facility. As informed by the Company, the 1.0 GW solar PV module manufacturing plant is expected to commence its commercial production post Q3 FY 2027. Post the completion of under execution solar module plant of 1.0 GW, the total solar module capacity of the Company will be 1.60 GW.

Under the current project, the company has proposed setting up a 1.2 GW solar cell manufacturing plant to strengthen its integrated renewable energy capabilities. The solar cells produced will primarily be used for captive consumption in its 1.60 GW PV module plant.

The current TEV Study is for the proposed 1.20 GW Solar Cell project of the Company.

Company's Background

Brief particulars of the Company are mentioned in the table below:

Company Details	
Name	Oswal Solar Energy Private Limited
Date of Incorporation	January 21, 2022
Constitution	Private Limited Company
Registered Office	Oswal Estate, NH-1, Kutail Road, P.O. Kutail, Karnal, Haryana, India, 132037
Proposed Plant Site	Khewat No. 55, Rect. No. 63 Killa Nos. 12, 13, 18, 19, 20, 21, 22 & 23; Rect. No. 64 Killa Nos. 16, 17, 22, 23, 24, 25 & 21 Min North; and Rect. No. 65 Killa No. 25/1 Min North, situated near Sawariya Overseas, Karnal-Munak Road, Village Munak, Sub-Tehsil Ballah, District Karnal, Haryana.
GST	06AADCO6824E1ZL

Source: OSEPL

OSEPL is a wholly owned subsidiary of OPL and manufactures PV modules along with other balance components such as inverters, etc. Incorporated on January 21, 2022, it started commercial operations from January 2024. It is located in Karnal, Haryana. The company has an annual PV module production capacity of 600 MW. It offers a range of PV modules with varying capacities, catering to residential, commercial and industrial applications. It also provides associated services such as system design and installation, positioning itself as a comprehensive provider within the solar energy sector.

OSEPL started its first PV module line of 600 MW capacity in January 2024 and expects to commission its second 1.0 GW PV module line post Q3 FY 2027.

Brief Background of Directors

Name	Experience
Mr. Vivek Gupta	He holds a bachelor's degree in commerce from Kurukshetra University, Haryana. He has has over 18 years of experience in the pumps manufacturing industry. He has received the Nation's Udyog Ratan Award from the Indian Organisation for Business Research & Development in 2005.
Mr. Shivam Gupta	He holds a bachelor's degree in commerce from University of Delhi, New Delhi and a master's degree in management from University of Liverpool, Liverpool. He has more than three years of experience in the pumps manufacturing industry.
Mr. Amulya Gupta	He holds bachelor's degree of science in business and management studies from University of Bradford, Bradford, West Yorkshire. He has more than five years of experience in the pumps manufacturing industry.

Ms. Kanchan Vohra	She holds a bachelor's degree in commerce from Punjab University, Chandigarh and a bachelor's degree in law from Chaudhary Charan Singh University, Meerut, Uttar Pradesh. She also holds a post graduate diploma in computer science from Kurukshetra University, Kurukshetra, Haryana. She was previously associated with Aglasem Edutech Private Limited as Senior Legal Manager, JMD Supplychain Solution Private Limited as Senior General Manager – Legal, HR and Admin and SBI Life Insurance Company Limited as Executive Assistant. She has over five years of experience in the legal field and is currently working as Chief Legal Officer in the legal department of Assotech Group. She has also been appointed as an independent director on the board of directors of Panasonic AVC Networks India Company Limited, Lucent Industries Limited and Agra Smart City Limited.

Source: OSEPL

Brief Background of Key Management Team

As informed, the Company has put in place an experienced senior management team responsible for project execution during the implementation phase as well as operational management post-COD. The details of the team are presented below. The identities of the key management personnel have not been shared by the Company citing privacy and confidentiality reasons.

Responsibilities	Proposed Designation	Total Experience	Number of Solar Cell Project Handled
SPOC-Strategic Management, Overall Project Cordination, Vendor Management, Organisation Building, Future Expensations, P&L Management, Budgeting, Media Management, Brand Development & Marketing	COO	18+	8
Machine Selection, Technology Evaluation, Mother Equipment Installation & Commissioning, Chemical & Gas Distribution System, Spare Management	CTO/ Sr. VP, Project & Maintenance	20+	9
Project & Operations Head, Ramp up, Manpower Management, Training Wing Development, Raw & Packaging Materials Planning, Construction Management etc	VP-Operations	18+	9
Process Intigration, New product Development, R&D,	GM/AVP-Process	10+	6
Utility Management- HT & LT Electrical Works, Mechanical, HVAC System, Cleanroom, DI, ZLD Etc	GM/Utility	18+	5

Historical Financial performance

The historical performance of the Company is summarized in table below:

Income Statement

INR Crore

Particulars	Audited	Provisional
	31-Mar-25	31-Mar-26
Revenue / Sales:		
Export Sales	-	
Domestic Sales	406.31	812.50
Traded goods	44.67	24.74
Total Gross Revenue from Operations	**450.98**	**837.24**
EPC Sales	-	0.00
Add: Other Income	2.32	13.40
Total Net Revenue	**453.31**	**850.64**
Cost of Sales:		
Raw Material Purchased	-	-
Opening Stock of RM	-	-
Closing Stock of RM	-	-
Raw Material Consumed	332.42	664.21
Stock in trade Purchased	46.25	22.48
Opening Stock of Stock in trade	-	4.20
Closing Stock of Stock in trade	4.20	3.26
Stock in trade Consumed	42.05	23.42
Salaries and Wages Expenses	10.02	17.75
Power & Fuel Costs	3.79	5.14
Repairs & Mainteance	2.13	3.41
Cell Packing Cost	-	-
Other Manufacturing Expenses	6.47	18.60
Sub-Total	**401.08**	**731.58**
Add: Opening WIP	0.98	2.89
Less: Closing WIP	2.89	1.91
Cost of Production	**399.16**	**732.56**
Add: Opening FG	0.08	16.34
Less: Closing FG	16.34	24.17
Cost of Sales	**378.69**	**725.67**
Gross Profit	**74.61**	**124.97**
Operating Expenses		
SG&A Expenses	3.86	3.15

Transfer Cost		
Lease Rent	0.01	0.63
Sub - Total	**3.86**	**3.78**
EBITDA	**70.75**	**121.18**
EBITDA Margin (%)	*15.61%*	*14.25%*
Depreciation / Amortization	4.42	5.86
Operating Profit (EBIT)	**66.33**	**115.33**
Financial Charges:		
Interest on Working Capital	-	-
Other Finance Cost	0.74	0.73
Interest on Term Loan	4.82	4.19
Interest on Unsecured Loan	-	-
Total Financial Charges	**5.55**	**4.92**
Add: Interest on subsidy	-	0
Profit Before Tax	**60.78**	**110.40**
Current Tax	10.47	19.50
Profit After Tax	**50.31**	**90.90**

Source: OSEPL

D&B India notes that

1. The Company's sales have shown an increasing trend growing from INR 453.31 crores in FY 25 to INR 850.64 crores in FY 26 on account of higher capacity utilisation levels y-o-y basis.

Balance Sheet Statement

INR Crore

Particulars	Audited	Prov
	31-Mar-25	31-Mar-26
LIABILITIES:		
Current Liabilities:		
Working Capital Loan	44.17	9.29
Unsecured Loan		
Lease Liability	0.64	0.10
Sundry Creditors	19.38	32.61
Creditors for Capital Goods	2.02	5.06
Other Current Liabilities	8.21	4.18
Advance from Customer		
Instalment of New TL	-	
Instalment Term Loan - Existing	1.43	4.46
Provision for Taxes and Gratuity	3.54	2.35
TOTAL CURRENT LIABILITIES (A)	**79.39**	**58.05**

Term Liabilities: (less next year installments)		
New Term Loan		
Lease Liabilities	5.08	2.50
Term Loan - Existing	11.92	11.05
Provisions	1.26	3.42
Deferred Tax Liabilities	0.21	
Other Non Current Liability	1.66	5.89
Unsecured Loans from promoters		
TOTAL TERM LIABILITIES (B)	**20.13**	**22.85**
TOTAL OF OUTSIDE LIABILITIES (C = A + B)	**99.52**	**80.90**
NET WORTH:		
Share Capital	12.50	64.87
Other Equity	-	59.69
Share Premium	0.11	251.39
Changes in accounting policies	9.19	
Surplus (+) or deficit (-) in Profit & Loss a/c	50.31	90.90
TOTAL NET WORTH (D)	**72.11**	**466.85**
TOTAL LIABILITIES (E = C + D)	**171.63**	**547.75**
ASSETS:		
Current Assets:		
Cash & Bank Balances	0.03	204.76
Raw Material & Consumables	52.24	56.42
Work In Progress	2.89	1.91
Finished Goods	20.55	27.44
Other Current Assets	27.91	86.40
Debtors	22.11	35.95
TOTAL CURRENT ASSETS	**125.72**	**412.87**
FIXED ASSETS:		
Gross Block (Land & Building, Machinery)	43.02	54.53
Less: Accumulated Depreciation	4.59	10.14
Net Block	**38.43**	**44.40**
Capital Work In Progress	0.16	41.90
Right of Use assets	5.42	2.42
Other Intangible assets	0.16	0.59
Capital Advances	0.14	42.91
Deferred Tax Assets	-	0.10
Deposits	1.61	2.39

Other Non Current Assets		0.17
Long term Investments		
TOTAL ASSETS	**171.64**	**547.75**

Source: OSEPL

Technical Assesment

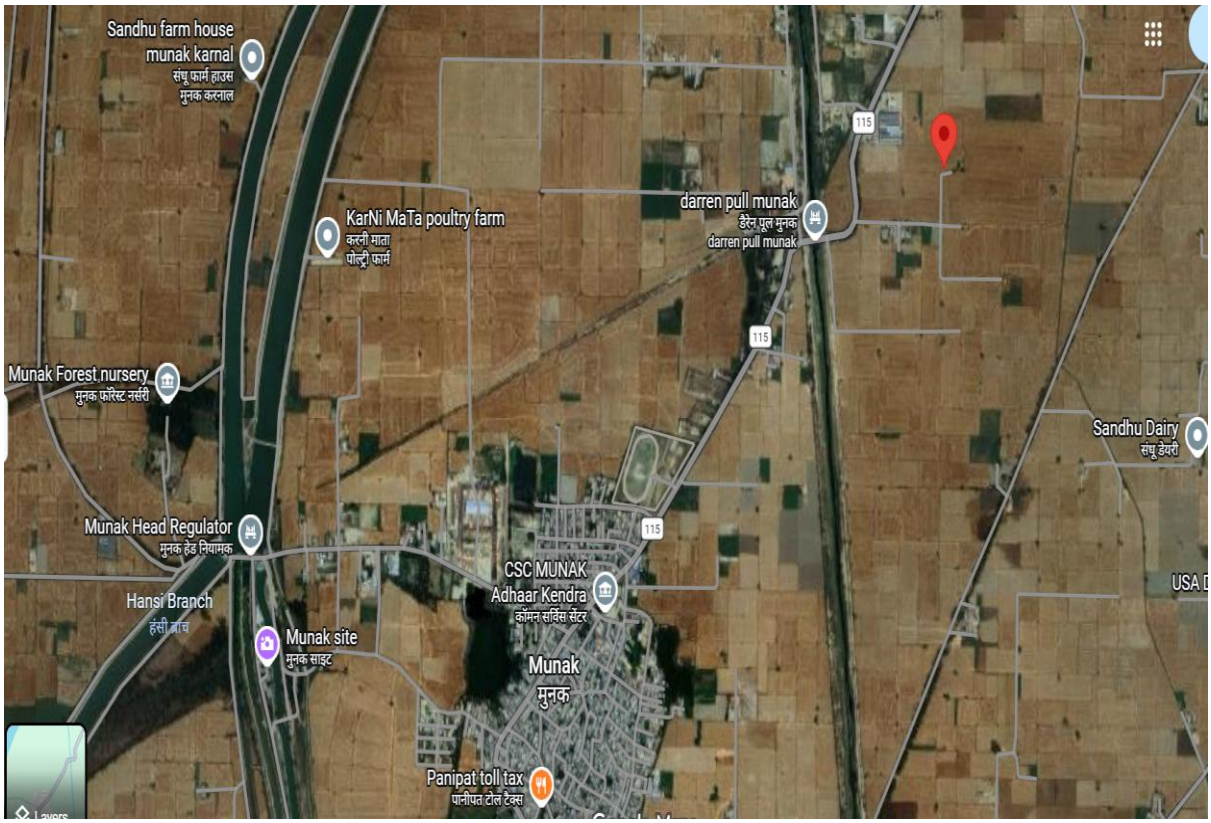
Land

OSEPL has entered into a registered lease agreement with Radhika Gupta for acquiring **114 Kanal 7 Marla (approximately 14.29 acres)** of land located at **Khewat No. 55, Rect. No. 63 Killa Nos. 12, 13, 18, 19, 20, 21, 22 & 23; Rect. No. 64 Killa Nos. 16, 17, 22, 23, 24, 25 & 21 Min North; and Rect. No. 65 Killa No. 25/1 Min North**, situated near Sawariya Overseas, Karnal-Munak Road, Village Munak, Sub-Tehsil Ballah, District Karnal, Haryana, for establishment of the proposed solar cell manufacturing facility. The lease has been executed for a period of **99 years** commencing from **06 October 2026** at an annual lease rental of **INR 97.24 lakh**. The lease deed grants the Company the right to construct buildings and project infrastructure on the leased land, while obtaining statutory approvals and bearing applicable taxes, duties and utility charges. The deed further permits creation of mortgage/hypothecation over the leasehold rights and structures in favour of recognized lenders for project financing purposes. The lessor has represented that the land is free from encumbrances, litigation and third-party claims and has assured peaceful possession of the leased premises throughout the lease tenure.

Location

Land location details are as under.

Google Co-ordinates: 29°31'51.2"N 76°51'39.9"E



Village: Munak

Tehsil: Ballah

District: Karnal

Nearest Major Bus stand: Karnal 25 km

Nearest Major Railway station: Karnal 25 Km

Nearest International Airport: Chandigarh 140 km

Nearest Domestic Airport: Karnal 30 km

Current Status / Site Visit Observations

D&B India conducted site visit of the proposed project location on 7th October 2026 to obtain a first-hand view of site including basic infrastructure facilities such as water, power, approach roads, and manpower etc. available at the location and to review the current status of plant.

The site visit observations are as follows:

- The Company has already secured the required land for the proposed project through a long-term lease arrangement.
- The project site is strategically located adjacent to State Highway (SH)-115, providing direct connectivity between Karnal and Munak.
- Construction of the boundary wall was observed to be in progress at the time of the site visit.
- Civil construction activities related to the proposed factory building had not commenced as of the site visit date.
- To meet the process water requirements of the manufacturing facility, the Company proposes to develop a dedicated borewell at the project site.
- The Company has already obtained quotations for the major project components, including plant and machinery, utilities, electrification works, and factory building and civil construction works.

Site Visit Photos













Implementation Schedule

The implementation schedule of the proposed project is as following:

Particulars	Date of Commencement	Expected Date of Completion
Acquisition of Land	Acquired on lease	
Boundary Wall and Land Development Works	Oct-26	Dec-26
Civil Works	Dec-26	Jul-27
Ordering of Plant and Machinery/Utilities	Oct-26	Jul-27
Delivery of Plant and Machinery/Utilities	Jul-27	Dec-27
Installation of Plant and Machinery/Utilities	Aug-27	Jan-28
Arrangement for Power for operations	Oct-27	Dec-27
Trail Runs and Validations	Feb- 28	Mar- 28
Commercial Production	Apr-28	

Source: OSEPL & D&B- India Estimates

As indicated in the implementation schedule, the Company has already acquired the land for the proposed project. Further, the Company has also obtained quotations for major project components, including factory building and civil works, plant and machinery, utilities, electrification and MFA. The implementation period for the proposed 1.2 GW solar cell manufacturing facility has been estimated at 18 months, with project execution scheduled to commence in October 2026. Considering the current stage of project development and the activities pending for completion, the proposed Commercial Operation Date (COD) of 1 April 2028 appears achievable, provided the Company will obtain all necessary / statutory approvals and permissions in time and would procure all critical plant and machineries including delivery of all plant and machineries as indicated in the implementation schedule.

D&B India advises the Company to strictly adhere to the implementation schedule, obtain necessary approvals, funds on time to avoid any time over-run.

Status of Statutory License / Registration / Approvals

Following are the approvals required for the PV module manufacturing line.

SN	Approval needed	Approving authority	Status
1	Factory license	Commissioner of Industries	To be Applied for post COD
2	Building Plan Approval	District Town Planner, Karnal	To be Obtained
3	Labour license	Inspector of factories	Before commissioning of the plant

4	Fire NOC	Fire Department	To be obtained
5	IEC/BIS certification of modules	Certification authorities like TUV, UL etc.,	After commencing production for market acceptance
6	ALMM Approval	MNRE, GoI	After commencing production for market acceptance
7	Land Conversion to Non Agricultural land	Collector, Karnal	To be Obtained
8	Power Connection	Uttar Haryana Bijli Vitran Nigam Limited	To be Obtained
9	Building Construction Permission	District Town Planner, Karnal	To be Obtained
10	Consent to Establishment	Pollution Control Board	To be Obtained before commencing civil works
11	Consent to Operation	Pollution Control Board and CI of factories	To be Obtained before Commencing operations
12	Petroleum and Explosive Safety Clearance	PESO-Petroleum and Explosives Safety Organization	To be Obtained before Commencing operations
13	Water Connection	Water Supply Board	To be Obtained

Source: OSEPL & D&B India

It is to be noted that the Company is yet to apply for majority of the approvals required for the project.

D&B-India advises the Company to complete the process in timely manner as per the above table, to avoid any adverse impact on project.

Project Configuration

Project Summary is exhibited below-

Sr. No.	Parameter	Cell plant
1	Project Title	Topcon cell manufacturing plant
2	Major components	N type wafer, Silver, Aluminium paste and gases.
3	Nameplate Capacity of plant	1200 MW per annum
4	Manufacturing facility	Wafer to cell manufacturing using Texturing, diffusion, annealing, metallization and screen printing equipment
5	Technology	Topcon cells using N type wafers

Source: OSEPL

Cell Manufacturing Process

Step 1: Texturization Process: At the beginning of the solar cell process, the wafers have to be cleaned from residual contaminants and the saw damage has to be removed. This is done by wet chemical etching, thereby creating a random surface texture. The wafers are passed through a texturing bath, two (alkaline /acid) cleaning baths with rinsing baths in between. After the wet processing, the wafers are dried by hot air.

One of the major loss mechanisms of solar cells is the reflection of light on the front surface. To achieve a higher efficiency, it is therefore necessary to do a texturing of the front surface to reduce reflection. For mono-crystalline p-type wafer, alkaline texturing using KOH solution is done using the following two steps:

- removal of the saw damage
- texturing of the surface to reduce reflection

A pyramid like structure is formed on the cells.



Texturization:

It Involves:

- **Creation of textured surface** on wafers by cleaning of wafers and removal of saw damages with the help of wet chemical etching
- **Wet Processing** - Further, the wafers are passed through texturing bath i.e., alkaline /acid cleaning bathand rinsing bath
- **Dry Processing** - After the wet processing, the wafers are dried by pressurized hot air.

Input Raw Materials:

- Silicon
- Wafers
- HF
- KOH
- HCL
- DI water

Step 2: Diffusion Process: To establish a separation of the photo generated charge carriers, the solar cell needs a p/n-junction. For p-type based solar cells, this is realized by an n-type emitter. The dopant is Phosphorus (P), coming from a liquid (POCl3) source. The dopant is diffused into the silicon by a combined oxidation / heat treatment in the POCl3 diffusion system.

The process steps are as follows:

- Load boat into oven
- Temperature stabilization
- P-glass deposition (POCl3 source active)
- Drive-in of phosphorus
- Purge
- Unload boat



Diffusion:

It involves:

- Establishing a separation of the photo generated charge carriers, as the solar cell needs a p/n-junction.
- The dopant is diffused into the silicon by a combined oxidation / heat treatment in the POCl3 diffusion system. The process steps are as follows:
  1. Load boat into oven
  2. Temperature stabilization
  3. P-glass deposition (POCl3 source active)
  4. Drive-in of phosphorus
  5. Purge
  6. Unload boat

Input Raw Materials:

- Textured Silicon wafers
- POCL3
- Oxygen
- Nitrogen

Step3: Formation of Selective Emitter

Etch-back process is used to form a selective emitter. This is the preferred method to process high efficiency screen printed solar cells. The high doping level underneath the contacts helps to form a good contact with low contact resistance and widens the process window in the firing step. After the emitter formation, a mask is printed by either using screen or inkjet printing technique. The etch-back step follows, and the mask is removed in a wet-chemical solution. The edge isolation can be done in several ways. The preferred method is to do this by single side etching, after the mask was printed. An inline wet bench can be used that contains all three modules in one system (edge isolation, etch-back and mask removal).

Step 4: PSG removal and junction edge isolation (supportive process):

- Junction Edge Isolation: During the diffusion process, since the N-layer is also formed on edges resulting into shorting between P and N region from the edge of solar cells. In case, shorting not removed, the unwanted current will flow which will result in shunted cells. This process isolates the junction from the edges by doing etching to some micron using HF and HNO3 chemical.
- PSG Removal During Emitter diffusion, an oxide is built on the wafer surface containing high concentrations of Phosphorous, there called phosphorous silicate glass (PSG). The layer thickness depends on the diffusion parameters and may vary between 20 and 50 nm. In case the standard POCl recipe is not changed the thickness should be constant and the wafers should have a brown appearance. The phosphorous silicate glass (PSG) has to be removed before silicon nitride deposition, because it does not have an appropriate refractive index and a poor surface passivation. This step is called PSG removal.
- The etching of the PSG is a very stable process because the PSG itself is etched very fast in diluted hydrofluoric (HF) acid, the bare silicon has a very slow etch speed. So even if the wafers are still in the HF solution after PSG is removed there is only a minor risk of etching back the emitter. So, the only parameters that influence the PSG removal itself are the HF concentration and the etch time. The rear side of the Wafer is polished which helps in reflection of light into the wafer.



PSG removal & junction edge isolation:

This is a supportive process for Diffusion and includes:

a) **Junction Edge Isolation**: This process isolates the junction from the edges to avoid unwarranted flow of electric current and also avoid the damage of cells.

b) **PSG Removal**: This involves removal of high concentrations of Phosphorous i.e. phosphorous silicate glass (PSG) on wafer surface

Input Raw Materials:

- Diffused silicon wafers
- HF
- HNO3
- KOH
- DI water

Step 5: Annealing

It is a process in which a thin layer of Si O2 is deposited on the front surface of the Cell.

A post-diffusion annealing process for a solar cell is is carried out according to the following steps of (1) normally advancing, heating a quartz furnace tube to 840 deg C, introducing nitrogen at the flow rate of 7slm/min, introducing oxygen at the flow rate of 2.5slm/min, not introducing other gases, advancing for 7-9min, (2)cooling to 810 deg C, simultaneously advancing and annealing, reducing the temperature to 810 deg C at the speed of 5 deg/min, introducing nitrogen at the flow rate of 7slm/min, not introducing other gases, and keeping advancing and annealing for 5-7 min; and (3) reducing the temperature to 750-800 deg C for variable temperature annealing, reducing the temperature to 780 deg C at the speed of 2 deg/min, simultaneously keeping introducing nitrogen at the flow of 7slm/min, not introducing other gases, and then keeping the temperature for 15-25 min,(4) annealing the phosphorus supplement source, introducing phosphorus oxychloride at the flow rate of 900sccm/min, introducing oxygen at the flow rate of 750slm/min, not introducing other gases, and cooling to 650 deg C at the flow rate of 2 deg/min and (5) annealing under the protection of nitrogen, introducing nitrogen at the flow rate of 7slm/min, not introducing other gases, and cooling to the normal temperature at the speed of 2deg/min.

Step 6: Aluminium Oxide deposition on the rear side of cell using PEVCD process

Plasma enhanced chemical vapor deposition (PECVD) is ubiquitously used in the crystalline silicon photovoltaics industry to deposit surface passivation and anti-reflection coatings. Aluminum oxide deposited by PECVD is becoming an increasingly common rear surface passivation layer, due to the growing market share of solar cells with partial rear contacts, such as the passivated emitter and rear solar cell.

Step 7: PECVD (Plasma Enhanced Chemical vapor deposition)

PECVD (Plasma Enhanced Chemical vapor deposition): Further to enhance the silicon solar cell efficiency, it is a good approach to deposit an anti-reflection coating on the N-side (exposed side to sun) of the solar cells. This coating is made up of silicon nitride and traps the light by making constructive interference pattern of light inside the solar cell and destructive interference outside of solar cells. Since the coating increases the light absorption property of solar cells and reduces reflection loss therefore it directly increases the short circuit current and hence increases efficiency.

For use as antireflection coating of silicon solar cells, a silicon nitride layer of 75 nm minimum (on flat surfaces) at a refractive index of 1.8 to 2.1 is recommended. Typically, a recipe for silicon nitride deposition comprises the following actions:

- Load boat into tube/chamber
- Evacuate/vacuum
- Purge with nitrogen
- Vacuum test
- NH3 plasma pre-cleaning
- SiNx Deposition
- Purge with nitrogen
- Backfill with nitrogen
- Unload boat from tube



PECVD (Plasma Enhanced Chemical vapor deposition):

This involves:

- Deposition of an anti-reflection coating on the N-side (exposed side to sun) of the solar cells. It **comprises the following actions:**
  - load boat into tube
  - evacuate
  - purge
  - Vacuum test
  - NH3 plasma pre-cleaning
  - Deposition
  - purge
  - Backfill
  - unload boat from tube

Input Raw Materials:

- PSG removed and edge isolated wafers
- Silane
- Ammonia
- Nitrogen

Step 8: Laser ablation on rear side for contacts.

A laser scribing tool is used to remove the Back Dielectric Layer at localized positions in a desired pattern to make good electric contacts on the backside of the solar cell without damaging passivated dielectric layer.

Step 9: Printing (Metallization) & Drying of contacts

For the completion of the solar cell, electrical contacts have to be applied to the front side and back side of the processed Wafer. This is carried out by deposition of metal paste via screen-printing. The wafer is placed on a

printing-table, the screen is lowered onto the wafer and a spreading knife presses the printing paste through the screen onto the wafer. The front contact is made of Silver and is grid-shaped for maximum light transmission. The back contact is made of AlAg alloy soldering pads. A direct soldering of aluminium is not possible due to immediate formation of aluminium oxide, which prevents wetting by solder. After then whole back side is printed with Aluminum to create a back surface. This field this field pushes the electron towards the N- side and attracts the holes towards rear contact, which are created by low energy photon and hence increases the efficiency. The typical process sequence of printing line is as follows:

- Screen-printing unit for Al Ag back contact
- Dryer
- Screen printing unit for front contact
- Drying and Firing



Printing & drying of contacts:
The typical process sequence of printing line is as follows:

- Screen printing unit for al and AG back contact.
- Dryer
- Screen printing for front unit
- Drying and firing

Input Raw Materials:
ARC coated blue wafers
Ag Paste

- Screens for Ag printing
- Back – Ag paste
- Screens for Back – Ag printing
- Al paste for BSF
- Screens for Al printing

Step 10: Firing of contacts

The front contact must penetrate the antireflective coating (ARC) and contact the emitter near the highly doped surface in order to get low contact resistance. On the rear side at the aluminum silicon interface a melt is produced and during cooling down a highly aluminum doped layer is crystallized. For multi-crystalline wafers the effect of hydrogen passivation of the bulk material is very important. During the firing process, hydrogen stored in the silicon surface and in the silicon nitride antireflective coating must be driven into the bulk as fast as possible but the process must be stopped before the hydrogen effuses again from the bulk. From all these process demands follows that the firing process must be done by a temperature pulse of a few seconds with very fast heating and cooling ramps.

Following processes are carried out in fast firing furnace:

- Firing of the front side-grid (Ag) through the anti-reflection-coating to form an ohmic contact with the emitter layer.
- Alloying of the large-area Al-metallization with the back-side of the silicon.
- Formation of an electrical contact for back AgAl layer.

- Overcompensation of the n+-phosphorous doped layer by a p+-aluminum doped layer Formation of the back-surface-field
- Gettering of metallic impurities into the aluminum melt
- Release of hydrogen from the silicon nitride layer that diffuses into the neighboring silicon to passivate defects.



Firing of contacts:

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- Overcompensation of the n+-phosphorous doped layer by a p+-aluminum doped layer
- Formation of the back-surface-field
- Gettering of metallic impurities into the aluminum melt
- Release of hydrogen from the silicon nitride layer that diffuses into the neighbouring silicon to passivate **defects.**

Input Raw Materials:

Front and back contact printed wafers

Step 11: Cell Testing and Sorting

In the last step the cells are tested and sorted according to their electrical and optical quality.

In cell tester unit all the electrical parameters of the solar cells like efficiency, short circuit current, open circuit voltage, fill factor, shunt resistance, series resistance etc. are measured and then the cells are sorted into the different bins according to their efficiency and optical quality.



Cell testing & sorting:
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Input Raw Materials:

- **Fired cells**
- **Tester Pins**

- Fired cells
- Tester pins
- ired cells
- Tester pins

Plant and Machinery incl. Utilities

The Company has proposed P&M and Utilities cost of INR 248.95 Cr (1.2 GW Cell line) for the proposed project. The details of the same is discussed hereunder:

Sr No	Name of the Machinery	Supplier	Remark	Quantity	Rate / Unit	Currency Rate	Basic Amount	IGST	Amount (INR)
1	Production equipment	Cliantech Solutions	Import	1	$70,00,000.00	96	67,20,00,000	18%	₹ 79,29,60,000.00
2	ALD (New Equipment)	Cliantech Solutions	Import	1	$15,00,000.00	96	14,40,00,000	18%	₹ 16,99,20,000.00
3	AGV System	Cliantech Solutions	Import	1	$3,20,000.00	96	3,07,20,000	18%	₹ 3,62,49,600.00
4	Work fixtures (210R)	Cliantech Solutions	Import	1	$6,00,000.00	96	5,76,00,000	18%	₹ 6,79,68,000.00
5	Offline Equipment	Cliantech Solutions	Import	1	$4,40,000.00	96	4,22,40,000	18%	₹ 4,98,43,200.00
6	Testing and detection equipment	Cliantech Solutions	Import	1	$4,58,000.00	96	4,39,68,000	18%	₹ 5,18,82,240.00
7	Design of Drawing and Schema	Cliantech Solutions	Import	1	$2,40,000.00	96	2,30,40,000	18%	₹ 2,71,87,200.00
8	Utility Machinery (Equipment)	Cliantech Solutions	Import	1	$74,24,480.00	96	71,27,50,080	18%	₹ 84,10,45,094.40
9	Electromechanical Works - Primary Distribution Main &	Cliantech Solutions	Import	1	$22,79,170.00	96	21,88,00,320	18%	₹ 25,81,84,377.60
10	Electromechanical Works - Secondary Distribution Main & Auxiliary Materials	Cliantech Solutions	Import	1	$5,49,500.00	96	5,27,52,000	18%	₹ 6,22,47,360.00
11	Electromechanical Works - Primary Distribution Labor (Labor + Equipment)	Cliantech Solutions	Import	1	$31,22,150.00	96	29,97,26,400	18%	₹ 35,36,77,152.00
12	Electromechanical Works - Secondary Distribution Labor	Cliantech Solutions	Import	1	$2,00,000.00	96	1,92,00,000	18%	₹ 2,26,56,000.00
13	Utility Engineering (Programming)	Cliantech Solutions	Import	1	$1,25,000.00	96	1,20,00,000	18%	₹ 1,41,60,000.00
14	Packing	Cliantech Solutions	Import	1	$3,00,000.00	96	2,88,00,000	18%	₹ 3,39,84,000.00
15	Freight (FOB SHANGHAI)	Cliantech Solutions	Import	1	$1,50,000.00	96	1,44,00,000	18%	₹ 1,69,92,000.00

16	On-site Support Service (After the installation and commissioning are completed, the service will commence, with 8 people stationed on-site for 1 Year)	Cliantech Solutions	Import	1					
	Discount				-$29,08,300.00	96	-27,91,96,800	18%	-₹ 32,94,52,224.00
17	Freight from FOB China to Factory								₹ 2,00,00,000.00
	Total				$2,18,00,000.00				₹ 2,48,95,04,000.00

The Company has proposed to procure the imported Plant and Machinery under the EPCG scheme wherein under the scheme the import of capital goods is allowed at **zero Basic Customs Duty. To avail exemption from Customs Duty, the importer must fulfill an export obligation (EO) equal to 6 times the duties, taxes, and cess saved on the imported capital goods.**

Below Table Lists down key equipment required for Cell manufacturing

A. Production Machinery List

Sr. No.	Process	Major Equipment	Qty.
1	Texturing	Texturing Automation + Texturing Machine	2 Sets + 2 Machines
2	Boron Diffusion	Boron Diffusion Automation + Diffusion Furnace	2 Sets + 4 Machines
3	BSG Removal	BSG Removal Automation + BSG Removal Machine	2 Sets + 2 Machines
4	Alkaline Polishing	Automation System + Polishing Machine	2 Sets + 2 Machines
5	PE-Poly Deposition	Automation System + PE-Poly Machine	4 Sets + 4 Machines
6	Oxidation / Annealing	Automation System + Annealing Furnace	3 Sets + 3 Machines
7	PSG Removal	PSG Automation + PSG Removal Machine	2 Sets + 2 Machines
8	RCA Cleaning	Automation System + RCA Cleaning Machine	2 Sets + 2 Machines
9	ALD Coating	ALD Automation + ALD Main Machine	1 Set
10	Front PECVD	Automation System + PECVD Machine	4 Sets + 4 Machines
11	Rear PECVD	Automation System + PECVD Machine	3 Sets + 3 Machines

12	Screen Printing Line	Printer & Oven	2 Lines
13	Metallization	Sintering Furnace	2 Nos.
14	Cell Enhancement	Photon Injection Machine	2 Nos.
15	Cell Regeneration	LECO Laser System	2 Nos.
16	Testing	IV Test System	2 Nos.

Production flow shown in the proposal: Texturing → Boron Diffusion → BSG Removal → Alkaline Polishing → LPCVD/PE-Poly → PSG Removal → RCA Cleaning → ALD → Front PECVD → Rear PECVD → Printing → Photon Injection → LECO → Sorting & Packing.

B. AGV & Material Handling System

Equipment	Qty.
Wireless Network System	1
Charging Piles	5-8
AGV Robots/Carts	30
Material Shelves (187 Wafer Cassette + 8 Boxes)	80

C. Auxiliary Equipment

Equipment	Qty.
Rework Wafer Cleaning Machine	1
Dry Wafer Basket Cleaning Machine	1
Front & Back Coating Graphite Boat Cleaning Machine	1
PE-Poly Graphite Boat Cleaning Machine	1
Fully Automatic Quartz Boat Cleaning Machine	1
Quartz Boat (Tube) Cleaning Machine	1

Oven	2

D. Quality Control & Laboratory Equipment

Equipment	Qty.
EL Offline Testing System	1
Sheet Resistance Tester	1
2D Image Measuring Instrument	1
3D Microscope	1
D8 Reflectometer	1
Spectral Ellipsometer	1

E. Tooling & Fixtures

Equipment	Qty.
Quartz Boats	350
Graphite Boats	100
Wet Wafer Baskets	800
Dry Wafer Baskets	400

F. Utilities & Infrastructure Requirement

Utility System	Major Equipment / Capacity
Power Supply System	33 kV supply with 2 × 10,000 kVA Transformers
Clean Room	9,000 m^2
Chillers	3 Nos.

Cooling Towers	6 Nos.
Air Handling Units (AHUs)	56 Nos. (6 large + 50 small)
FFUs	155 Nos. (30 + 125 units)
Acid Exhaust System	4 Nos.
Alkali Exhaust System	4 Nos.
Silane Exhaust System	1 No.
Organic Exhaust System	1 No.
Thermal Exhaust System	8 Nos.
Gas Supply Cabinets	6 Nos.
Liquid Nitrogen Tanks	2 × 50 m^3
Liquid Oxygen Tank	1 × 20 m^3
Air Compressors	3 Nos.
Air Dryers	3 Nos.
Air Storage Tanks	2 × 80 m^3
Gas Fired Steam Boiler	2 TPH
Centralized Chemical Supply Cabinets	4 Nos.
Process Cooling Water Pumps	3 Nos.

Source: OSEPL

The proposed machinery package primarily covers the solar cell production equipment, utility equipment, internal utility distribution works, and commissioning support. However, certain items are specifically excluded from the supplier's scope and are to be arranged by the Company. These include land acquisition, factory building and civil construction works, external infrastructure development, substation and power room equipment, external power distribution network, water supply arrangements, room construction for air-conditioning, acid supply, special gas storage and other utility areas, pure water plant and wastewater treatment plant civil structures. The same are covered separately under the Factory Building and Civil works costing.

Further, as per the machinery proposal submitted by the Company, a significant portion of the core production equipment (mother tools) proposed for the 1.2 GW TOPCon solar cell manufacturing line comprises pre-owned/used machinery. The proposal indicates that most of the key process equipment and automation systems for Texturing, Boron Diffusion, BSG Removal, Alkaline Polishing, PE-Poly, Annealing, PSG Removal, RCA, Front PECVD, Rear PECVD, Printing and associated production processes are of Year of Use: 2023, while the ALD system is proposed to be sourced as a new system. The supplier has also separately issued an option to upgrade certain tooling and fixtures from used to brand-new condition at an additional cost. Accordingly, the proposed project implementation is expected to be based substantially on refurbished/used production equipment, the performance and reliability of which would be contingent upon the residual life, operating condition, refurbishment quality, and successful recommissioning of the machinery.

The Company has submitted an independent Chartered Engineer's Certificate issued by Vinod Kumar Goel dtd. 06th October 2026, certifying the identification, valuation, condition and residual useful life of the proposed pre-owned plant and machinery. The Chartered Engineer has assessed the residual useful life of the key production equipment at not less than 10 years from the proposed COD and has opined that the machinery is suitable for the proposed TOPCon solar cell manufacturing facility.

Further, the draft turnkey supply agreement incorporates performance commitments relating to the proposed 1.2 GW production capacity, cell efficiency, line yield, equipment uptime, warranty obligations, training and post-commissioning technical support. The agreement also provides for liquidated damages at the rate of 0.5% per week of delay, subject to a maximum cap of 10% of the Purchase Order value, along with termination rights in case of prolonged delays. However, D&B India advises the Company to seek confirmation regarding the mechanism for compensation, if any, in the event of non-achievement of guaranteed production capacity, cell efficiency, yield and equipment availability parameters during operational performance testing. As informed by the Company, discussions with the OEM are currently underway, and the Company expects to execute the supply agreement by the end of October 2026.

Electrification and MFA

The Company has proposed Electrification and MFA cost of INR 63.21 Cr for the proposed project. The details of the same is discussed hereunder:

S. No	Name of the Machinery	Name of Supplier	Basic Amount in INR	GST	GST in INR	Amount (INR)
1	33kV Switchboard & Cable	Simartech Projects and Services Ltd.	15391675	18%	2770501.5	18162176.50
2	Transformer 33/0.4 kV		44988820	18%	8097987.6	53086807.60
3	Busduct		14335000	18%	2580300	16915300.00
4	451 V LV Panel		73750000	18%	13275000	87025000.00
5	Cable Tray		18645850	18%	3356253	22002103.00
6	Cables & Termination		66764610	18%	12017629.8	78782239.80

7	Earthing		8845000	18%	1592100	10437100.00
8	Lighting		11381470	18%	2048664.6	13430134.60
9	Electrical Safety & Miscellaneous Items		1381000	18%	248580	1629580.00
10	DG Set		152301060	18%	27414190.8	179715250.80
11	Fire Hydrant/ Fire Fighting		30713000	18%	5528340	36241340.00
12	Data & Voice		1549000	18%	278820	1827820.00
13	CCTV		2060000	18%	370800	2430800.00
14	UPS system		93600000	18%	16848000	110448000.00
	Total		**535706485.00**		**45987016.50**	**632,133,652**

As per the terms of the turnkey supply proposal, installation, commissioning, trial runs, and operational stabilization of the proposed 1.2 GW TOPCon solar cell manufacturing line shall be undertaken by the turnkey supplier, **Cliantech Solutions**, in association with its technology partners. The supplier has indicated that experienced engineers will be deputed for on-site installation, commissioning, training, and technical support activities. Further, the proposal envisages deployment of technical personnel at the project site for a period of one year following installation and commissioning to assist in production ramp-up and operational support. Accordingly, the responsibility for erection, commissioning, process stabilization, and achievement of the specified operational parameters rests with the turnkey supplier.

Supplier Credentials

Cliantech Solutions is a turnkey solution provider engaged in the supply, installation, and commissioning of solar PV module and cell manufacturing facilities. Established in 2019, the company offers comprehensive services including plant design, technical consultancy, machine selection, utility integration, project engineering, installation, commissioning, manpower training, raw material sourcing, and after-sales support for photovoltaic manufacturing projects. The company collaborates with technology partners such as GAORUN, VISUAL, ASICPY, HSPV, and AUTO-ONE for PV manufacturing equipment and maintains sales and service offices in NCR, Gujarat, and Haryana.

Cliantech Solutions, has represented in its proposal that it possesses significant experience in the photovoltaic manufacturing sector, with over 65 turnkey line installations and cumulative machinery deployments exceeding 57 GW. The company further claims to have a customer base of more than 54 clients and a dedicated after-sales support team comprising over 85 service engineers.

Building and Civil Works

The cost of factory building and civil works is estimated at INR 89.20 crores as per the estimate of M/s ECR Buildtech Pvt. Ltd. submitted by the Company. The civil estimate as provided by the Company is tabulated below:

Particular	Length (Mtr)	Width (Mtr)	Area required (SQM)	Building Type	Height	Total Buildup area (SQM)	Volume (cum)	Rate/sqm Rs	Amount excl GST in INR
CIVIL									
1.2 GW Cell Line	205.725	63.136	12988.654	RCC+PEB	12			8500	110403555.60
Locker and change Room	22.500	8.500	191.250	Lean to	4			6500	1243125.00
RM Store	48.000	8.500	408.000	Lean to	4			6500	2652000.00
Male/Female Wash Room	25.000	8.500	212.500	Lean to	4			6500	1381250.00
Gas and Chemical Distribution	110.000	8.500	935.000	Lean to	4			6500	6077500.00
Gas and Chemical Distribution	80.000	8.500	680.000	Lean to	4			6500	4420000.00
Utility-Cell	205.725	8.300	1707.518	Lean to	4			7000	11952622.50
Office Block G+1	60.000	26.200	1572.000	RCC	4.00			23681	37226532.00
Commercial Block G+1	60.000	24.000	1440.000	RCC	4.00			23681	34100640.00
Kitchen Area	40.000	10.000	400.000	RCC	4.00			23681	9472400.00
Dinning Area	40.000	15.000	600.000	RCC	4.00			23681	14208600.00
Security Room	6.000	4.000	24.000	RCC	3.150			40903	981672.00
Parking	114.000	10.000	1140.000	Paver				2000	2280000.00
Underground Tanks	41.000	10.000	410.000	RCC	3	30366.631	1230	18000	22140000.00
Pump Room	20.000	7.000	140.000	RCC	3.5		490	18000	8820000.00
Meter Room	4.000	5.000	20.000	RCC	4			26910	538200.00
HT/LT Room	18.850	15.000	282.750	RCC	5.000			23681	6695802.75
Transformer and DG Yard	36.000	15.000	540.000	Open				6000	3240000.00
ETP+STP+ZLD+Waste Water-Underground Tanks	42.900	17.300	742.170	RCC	4		2969	18000	53436240.00
ETP+STP+ZLD+Waste Water-Shed Above	42.000	42.000	1764.000	PEB	8			7000	12348000.00
N2,O2 Open Yard	41.200	28.700	1182.440	Open				6000	7094640.00
NH3-PH3- Shed	60.500	28.700	1736.350	PEB	4			5500	9549925.00
Roads With Walkways/pathways	407.000	8.000	3256.000	RCC				3800	12372800.00
	240.000	8.000	1920.000	RCC				3800	7296000.00
	80.000	8.000	640.000	RCC				3800	2432000.00
	80.000	8.000	640.000	RCC				3800	2432000.00
	176.000	8.000	1408.000	RCC				3800	5350400.00
	60.000	8.000	480.000	RCC				3800	1824000.00

	167.000	5.000	835.000	RCC				3800	3173000.00
	25.000	5.000	125.000	RCC				3800	475000.00
	25.000	5.000	125.000	RCC				3800	475000.00
Soil Filling Phase-I			48100.000		0.70		33670	700	23569000.00
Green Area Area Phase-I			7215.000	L/s				550	3968250.00
PEB									
1.2 GW Cell Line	213.750	79.850	17067.938	RCC+PEB	12			12,055.68	205765592.76
Locker and change Room	22.500	8.500	191.250	Lean to	4			9,493.85	1815698.81
RM Store	48.000	8.500	408.000	Lean to	4			9,493.85	3873490.80
Male/Female Wash Room	25.000	8.500	212.500	Lean to	4			9,493.85	2017443.13
Gas and Chemical Distribution	110.000	8.500	935.000	Lean to	4			9,493.85	8876749.75
Gas and Chemical Distribution	80.000	8.500	680.000	Lean to	4			9,493.85	6455818.00
Utility-Cell	205.725	8.300	1707.518	Lean to	4			11,000.81	18784075.59
ETP+STP+ZLD+Waste Water-Shed Above	58.000	42.900	2488.200	PEB	8			6,781.32	16873280.42
NH3-PH3- Shed	60.500	28.700	1736.350	PEB	4			6,027.84	10466439.98
RWH			17					10,00,000	17000000.00
PHE			30367					1,000.00	30367000.00
Machine Foundations			1	L/s				1,00,00,000.00	10000000.00
TOTAL in INR									**755925744.09**
GST in INR									136066633.9
Total Cost incl. GST in INR									891992378.03
Total Cost incl. GST in INR Crs									**89.20**

Source: OSEPL

The estimated Factory Building & Civil Works cost for the proposed built-up area of **30367 sq. meters** translates to **INR 2729 per sq. ft.**, which is slightly higher than the prevailing market rates.

Plant Layout

The tentative plant layout was awaited as on date of drafting this report.

The total built up area of the manufacturing plant is as provided by turnkey supplier is as follows:

Cell Production Workshop (Single-story Light Steel Roof): 12500 m2

Raw Material Storage: 2000 m2

Finished Goods Storage: 3000 m2

Utility Area (Double-story concrete frame): 1900 m2 + 1900 m2

Waste Treatment Area: 2500 m2

Class A Warehouse_ For Explosive Chemicals (Single-story Light Steel Roof): 1200 m2

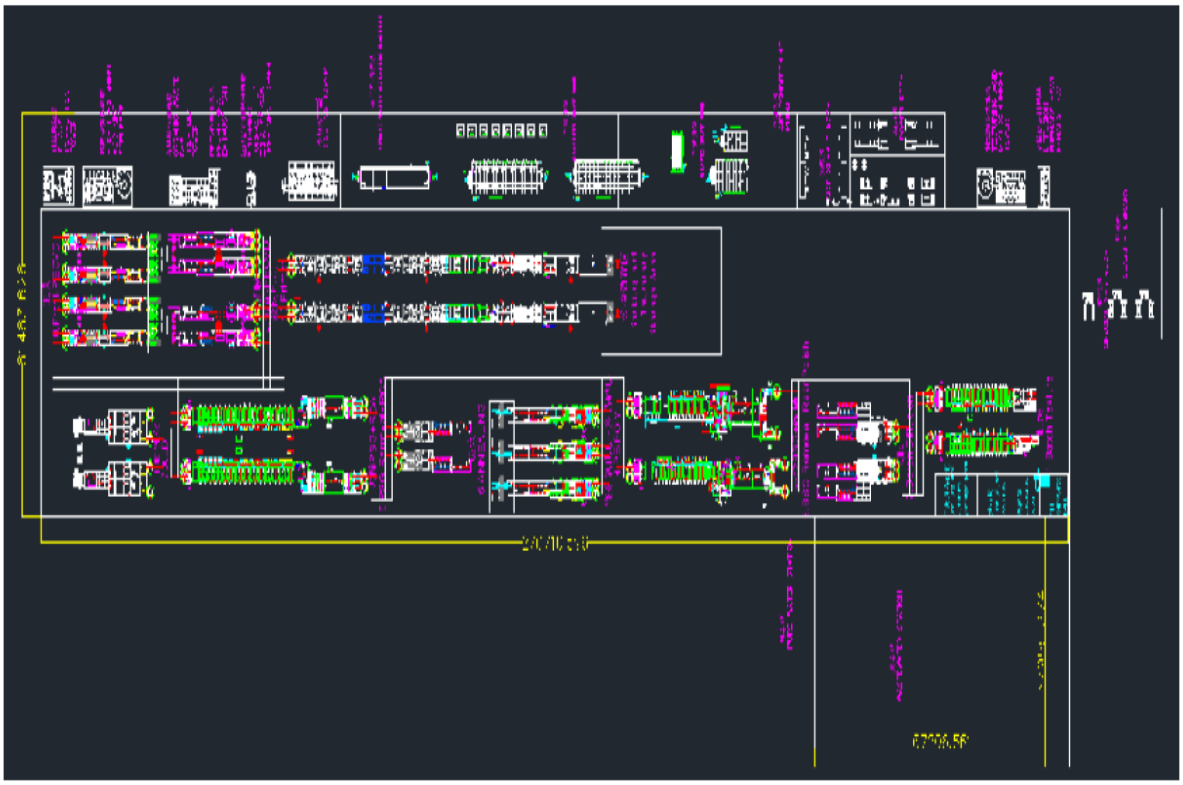
Class C Warehouse (Single-story Light Steel Roof): 1000 m2

Power Station (Double-story concrete frame): 1600 m2

Substation (single-story concrete frame): 80 m2

Total: 27680 m²

The Standard Solar manufacturing equipment placement layout is given below.



Note: This is the standard layout, the final layout will be designed based on the available area.

Installed Capacity

Below table lists down the capacities of individual equipment in the process line:

1.2GW Topcon Cells Capacity Evaluate (182*210)

Size:182*210	Machine quantity	Bath/ Tube Qty	Machine parameters				Theoretical output (single machine)		Theoretical output	Uptime	Process utilization rate	Production utilization rate	Quality utilization rate	Rework rate	Broken rate	Process Yield	OEE	OEE	Actual capacity of a single machine		Actual capacity	Annual capacity
Process			Process time(S)	Machine time	Batch Qty	Unit	pcs/H	Kpcs/Day	Kpcs/day	%	%	%	%	%	%	%	%	%	pcs/h	Kpcs/day	Kpcs	GW
Texture	2	4	750	20	720	sec/batch	13465	323	646	98%	93%	98.61%	99.97%	0%	0.06%	99.94%	89.79%	90.0%	12119	291	581	1.95
Diffusion	4	6	12240	180	2400	sec/tube	4174	100	400	96%	97.61%	98.61%	99.44%	0.20%	0.28%	99.52%	91.41%	90.0%	3757	90	360	1.21
BSG	2	10	0.072	-	-	m/sec	11121	267	534	98%	93%	98.61%	99.42%	0.20%	0.11%	99.69%	89.04%	90.0%	10009	240	481	1.62
Polishing	2	5	750	20	480	sec/batch	11221	269	538	98%	93%	98.61%	99.97%	0%	0.06%	99.94%	89.79%	90.0%	10099	242	484	1.63
PE Poly	4	6	2580	180	616	sec/tube	4821	116	464	96%	97.61%	98.61%	99.44%	0.20%	0.28%	99.52%	91.41%	87.0%	4194	101	404	1.36
Annealing	3	6	6960	180	2400	sec/tube	7261	174	522	96%	97.61%	98.61%	99.44%	0.20%	0.28%	99.52%	91.41%	93.0%	6753	162	485	1.63
PSG	2	10	0.072	-	-	m/sec	11121	267	534	98%	93%	98.61%	99.42%	0.20%	0.11%	99.69%	89.04%	90.0%	10009	240	481	1.62
RCA	2	5	750	20	480	sec/batch	11221	269	538	98%	93%	98.61%	99.97%	0%	0.06%	99.94%	89.79%	90.0%	10099	242	484	1.63
ALD	1	4	2040	180	2520	sec/tube	16346	392	392	96%	97.61%	98.61%	99.44%	0.20%	0.28%	99.52%	91.41%	90.0%	14711	353	353	1.19
Front PECVD	4	6	2520	180	616	sec/tube	4928	118	472	96%	97.61%	98.61%	99.44%	0.20%	0.28%	99.52%	91.41%	88.0%	4337	104	415	1.39
Rear PECVD	3	6	2190	180	616	sec/tube	5614	135	405	96%	97.61%	98.61%	99.44%	0.20%	0.28%	99.52%	91.41%	90.0%	5053	122	365	1.23
Printing	4	1	0.85	-	1	sec/pcs	4235	102	408	98%	96.80%	98.61%	99.50%	0%	0.06%	99.94%	93.02%	90.0%	3812	92	367	1.23
Tester+Sorting	4	1	0.85	-	1	sec/pcs	4235	102	408	98%	96.80%	98.61%	99.50%	0%	0.06%	99.94%	93.02%	90.0%	3812	92	367	1.23

Following is the summary of plant capacity considered for the proposed project of plant:

Particular	Name Plate	Thought Put
Days Per Year	365	350
Hours per Day	23	23
Uptime (Hours/Year)	8395	8050
Cell Size (in MM)	182.2*210	182.2*210
Cell Power (in Wp)	9.60	8.25
No of Cells Per Hour	15028	15028
No of Cells Manufactured	126160060	120975400
Capacity in MW	**1211**	**998**

Source: OSEPL

Based on the above assumptions of 8.25 Wp per cell the installed plant capacity is arrived at 998 MW but in practice, the output depends on the effective working hours in the year and the average wattage of the cells which in turn depends on the quality of the wafer and the process. Considering a cell wattage of 9.60 Wp achievable with the proposed equipment the installed plant capacity is calculated at 1211 MW, which represents the nameplate capacity.

Raw Materials

Basic raw material required for manufacturing of Solar Cells is Silicon Wafer. The company intends to procure wafers from the International market at competitive prices at high volumes.

The Company is yet to identify key potential suppliers for the various raw materials required for manufacturing Solar PV Cell.

Utilities

Power

The Company has estimated the total power requirement of 15,000 KVA for the proposed project. The Company has proposed to source the power from local discom namely Uttar Haryana Bijli Vitran Nigam Ltd. The per unit power cost is considered INR 9.50. Below table shows the net power requirement from the grid for the proposed project.

POWER CONSUMPTION	Units	31-Mar-29	31-Mar-30	31-Mar-31	31-Mar-32	31-Mar-33	31-Mar-34	31-Mar-35
Total Proposed Connected Load	**kVA**	**15,000.00**	**15,000.00**	**15,000.00**	**15,000.00**	**15,000.00**	**15,000.00**	**15,000.00**
Billing Demand Load	kVA	9,000.00	9,000.00	9,000.00	9,000.00	9,000.00	9,000.00	9,000.00
Number of Operating Hours	Nos	23.00	23.00	23.00	23.00	23.00	23.00	23.00
No. of Operating Days	Nos	**350.00**	**350.00**	**350.00**	**350.00**	**350.00**	**350.00**	**350.00**
Capacity Utilisation	Percentage	81%	84%	89%	90%	90%	90%	90%
Total Units Consumed	Units	5,83,24,476	6,09,00,889	6,47,81,351	6,52,14,910	6,52,04,768	6,52,05,005	6,52,05,000
Power Cost per unit for units consumed from GRID	INR	9.50	9.50	9.50	9.50	9.50	9.50	9.50
Total Power Costs	**INR Crores**	**55.41**	**57.86**	**61.54**	**61.95**	**61.94**	**61.94**	**61.94**

Source: OSEPL & D&B-India Estimate

Water

Apart from process water requirement for cell manufacturing, water should be required for cleaning, drinking and sanitation purposes. As informed by the Company, this requirement will be met through water sourced from a nearby canal and groundwater extracted through borewells.

The Water requirement for the project is 900 m3/day for DI water make up and domestic usage. It is to be noted that the Company has proposed to avail water connection from the nearby Canal to fulfil the water requirement for the project. The Company will apply to respective Authority in due course for obtaining water connection in due course.

Other Utility

- **Nitrogen:** This plant-wide utility provides inert gas space and purges process materials from equipment and piping before maintenance. Typical purity 5N is required. Nitrogen is also used in the following locations in the polysilicon production process:
    - Pressurizing the Metallurgical Grade Silicon Reactor Feed Tank
    - N2 pad for chlorosilanes storage tanks (pressure control and inert gas space)
    - Pressure control for certain distillation columns.

  In addition, a major use of nitrogen is for purging the bell jar reactors (both polysilicon deposition and STC conversion) before accessing the reactor internals. The bell jars are similarly purged with nitrogen following

any activity that exposes the bell jar's inside to the atmosphere. The nitrogen must be of very high quality since it does come in contact with process streams and process equipment.

- **Compressed & Dry Air (CDA)**: In all four segments of PV manufacturing, Compressed air is a plant-wide utility used for general applications and maintenance activities. Compressed & dry air is also used as an energy source for pneumatic actuators: The CDA is typically supplied at a pressure of 7- 8 bar, having a dew point of -40 ^{0}C to make it suitable for plant utility purposes and instrument purposes
- **Instrument Air:** Instrument air is a plant-wide utility used primarily to drive valve actuators. This utility will not meet process streams or be connected to process equipment.
- **Cooling Towers:** Process Cooling Water is a plant-wide utility that cools process streams. This utility is for the cooling medium in heat exchange processes such as distillation column condensers, process stream coolers, and compressor discharge coolers. The typical operating temperature is 25 to 30 degrees C. The temperature is maintained through the operation of evaporative cooling towers. The cooling water system consists of a cooling tower, cooling water pumps, hot well, good hot pumps, cooling water treatment facilities, hot water collection in storage tanks, and hot water return to the cooling tower.
- **Steam:** Steam is a potential heat source to be used either directly (or indirectly via hot oil) for heating or vaporizing process streams in heat exchangers throughout the process (e.g. column reboilers).
- **Fuel Source:** Natural gas or liquid fuels such as HFO or LDO are required for firing the Hot Oil Furnace and Boilers.
- **HVAC for Clean Room:** The Cleanrooms will be provided with a dedicated HVAC with sufficient backup.
- **Chemical Delivery System (CDS)**: For Ingot & Wafer and PV cell plants, the chemicals such as H_2O_2, HF, KOH, HCL, H_2SO_4 and HNO_3 are supplied to various tools through a dedicated network of special pipelines and pumps.
- **Argon Gas delivery system:** In ingot manufacturing, 5N grade Argon gas is required in bulk. The out-door cryogenic storage facility, gasification and distribution system shall be suitably designed and provided
- **Argon Gas Recovery system:** Due to the high cost of Argon gas and bulk consumption, the Argon gas recovery system is considered in this project. The gas recovered from the CZ furnaces is returned to the Argon storage system for reuse.
- **Special Gas Delivery System (GDS):** In a cell plant, special gases such as TMA, Silane & Ammonia are supplied to various tools through a dedicated network of special pipelines and valve boxes
- **Silane Abatement System**: This is specially treated through this: Excess Silane gas from cell plant.
- **Fire Protection System:** To protect the plant against fire, all buildings/equipment, storage yards, the plant would be protected by anyone or a combination of the following system.
    - Hydrant System: Medium velocity & High-velocity water spray system; The water for hydrant and water spray system will be met from a dedicated firewater storage tank
    - Dry Chemical / Low expansion foam system: The chlorosilanes present in the process areas are water-reactive. Therefore, water for fire suppression must not be considered.
    - Mobile & portable fire extinguishing equipment: Other firefighting equipment (portable fire extinguishers of Dry Chemical Powder / CO2 type) shall also be provided.

- Fire alarm & detection system: All fire hydrants will be provided with necessary accessories and hose houses. Fire monitor systems are normally installed in polysilicon plants to cool equipment and knock down hazardous vapours in the case of a major fire.

- **Plant Safety System**: The following plant safety systems are required to support processes:
  - Fire and Hazardous Gas Detection and Monitoring
  - Liquid Leak Detection and Monitoring
  - Spill Containment and Vapor Suppression

Manpower Requirement

The proposed project will require total 495 persons as per category wise bifurcation given in table below. The proposed project location is developed and therefore it is envisaged that skilled and unskilled manpower is available for the proposed project in the region. The detailed manpower requirement has been provided in the following table –

Function	Total Manpower Required
Production	
HOD- Production	1
Shift Incharge	2
Engineer/ Sr. Engineer	14
Sr. Technician	90
Technician	90
Helper	9
Total	**206**
Maintenance	
HOD- Maintenance	1
Shift Incharge	2
Engineer/ Sr. Engineer	5
Sr. Technician	24
Total	**32**
Process	
HOD	1
Shift Incharge	2
Engineer/ Sr. Engineer	5
Sr. Technician	16
Total	**24**
Quality	

HOD- Quality	1
Shift Incharge	2
Shift Engineer	3
OQA Engineer	3
IPQC Engineer	3
IQC Engineer	3
ITI Technician	16
Total	**31**
Utility	
HOD- Utility	1
Shift Incharge	2
Shift Engineer	3
Technician	13
Welder	2
Total	**21**
Facility	
HOD- Facility	1
Shift Incharge	2
Shift Engineer	5
Sr Technician/ Technician	24
Helper	9
Welder	2
Total	**43**
Safety	**5**
Commercial	**20**
HR	**6**
Admin	**12**
Contract employees	**95**
Total	**495**

Source: OSEPL

Standards for Solar Cells

Standards from this category regulate solar cells characteristic measurement, solar cells tests and other standards referring to solar cells production and testing - production procedure, mechanic or electric photovoltaic module testing, I-U module characteristics measurement etc.

Solar Cells - General Standards

EN 50461, Solar cells - Data sheet information and product data for crystalline silicon solar cells.

IEC 60891, Procedures for temperature and irradiance corrections to measured I-V characteristics of crystalline silicon photovoltaic devices.

IEC 60904-1, Photovoltaic devices - Part 1: Measurement of photovoltaic current-voltage characteristics.

IEC 60904-2, Photovoltaic devices - Part 2: Requirements for reference solar cells.

IEC 60904-3, Photovoltaic devices - Part 3: Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data.

IEC 60904-4, Photovoltaic devices - Part 4: Reference solar devices - Procedures for establishing calibration traceability.

IEC 60904-5, Photovoltaic devices - Part 5: Determination of the equivalent cell temperature (ECT) of photovoltaic (PV) devices by the open-circuit voltage method.

IEC 60904-7, Photovoltaic devices - Part 7: Computation of spectral mismatch error introduced in the testing of a photovoltaic device.

IEC 60904-8, Photovoltaic devices - Part 8: Measurement of spectral response of a photovoltaic (PV) device.

IEC 60904-10, Photovoltaic devices - Part 10: Methods of linearity measurement

Test Methods and Reference Cells

ASTM E973, Standard Test Method for Determination of the Spectral Mismatch Parameter Between a Photovoltaic Device and a Photovoltaic Reference Cell.

ASTM E1021, Test Methods for Measuring Spectral Response of Photovoltaic Cells.

ASTM E1040, Standard Specification for Physical Characteristics of Non concentrator Terrestrial Photovoltaic Reference Cells.

ASTM E1143, Standard Test Method for Determining the Linearity of a Photovoltaic Device Parameter with Respect to a Test Parameter.

ASTM E1125, Standard Test Method for Calibration of Primary Non-Concentrator Terrestrial Photovoltaic Reference Cells Using a Tabular Spectrum.

Market Assessment

Industry Profile

Among various renewable energy resources, solar energy potential is the highest in the country. In most parts of India, clear sunny weather is experienced for 250 to 300 days a year. The annual radiation varies from 1600 to 2200 kWh/m2, which is comparable with radiation received in the tropical and sub-tropical regions. Based upon availability of land and solar radiation, the potential of solar power in the country has been assessed to be around 750 GWp.

Solar energy is the most viable forms of renewable energy because the energy within the sunlight can be used to produce electricity by means of solar cells. These cells operate according to what is known as the photovoltaic effect (photo means light, and voltaic means electricity). It is this solar photovoltaic effect, which is key to harnessing solar power and converting it into electricity. Hence, solar cells are called Photovoltaic Solar Cells, Photovoltaics, or simply PVs.

Solar Photovoltaic System (SPV system) or Solar Parts

Solar-electric systems generate electricity from sunlight where *PV cells* forms the building block of the overall SPV system. Photovoltaic (PV) cells are semiconductor diodes which is capable of converting light to electric energy. PV cells are made from wafers of highly purified silicon (Si) imparted with special impurities, giving them an abundance of electrons and holes within the lattice structure. A PV cell composed of semiconductor material combines some properties of metals, and some properties of insulators, thus making it uniquely capable of converting light into electricity. When the light shining on the PV cell is absorbed by a semiconductor, photons of light transfer their energy to electrons, allowing the electrons to flow through the material as electrical current. However, PV cells cannot store the electricity thus generated. Instead, they may be thought of as individual batteries producing a variable output DC current that is proportional to their size and the amount of solar radiation falling upon the silicon wafer. This current then flows out of the semiconductor to metal contacts, and eventually reaching the electricity grid.

Silicon (Si) is the second most abundant element in the Earth's crust (after oxygen) and is the same material from which sand is made. Solar cells made out of silicon provide a combination of high efficiency, low cost, and longevity. Silicon PV cell modules are expected to last for 25 years or more; and produce more than 80% of their original capacity even after that. However, on its own, silicon is not very pure and is therefore refined to a purity level of up to 99.99%, before it can be used as a semiconductor material in PV cells. Silicon is first melted, and then crystalized into ingots or castings of pure silicon. Thin slices called wafers, are then cut from a single crystal of silicon (Mono-crystalline), or from a block of silicon crystals (Poly-crystalline), to make individual cells.

A photovoltaic cell is comprised of many layers of materials, each with a specific purpose. The most important layer of a photovoltaic cell is the specially treated semiconductor layer. It comprises of two distinct layers (p-type and n-type) which convert the Sun's energy into useful electricity through the photovoltaic effect. On either

side of the semiconductor, is a layer of conducting material which "collects" the electricity produced. However, while the backside or shaded side of the cell can be completely covered in the conductor, the front or illuminated side must use conductors sparingly in order to avoid blocking too much of the Sun's radiation from reaching the semiconductor. The final layer which is applied only to the illuminated side of the cell is the anti-reflection coating. This is because all semiconductors are naturally reflective, and so without anti reflection coating, reflection loss can be significant. Hence one or several layers of an anti-reflection coating (similar to those used for eyeglasses and cameras) are applied to reduce the amount of solar radiation that is reflected off the surface of the cell.

Key components of solar panel (apart from PV module)

1. Metal frame (typically aluminum)
2. Glass sheet for casing
3. Standard 12V Wire
4. Bus wire
5. Plexiglas

Solar Module

Solar photovoltaic cells are the building blocks of solar panels. Solar Module/Panel refers to a single photovoltaic panel which is a packaged, connected assembly of solar cells. A photovoltaic cell on its own cannot produce enough usable electricity for more than a small electronic gadget. In order to produce large amount of energy, solar cells are wired together to create solar panels, which are installed in groups to form a solar energy system. A standard panel used in a rooftop residential system will have 60 cells linked together. Commercial solar installations often use larger panels with 72 or more photovoltaic cells.

Solar panels are also known as solar module or PV module. Multiple modules are connected in various ways, depending on current or voltage requirement, to form solar arrays. For instance, connecting solar arrays parallelly increases the output current, while connecting them in series increases output voltage.

Silicon based PV cells are the most commonly used types of solar cells and account for about 95% of the commercial market. The general types of photovoltaic cells made from silicon are:

Mono-crystalline Silicon	Manufactured from a single-crystal silicon structure. Highly reliable for outdoor power applications due to wafer thickness. Conversion efficiency for a mono-crystalline cell range between 15 to 20%.
Poly-crystalline Silicon	Silicon molecular structure consists of several smaller groups or grains of crystals. Less expensive to produce than the equivalent single mono-crystalline silicon. Conversion efficiency for a poly-crystalline PV cell range between 10 to 14%.

Thin Film Silicon	Produced by printing or spraying a thin semiconductor layer of PV material onto a glass, metal or plastic foil substrate. Originally developed for space applications due to better power-to-size and weight ratio. Require larger sized cells to improve cell conversion efficiency due to their non-single crystal structure.

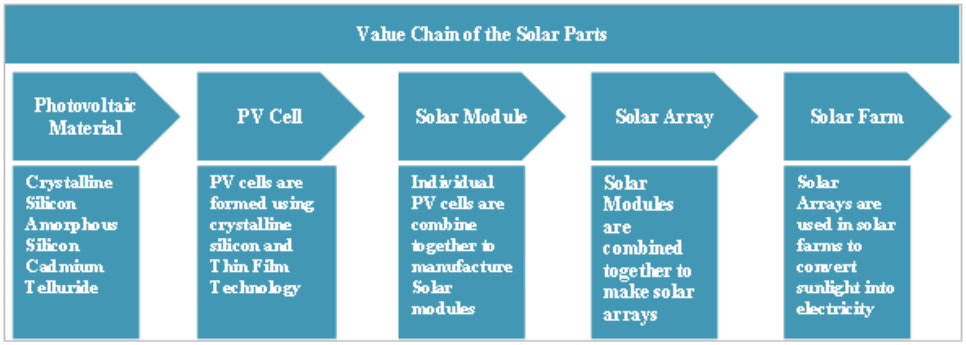
Other types of photovoltaic cells currently being developed include:

1. **Multijunction PV Cells:** Designed to maximize the overall conversion efficiency of the cell – by creating a multi-layered design in which two or more PV junctions are layered one on top of the other – a Multijunction PV cell is made up of various semiconductor materials in thin-film form for each individual layer. The advantage is that each layer extracts energy from each photon, from the light spectrum that is bombarding the cell. This layering of the PV materials increases the overall efficiency, and reduces the degradation in efficiency that occurs with standard amorphous silicon cells.
2. **Dye-Sensitive PV Cells:** Instead of using solid-state PN-junction[a] technology to convert photon energy into electrical energy, an electrolyte, liquid, gel or solid is used to produce a photo-electrochemical PV cell. These are manufactured using microscopic molecules of photosensitive dye on a nano-crystalline or polymer film. The advantage is that the dye can be screen printed onto any surface. However, the conversion efficiencies of these cells, is only about 10%.
3. **3D Photovoltaic Cells:** A 3D PV cell uses a unique three-dimensional structure to absorb the photon light energy from all directions and not just from the top as in convectional flat PV cells. The cell uses a 3D array of miniature molecular structures which capture as much sunlight as possible, thus boosting its efficiency and voltage output while reducing its size, weight and complexity.

As PV cell made using crystalline silicon requires little or no maintenance and have a lifetime of over 25 years, it has the highest market share in India as well as in global market.

The key stakeholders in solar value chain of comprises of developers, manufacturers of cells, modules and solar thermal equipment, raw materials suppliers and ecosystem entities for solar manufacturing while PV systems include *cells, modules, strings, and arrays.*

[a] A p-n junction represents an electrical component with the function to allow an electric current in one direction (called the forward biased condition) and to block the current in the opposite direction (the reverse biased condition)



Sources: D&B Research

The supply chain of solar energy supply chain framework also comprises of ***balance of system*** which includes *inverters, connecting wires, trackers* etc. and the *integration* of the different components. It should be noted that the electricity generated through PV cell is direct in nature i.e. Direct Current (DC), whereas the electricity transmitted and used generally is alternating in nature i.e. Alternating Current (AC). Therefore, to convert direct current into alternating current, inverter is required.

India Macroeconomic Analysis

Against the backdrop of a moderating global growth environment, India continues to be one of the fastest-growing major economies globally. Supported by strong domestic demand, increasing investments, rising consumption expenditure and sustained policy reforms, the Indian economy has demonstrated robust growth momentum relative to most large economies. According to the IMF, India's GDP is projected to grow at 6.4% in CY2026 and 6.7% in CY2027, significantly higher than several advanced and emerging economies.

Country	CY 2020	CY 2021	CY 2022	CY 2023	CY 2024	CY 2025	CY 2026 P	CY 2027 P	CY 2028P
India[b]	–5.8%	9.7%	7.6%	9.2%	7.1%	7.7%	6.4%	6.7%	6.5%
China	2.3%	8.6%	3.1%	5.4%	5.0%	5.0%	4.6%	4.1%	4.0%
United States	-2.2%	6.1%	2.5%	2.9%	2.8%	2.1%	2.3%	2.2%	2.1%
Japan	-4.2%	2.7%	0.9%	1.4%	-0.2%	1.1%	0.6%	0.7%	0.6%
United Kingdom	-10.3%	8.6%	4.8%	0.4%	1.0%	1.4%	1.0%	1.3%	1.6%
Russia	-2.7%	5.9%	-1.4%	4.1%	4.9%	1.0%	1.1%	1.1%	1.0%
Germany	-4.1%	3.9%	1.8%	-0.9%	-0.5%	0.2%	0.7%	1.0%	1.2%

Source: World Economic Outlook, July 2026[c]

Note: The data presented till CY 2027P are taken from the IMF's July 2026 World Economic Outlook (WEO) and the CY2028 data are sourced from the IMF World Economic Outlook Database.[d]

Growth across major economies is expected to remain mixed. The United States is projected to grow by 2.3% in CY 2026 and 2.2% in CY 2027, while China is expected to expand by 4.6% in CY 2026 and 4.1% in CY 2027. Among other major economies, Germany is projected to grow by 0.7% in CY 2026 and 1.0% in CY 2027, while Japan is expected to expand by 0.6% and 0.7%, respectively. The United Kingdom is projected to grow by 1.0% in CY 2026 and 1.3% in CY 2027, while Russia is forecast to grow by 1.1% in both years. Against this backdrop, India continues to stand out as one of the fastest-growing major economies globally. The IMF projects India's growth at 7.7% in CY 2025, 6.4% in CY 2026, 6.7% in CY 2027 and 6.5% in CY 2028.

India's growth trajectory is underpinned by a broad-based expansion across key sectors of the economy. The country's large domestic market, favourable demographics, increasing urbanization, growing middle-income population and expanding industrial base continue to support economic activity. In addition, structural reforms, infrastructure development initiatives and efforts to strengthen domestic manufacturing capabilities have contributed to enhancing India's long-term growth potential.

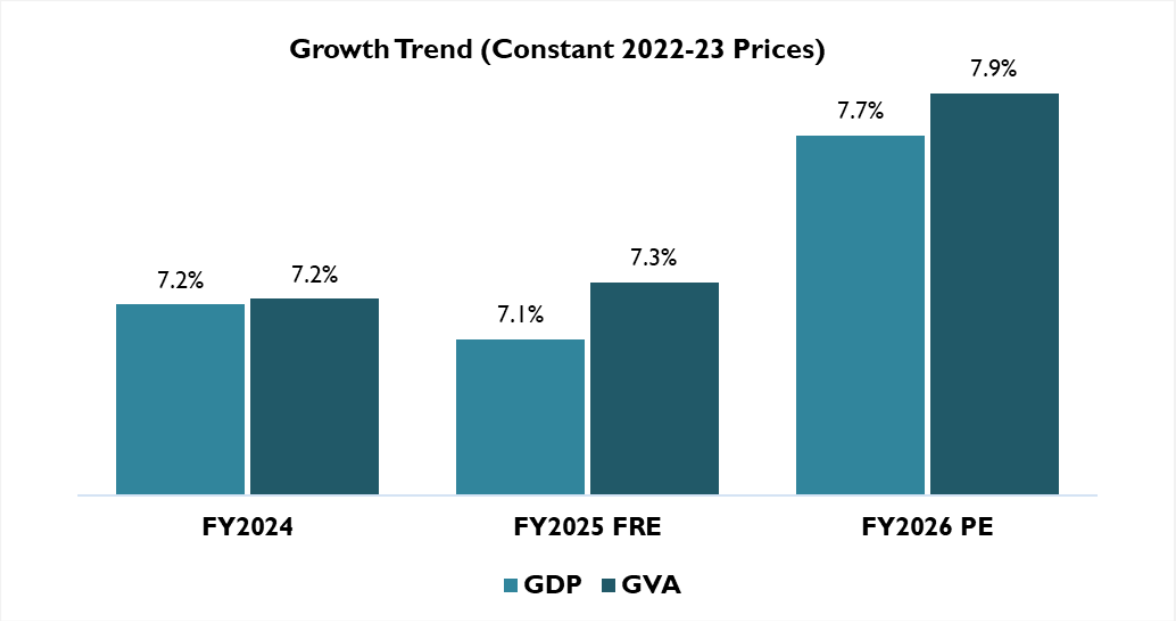
[c] https://www.imf.org/-/media/files/publications/weo/2026/update/july/english/text.pdf

[d] https://www.imf.org/external/datamapper/NGDP_RPCH@WEO/OEMDC/ADVEC/WEOWORLD

Historical GDP and GVA Growth Trend

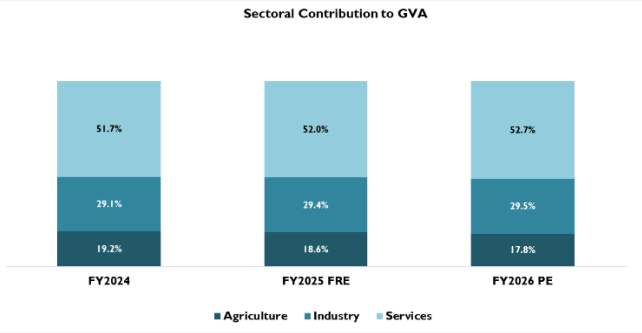
As per MOSPI's Provisional Estimates, India Real GDP (GDP at constant prices) for FY 2026 is estimated to reach INR 323.12 lakh crore, compared to the First Revised Estimate (FRE) of INR 299.89 lakh crore for FY 2025. This represents a growth rate of 7.7% in 2026, higher than the 7.1% growth recorded in 2025.

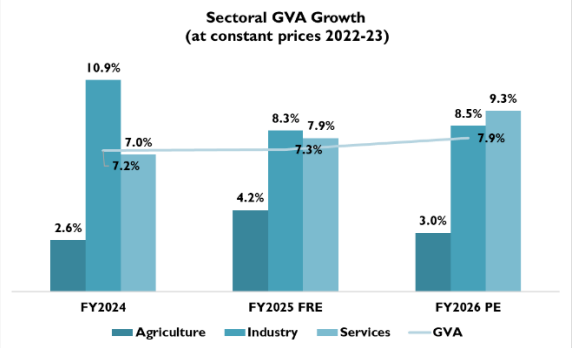
Similarly, Real GVA for FY 2026 is estimated to reach INR 294.91 lakh crore, up from INR 273.36 lakh crore in FY 2025. This indicates a growth rate of 7.9%, compared with the 7.3% growth achieved in the previous year.



Source: Ministry of Statistics & Programme Implementation (MOSPI), National Account Statistics: FY2025, FRE is First Revised Estimate; PE is Provisional Estimates

Sectoral Contribution to GVA and Annual Growth Trend





Source: Ministry of Statistics & Programme Implementation (MOSPI), CMIE Economics Outlook

FRE is First Revised Estimate; PE is Provisional Estimates

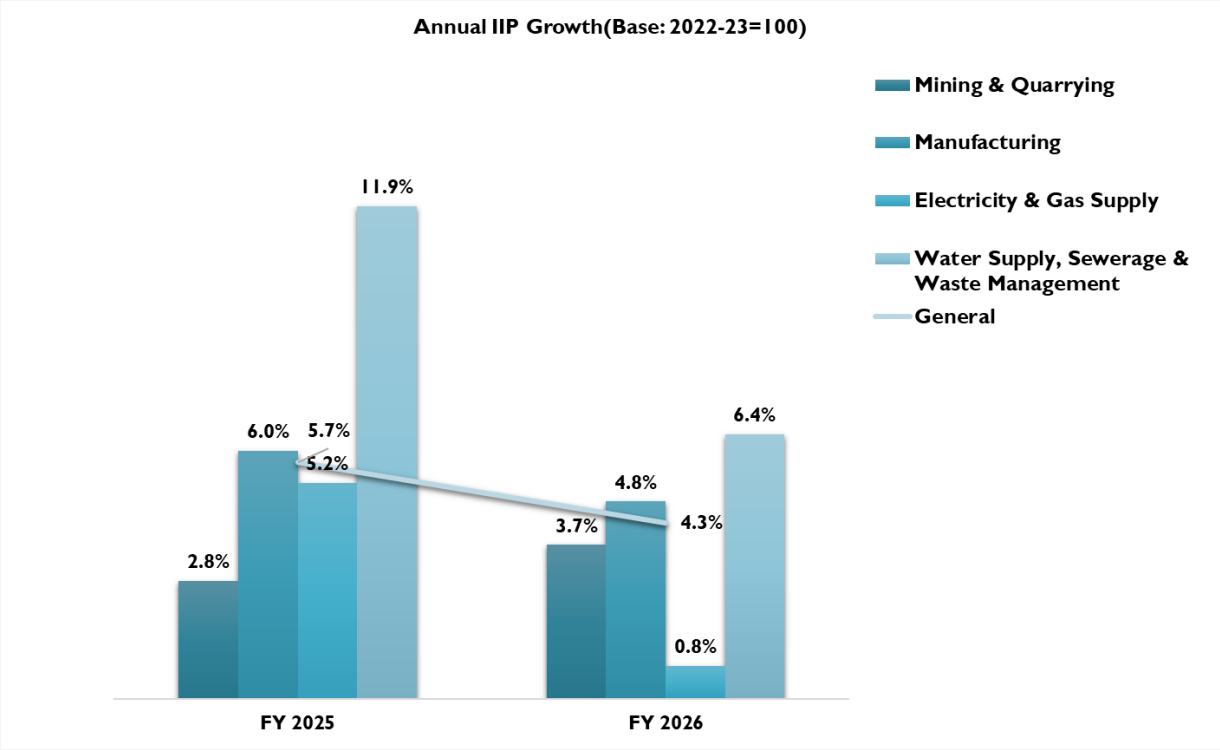
Sectoral analysis of GVA reveals that the industrial sector experienced steady growth momentum in FY 2026, recording a 7.9% y-o-y growth against 7.3% year-on-year growth in FY 2025. Within the industrial sector, growth moderated across sub-sectors with mining, and construction activities growing by 5.15%, and 7.36%, respectively in FY 2026, compared to 11.69%, and 7.30% in FY 2025. Growth in the utilities sector too moderated to 1.74% in FY 2026 from 2.87% in the previous year. The industrial sector's contribution to GVA increased marginally from 29.4% in FY 2025 to 29.5% in FY 2026.

The services sector continued to be the main driver of economic growth. It expanded by 9.3% in FY 2026 from 7.9% in FY 2025. The services sector retained its position as the largest contributor to GVA, rising from 51.7% in FY 2024 to 52.0% in FY 2025, with a further increase to 52.7% in FY 2026.

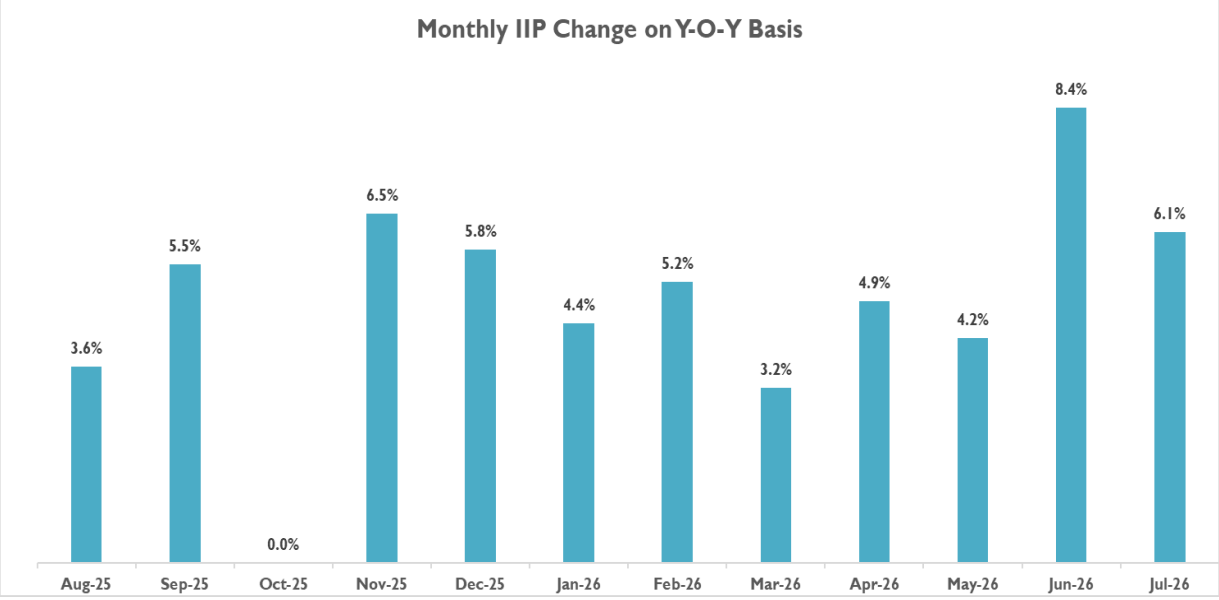
The agriculture sector saw an acceleration in growth, increasing from 2.66% in FY 2024 to 4.18% in FY 2025, before moderating to 3.0% in FY 2026. However, its contribution to GVA declined marginally from 19.2% in FY 2024 to 17.8% in FY 2026. Overall, Gross Value Added (GVA) growth rose to 7.9% in FY 2026 from 7.3% in FY 2025.

Annual & Monthly IIP Growth

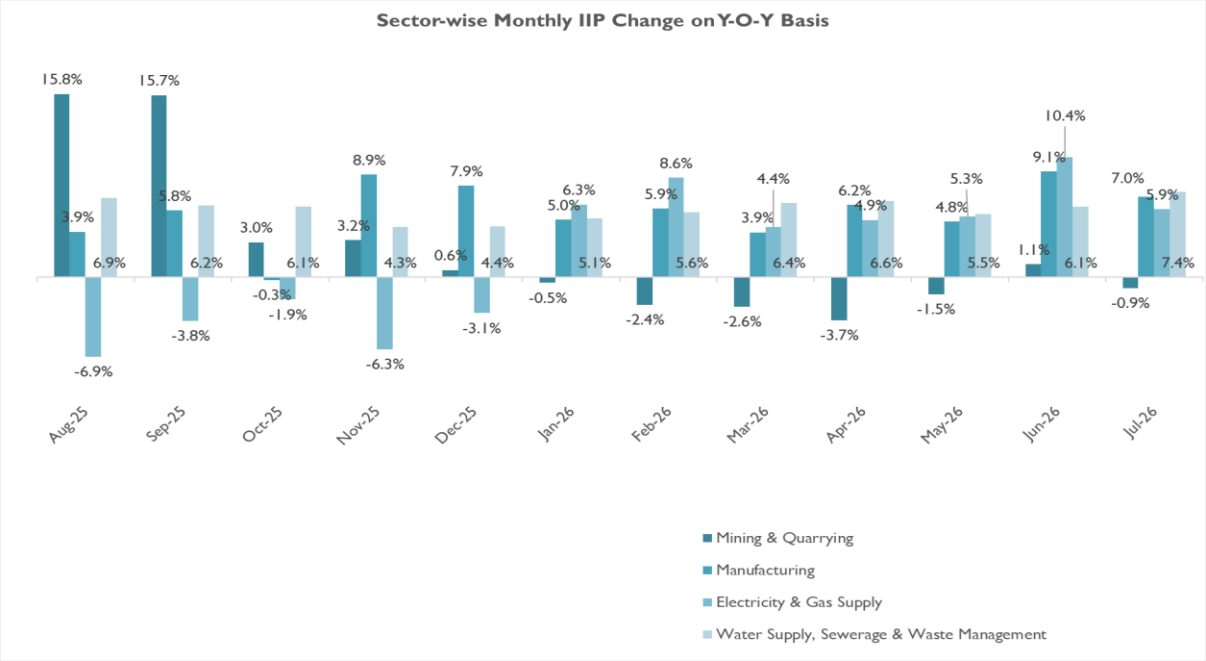
Industrial sector performance, as measured by the IIP, moderated in FY 2026, recording 4.3% y-o-y growth compared with 5.2% in FY 2025. The manufacturing sector grew by 4.8% in FY 2026, compared with 6.0% in FY 2025. The Electricity & Gas Supply sector recorded growth of 0.8%, compared with 5.7% in the previous year. Water Supply, Sewerage & Waste Management grew by 6.4% in FY 2026, compared with 11.9% in FY 2025. In contrast, Mining & Quarrying growth improved to 3.7% in FY 2026 from 2.8% in FY 2025.



Source: Ministry of Statistics & Programme Implementation (MOSPI)



Source: Ministry of Statistics & Programme Implementation (MOSPI)

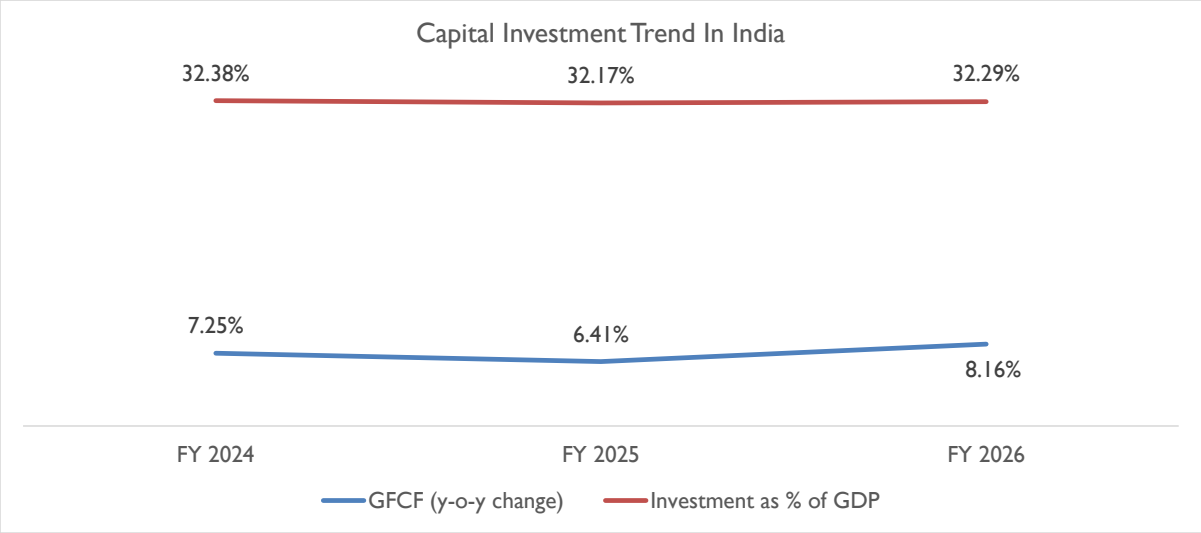


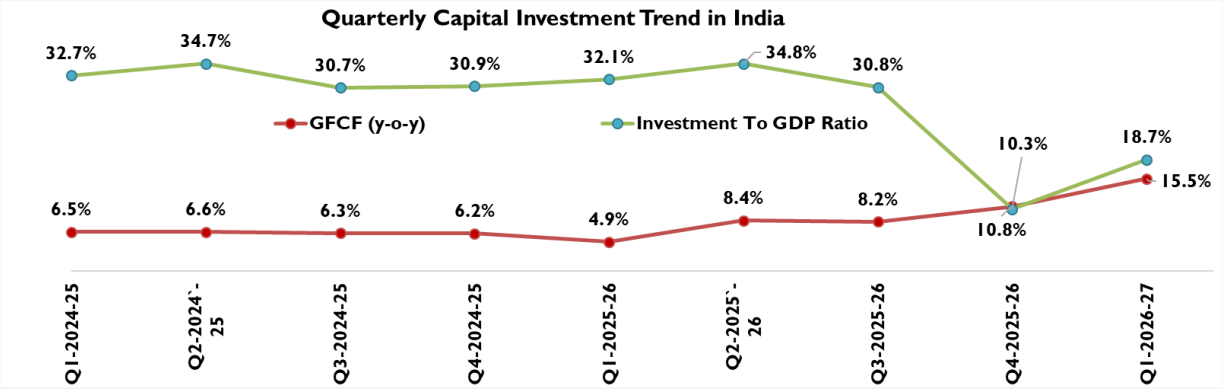
Source: Ministry of Statistics & Programme Implementation (MOSPI)

In the latest month shown, July 2026, IIP growth stood at 6.1% y-o-y, compared with 4.2% in May and 8.4% in June 2026. Sector-wise, Mining & Quarrying declined by 0.9%, while Manufacturing grew by 7.0%, Electricity & Gas Supply by 5.9%, and Water Supply, Sewerage & Waste Management by 7.4% in July 2026.

Annual and Quarterly: Investment & Consumption Scenario

Other major indicators, such as Gross Fixed Capital Formation (GFCF), a measure of investment, increased during FY 2026, registering 8.16% year-on-year growth compared with 6.41% in FY 2025, bringing the GFCF-to-GDP ratio to 32.29%.



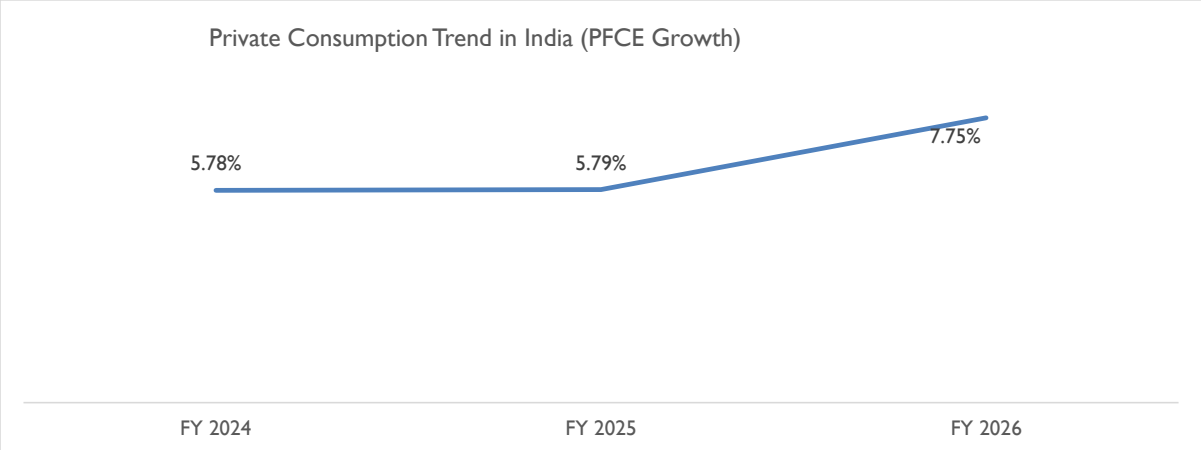


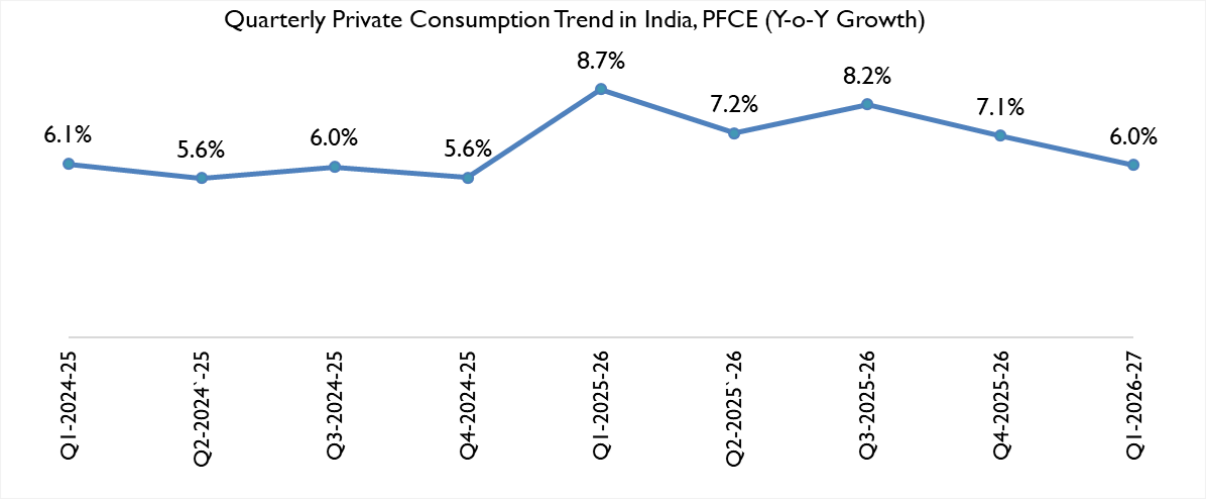
Source: Ministry of Statistics & Programme Implementation (MOSPI), CMIE Economics Outlook

India's capital investment activity remained broadly resilient during the period under review, with the Investment-to-GDP ratio consistently remaining above 30% across most quarters. After peaking at 34.8% in Q2 FY 2025-26, the ratio moderated sharply to 10.3% in Q4 FY 2025-26, before recovering to 18.7% in Q1 FY 2026-27, indicating a temporary slowdown followed by an improvement in investment activity. The overall trend reflects continued emphasis on capital formation and infrastructure development as key drivers of economic growth.

Meanwhile, Gross Fixed Capital Formation (GFCF) growth exhibited a strong upward trajectory after a brief moderation in early FY 2025-26. GFCF growth increased from 4.9% in Q1 FY 2025-26 to 10.8% in Q4 FY 2025-26, further accelerating to 15.5% in Q1 FY 2026-27, the highest level during the period. The sustained improvement in GFCF growth highlights strengthening fixed asset creation, supported by higher public and private sector investments, reinforcing a positive outlook for India's infrastructure and industrial development landscape.

Private Consumption Scenario





Sources: MOSPI, CMIE Economics Outlook

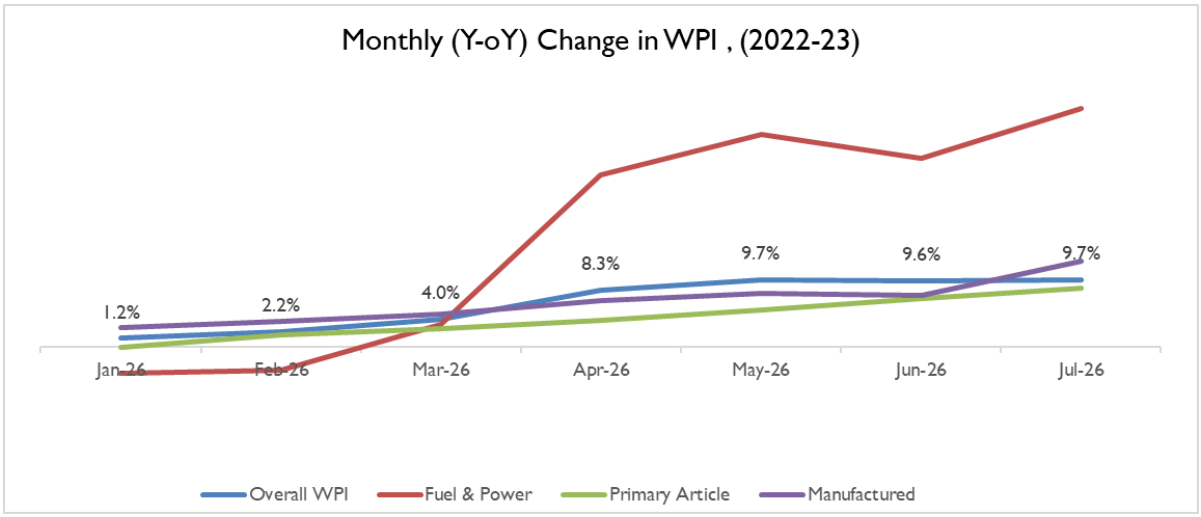
Private Final Consumption Expenditure (PFCE), a key indicator of household consumption and domestic demand, maintained healthy year-on-year growth throughout the period, although momentum moderated in the latest quarter. PFCE growth stood at 6.1% in Q1 FY 2024-25, before moderating slightly to 5.6% in Q2, rising to 6.0% in Q3 and easing again to 5.6% in Q4. In FY 2025-26, consumption growth strengthened significantly to 8.7% in Q1, before moderating to 7.2% in Q2 and recovering to 8.2% in Q3. Growth then eased to 7.1% in Q4 FY 2025-26 and further moderated to 6.0% in Q1 FY 2026-27.

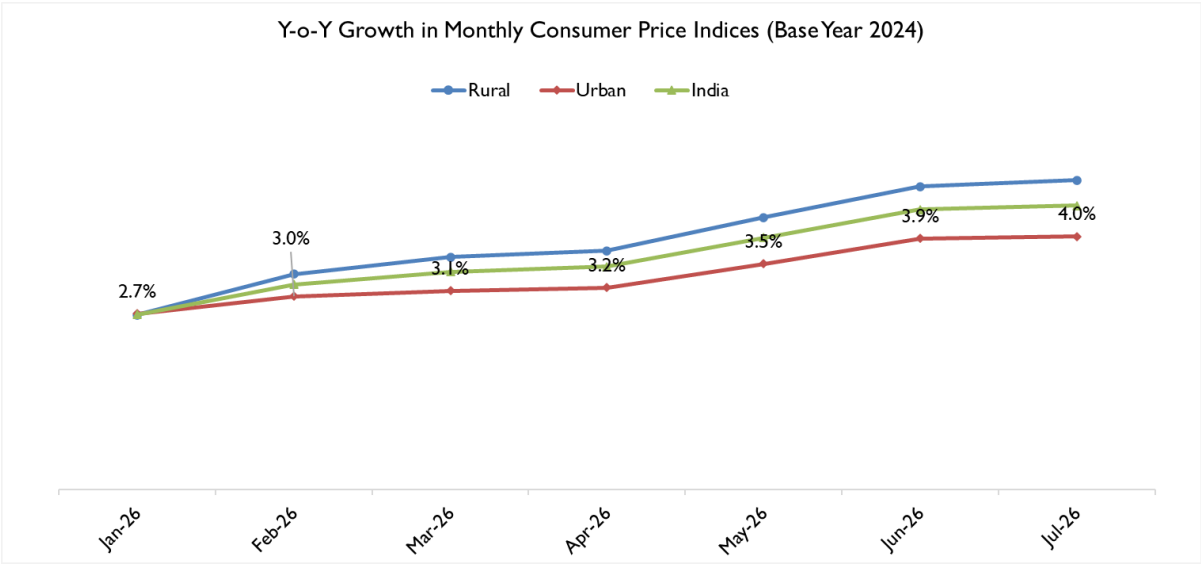
Overall, the data indicates that private consumption remained a key driver of domestic economic activity, with PFCE growth consistently above 5% and recording particularly strong momentum during FY 2025-26. However, the moderation to 6.0% in Q1 FY 2026-27 suggests some easing in household consumption momentum compared with the stronger growth recorded during the preceding quarters.

Inflation Scenario

All India Wholesale Price Index (WPI) inflation for July 2026 is 9.7 per cent on a year-on-year (YoY) basis, compared to 9.6 per cent in June 2026. The index for All Commodities for July 2026 stands at 109.7, whereas it was 109.6 in June 2026. Across Groups, 'Mineral Oils (containing Petroleum Products)', 'Crude Petroleum and Natural Gas', 'Manufacture of Chemicals and Chemical Products', and 'Manufacture of Basic Metals' continued to be major drivers of WPI inflation in June and July 2026.

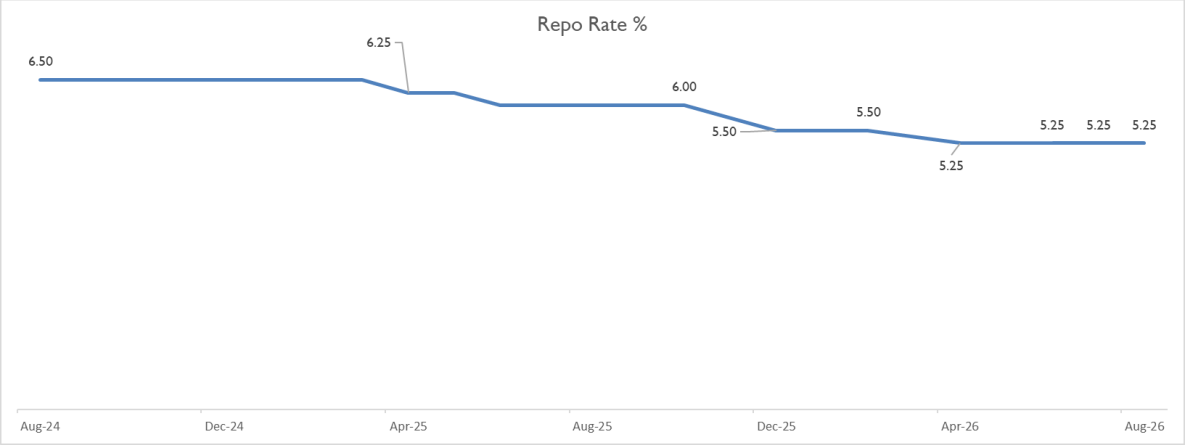
Across the regions, YoY inflation for Rural, Urban, and India stood at 1.03 per cent, 0.71 per cent, and 0.94 per cent, respectively, in July 2026, compared with 7.24 per cent, 6.69 per cent, and 7.00 per cent, respectively, in June 2026. The indices for Rural, Urban, and India were 108.34, 107.45, and 107.94, respectively, in July 2026, compared with 107.24, 106.69, and 107.00, respectively, in June 2026.





Source: MOSPI, Office of Economic Advisor

With effect from January 2026, the National Statistics Office (NSO) introduced a revised Consumer Price Index (CPI) series with base year 2024=100, incorporating revised item weights based on the Household Consumption Expenditure Survey (HCES) 2023-24. Under the revised series, All India CPI inflation increased gradually from 2.7% in January 2026 to 4.0% in July 2026. Inflation rose from 3.0% in February to 3.1% in March and 3.2% in April, before accelerating to 3.5% in May, 3.9% in June and 4.0% in July. The trend indicates a steady pick-up in retail inflation during the first half of 2026, following relatively subdued price pressures at the beginning of the year. Rural inflation remained higher than urban inflation during the period, with the gap widening toward the latest months, indicating relatively stronger price pressures in rural areas.



Sources: CMIE Economic Outlook

On the monetary policy front, the RBI had cumulatively raised the repo rate by 250 basis points between May 2022 and February 2023, bringing it to 6.50%, where it was maintained through January 2025 to anchor inflationary expectations. With inflationary pressures moderating and the need to support economic activity, the RBI's Monetary Policy Committee (MPC) initiated an easing cycle in February 2025, delivering a cumulative 125 basis points of rate cuts through four reductions — 25 basis points each in February and April 2025, 50 basis points in June 2025, and 25 basis points in December 2025. The MPC subsequently maintained the repo rate at 5.25% through August 2026, reflecting a balanced approach between supporting growth and maintaining price stability. The policy repo rate currently stands at 5.25% as of August 2026.

Growth Outlook

The Union Budget 2026–27 sets out a quantitatively strong push to build resilient supply chains and develop next-generation industrial capacity. The INR 12.2 lakh crore public capital expenditure outlay is aimed at strengthening infrastructure, connectivity and economic competitiveness. The Budget proposes seven high-speed rail corridors, a new Dedicated Freight Corridor connecting Dankuni to Surat, and the operationalisation of 20 new National Waterways over the next five years. Employment and economic activity are also expected to be supported through infrastructure development, with a focus on Tier-2 and Tier-3 cities through the proposed City Economic Regions.

Employment measures extend across both urban and rural India in one sweep. In cities and large towns, capital expenditure is channelled into growth connectors such as the seven proposed high-speed rail corridors and improved infrastructure in Tier-2 and Tier-3 cities, supporting construction, logistics and related economic activity. In smaller towns and villages, employment generation is expected to be supported through initiatives covering textiles, khadi, handloom and handicrafts, as well as tourism-linked skilling. The Budget also proposes Samarth 2.0 to strengthen the textile skilling ecosystem and build employment-oriented capabilities.

This domestic push is complemented by targeted measures to strengthen strategic supply chains. Dedicated Rare Earth Corridors in Odisha, Kerala, Andhra Pradesh and Tamil Nadu; customs-duty exemptions for capital goods required for processing critical minerals and manufacturing lithium-ion cells for batteries; and India Semiconductor Mission 2.0 aim to deepen domestic capabilities in critical minerals, advanced materials, semiconductor equipment and electronics. The Government has also increased the proposed outlay for the Electronics Components Manufacturing Scheme to INR 40,000 crore. These measures are intended to

strengthen domestic manufacturing capabilities, develop strategic industrial ecosystems and reduce import dependence in critical supply chains.[e]

Alongside these domestic measures, India is also seeking to strengthen its external trade architecture through major trade agreements. The conclusion of the India–EU FTA negotiations in January 2026 marks a major strategic milestone, providing preferential access across 97% of EU tariff lines covering 99.5% of trade value. Around 90.7% of India's exports are covered by immediate duty elimination, particularly benefiting labour-intensive sectors such as textiles, leather and footwear, tea, coffee, spices, sports goods, toys, gems and jewellery and selected marine products. The agreement remains subject to the necessary subsequent processes before implementation and is therefore not yet an operational FTA.[f]

In a similar vein, the India–Oman Comprehensive Economic Partnership Agreement (CEPA) has moved from negotiation to implementation, having entered into force on 1 June 2026. Bilateral trade between India and Oman reached USD 11.18 billion in FY 2025–26, compared with USD 10.61 billion in FY 2024–25. Under the CEPA, Oman provides duty-free access covering 98.08% of its tariff lines and 99.38% of India's exports by value, strengthening market access for Indian products across engineering goods, pharmaceuticals, agriculture and processed food, electronics, textiles, plastics, gems and jewellery and other sectors.[g]

At the same time, India has adopted a calibrated liberalisation approach by offering tariff liberalisation on 77.79% of its tariff lines, covering 94.81% of imports from Oman by value, while retaining exclusions and safeguards for sensitive domestic sectors. The agreement also provides gains in services, with Oman undertaking commitments across 127 services subsectors and improving provisions for professional mobility. The ceiling for Intra-Corporate Transferees has been increased from 20% to 50%, supporting greater deployment of managerial and specialist personnel by Indian companies.[h]

However, these gains remain exposed to external geopolitical risks. The escalation of the West Asia crisis represents an external shock for India, transmitted primarily through energy markets, logistics and trade-linked business exposure. Heightened security concerns around the Strait of Hormuz have resulted in vessel diversions, longer sailing routes, congestion at transshipment hubs and higher freight, insurance and war-risk costs, creating operational uncertainty for export consignments moving to or through the region.

The early trade response following implementation has also been positive. The number of tariff lines exported to Oman increased from 2,879 in May 2026 to 3,371 in June 2026, while exports across these tariff lines increased to USD 622.8 million in June 2026 from USD 402.7 million in May 2026. These developments indicate an initial expansion in export diversification and utilisation of the preferential market-access framework, although the longer-term impact of the CEPA will depend on sustained exporter participation and trade flows.[i]

[e] https://www.pib.gov.in/PressReleasePage.aspx

[f] https://www.pib.gov.in/PressReleasePage.aspx

[g] https://www.pib.gov.in/PressReleaseIframePage.aspx

[h] https://www.pib.gov.in/PressReleaseIframePage.aspx

[i] https://www.pib.gov.in/PressReleasePage.aspx

At the same time, perishable agricultural exporters and other import- and export-dependent businesses remain exposed to shipping delays and logistics disruptions. Diversions and longer sailing routes can increase transit times and logistics costs, while disruptions to maritime trade can create working-capital and delivery pressures for exporters. For import-dependent industries, delays in critical inputs can increase the risk of production disruptions, while sustained increases in freight, insurance and energy-related costs can place pressure on manufacturing and services margins. The Government's response, including RELIEF and measures to facilitate alternate routing and cargo movement, is intended to mitigate these extraordinary logistics and insurance pressures.

Insight into type of solar power installations:

Ground Mounted Solar Plant, Grid Connected Solar Rooftop, Hybrid Projects, Off-Grid Solar

India's cumulative installed solar capacity reached **168.04 GW as of August 31, 2026**, reflecting the continued rapid expansion of solar power deployment across ground-mounted, rooftop, hybrid and off-grid installations. Solar power installations in India can broadly be categorized into **ground-mounted solar plants, grid-connected rooftop solar systems, hybrid solar projects, and off-grid solar installations**, each serving distinct applications within the energy ecosystem.

Solar power installations	Installed Capacity (as on 31st August 2026)	% share
Ground Mounted Solar Plants	123.99 GW	76.3%
Grid-Connected Solar Rooftop	32.59 GW	17.3%
Hybrid Projects (Solar Component)	4.83 GW	2.4%
Off-Grid Solar	6.63 GW	4.0%

Ground Mounted Solar Plants: These include **large-scale solar photovoltaic (PV) installations built on open land areas**, typically connected directly to the transmission or distribution grid. These projects are generally developed by independent power producers (IPPs), utilities, or renewable energy developers and supply electricity to the grid under long-term power purchase agreements. This segment represents the **largest share of India's solar capacity**, accounting for more than three-fourths of total installations, driven by large utility-scale solar parks, competitive bidding mechanisms, and strong policy support. The availability of large land parcels in solar-rich states such as Rajasthan, Gujarat, and Karnataka has further supported the expansion of this segment.

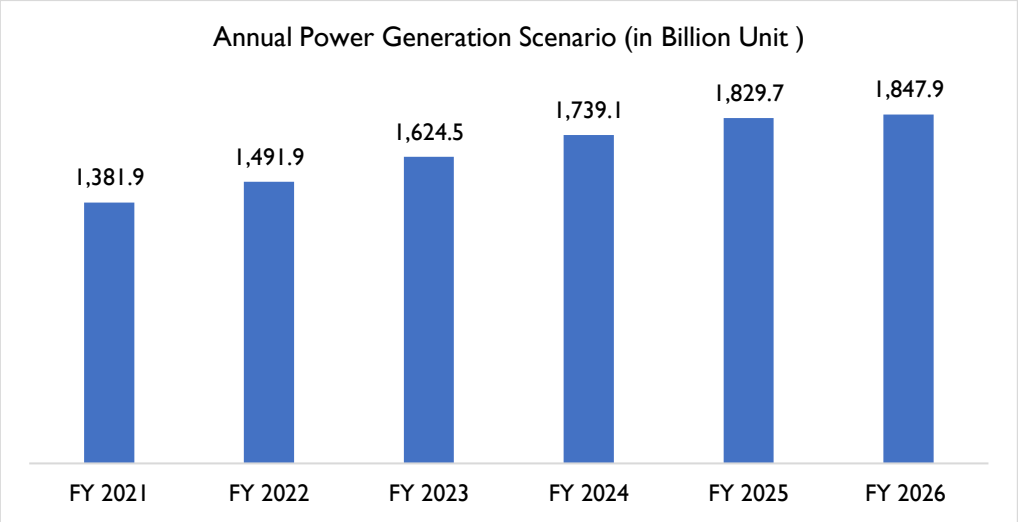
Grid-Connected Solar Rooftop: Grid-connected rooftop solar systems are **solar PV installations mounted on rooftops of residential, commercial, industrial, or institutional buildings and connected to the electricity grid**. These systems allow consumers to generate electricity for self-consumption while exporting surplus power to the grid through mechanisms such as net metering or gross metering. Rooftop solar plays a crucial role in promoting **distributed power generation and reducing dependence on centralized power supply**, particularly in the commercial and industrial (C&I) sector where electricity tariffs are relatively high. Government initiatives, including residential subsidy schemes and rooftop solar programs, have supported gradual growth in this segment. This model offers substantial savings over traditional grid electricity, while contributing to sustainable energy consumption.

Hybrid Projects (Solar Component): Hybrid solar projects refer to **power generation systems that combine solar energy with other generation sources such as wind power or energy storage systems** to provide more stable and dispatchable electricity output. In these projects, the solar component operates alongside complementary technologies that help manage variability in renewable energy generation. Although currently representing a relatively small share of installed capacity, hybrid projects are gaining strategic importance as India increases renewable energy penetration and seeks solutions to improve grid balancing, optimize land and transmission infrastructure usage, and enhance overall power supply reliability.

Off-Grid Solar: Off-grid solar installations refer to **solar energy systems that operate independently of the central electricity grid**, typically deployed in remote or rural areas where grid connectivity is limited or unreliable. These systems include solar home systems, solar mini-grids, solar street lighting, and solar-powered agricultural pumps. Off-grid solar solutions play an important role in supporting **rural electrification, agricultural energy access, and decentralized power generation**, particularly in regions where extending conventional grid infrastructure is economically challenging. Government programs focused on rural energy access and solar irrigation have contributed to the adoption of off-grid solar systems across various parts of the country.

Electricity Demand Scenario in India

India's electricity generation has demonstrated a steady upward trend in recent years, reflecting the country's expanding energy requirements and continued economic growth. Total power generation increased from **1,381.9 billion units in FY2021 to 1,847.9 billion units in FY2026**, indicating sustained growth in electricity demand and consumption across the country. This rise in power generation is supported by structural factors such as urbanization, industrial expansion, increasing electrification, and rising usage of electrical appliances across residential, commercial, and industrial sectors.



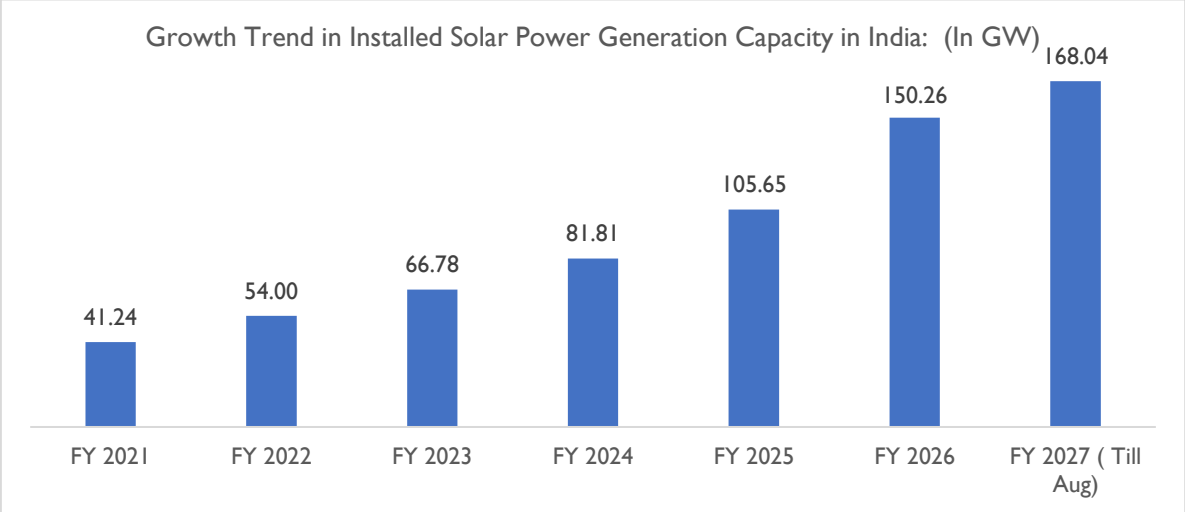
Source: Central Electricity Authority (CEA)[j]

[j] https://www.powermin.gov.in/static/uploads/2026/05/79a76e18613c2bfed12b37f426da5c39.pdf

The increase in power generation has been supported by capacity additions across both conventional and renewable energy sources. In particular, the growing deployment of renewable energy especially solar and wind power has contributed to diversifying India's power generation mix while supporting the country's energy transition objectives. Government initiatives aimed at strengthening transmission infrastructure, improving electricity access, and expanding renewable energy capacity have further supported the growth in overall power generation.

Solar power: Installed capacity & historical growth capacity in India[k]

Over the past five years, India's solar sector has undergone a decisive transformation, emerging as the primary driver of renewable energy expansion and a central pillar of the country's clean energy transition. The growth has been marked by the steady scaling of large utility-scale solar projects alongside a rising contribution from rooftop and distributed solar systems, supported by national and state-level policies. Initiatives such as rooftop subsidy schemes, incentives for domestic manufacturing, and competitive auctions have encouraged broader participation from public and private players. At the same time, the sector has diversified into hybrid and storage-linked projects, reflecting a growing focus on grid stability, flexibility, and reliability.



Source: Ministry Of New and Renewable Energy[l]

India's installed solar power capacity has witnessed substantial growth over the past few years, reflecting strong policy support and the country's increasing focus on renewable energy expansion. Installed solar capacity increased from **41.24 GW in FY2021 to 81.81 GW in FY2024**, highlighting a steady scale-up of solar installations across both utility-scale and distributed segments. This upward trend continued, with total installed capacity reaching **105.65 GW in FY2025**, driven by accelerated solar project commissioning and increased investments in renewable energy infrastructure.

[k] https://mnre.gov.in/en/year-wise-achievement/

[l] https://mnre.gov.in/en/physical-progress/

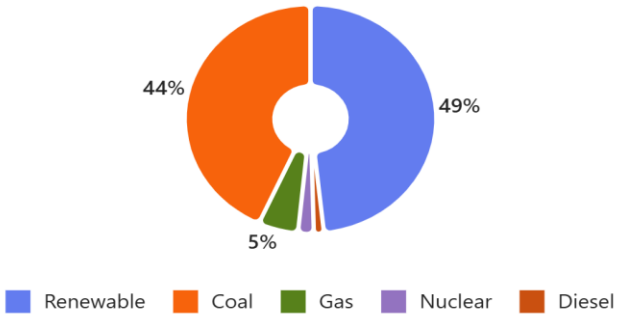
The growth trajectory remained strong in **FY2026**, with India's installed solar capacity reaching **150.26 GW in FY 2026**, demonstrating the rapid pace at which solar energy is becoming a key component of the country's power generation mix. This expansion has been supported by government initiatives such as ambitious renewable energy targets, competitive solar auctions, improved transmission and grid infrastructure, and measures to promote domestic solar manufacturing. Additionally, rising electricity demand from industrial, commercial, and urban sectors, along with increasing corporate decarbonization efforts, is contributing to continued solar capacity additions. Overall, the consistent expansion of installed solar capacity highlights India's strategic push toward achieving its long-term renewable energy and energy transition objectives.

Sources of Power Generation

As of October 2025, India's total installed electricity generation capacity stands at approximately 476 GW. This marks a significant increase from 305 GW in 2015–16, representing a 56% growth over the past decade. Of this, nearly 49% (235.7 GW) comes from non-fossil fuel sources, including 226.9 GW of renewable energy and 8.8 GW of nuclear power, while thermal power continues to dominate with 240 GW, accounting for ~50.5% of the total capacity.

As of October 2025, coal and lignite-based installed power generation capacity in India stands at approximately 221.3 GW, which accounts for ~46.4% of the country's total installed capacity of 476 GW. This marks a slight decline in share from ~48% in September 2024, reflecting the growing contribution of renewable energy sources to the national grid. In the last few years, RE has been the focused area for capacity additions which is evident from the fact that RE installations (including large hydroelectric projects), have reached ~247 GW capacity as of October 2025, compared with 114 GW as of March 2018, constituting about 52% of total installed generation capacity. **This growth has been led by solar power, which rapidly rose to ~127 GW from 22 GW over the same period.**

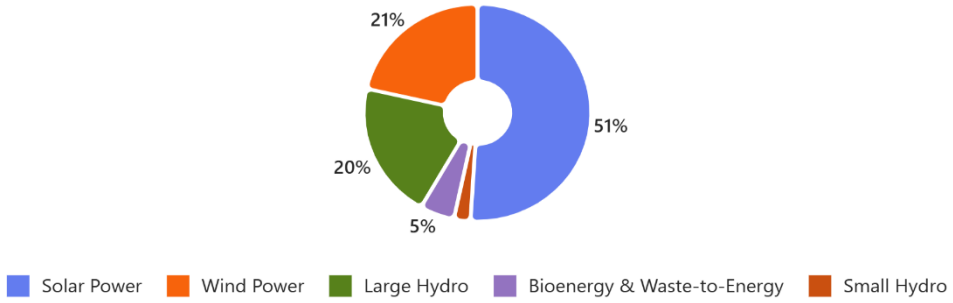
India Installed Capacity – 476 GW (October 2025)



Below is the Summary:

Source	Capacity in GW	% Break up
Coal	221.3	-46.40%
Renewable	247.3	-51.90%
Gas	25	-5.30%
Nuclear	8.8	-1.80%
Diesel	1	-0.20%

India Installed Renewable Energy Capacity – 247.3 GW (October 2025)



Below is the Summary:

Source	Capacity in GW	% Break up
Solar Power	127.3	-51.50%
Wind Power	53.1	-21.50%
Large Hydro	50.1	-20.30%
Bioenergy & Waste-to-Energy	11.6	-4.70%
Small Hydro	5.1	-2.10%

Renewable Energy Landscape in India

As per International Renewable Energy Agency's 'Renewable capacity statistics 2023', **India globally ranks 4th in Renewable Energy Installed Capacity**, 4th in Wind Power capacity and **5th in Solar Power capacity**. One of the key factors driving this growth is the increasing share of renewable energy in India's overall energy consumption. This shift has been facilitated by supportive policy measures implemented by the government in recent years. With a growing awareness of the environmental impact of non-renewable energy sources and the nation's increasing dependence on energy imports, the Indian government has been incentivized to promote cleaner energy alternatives.

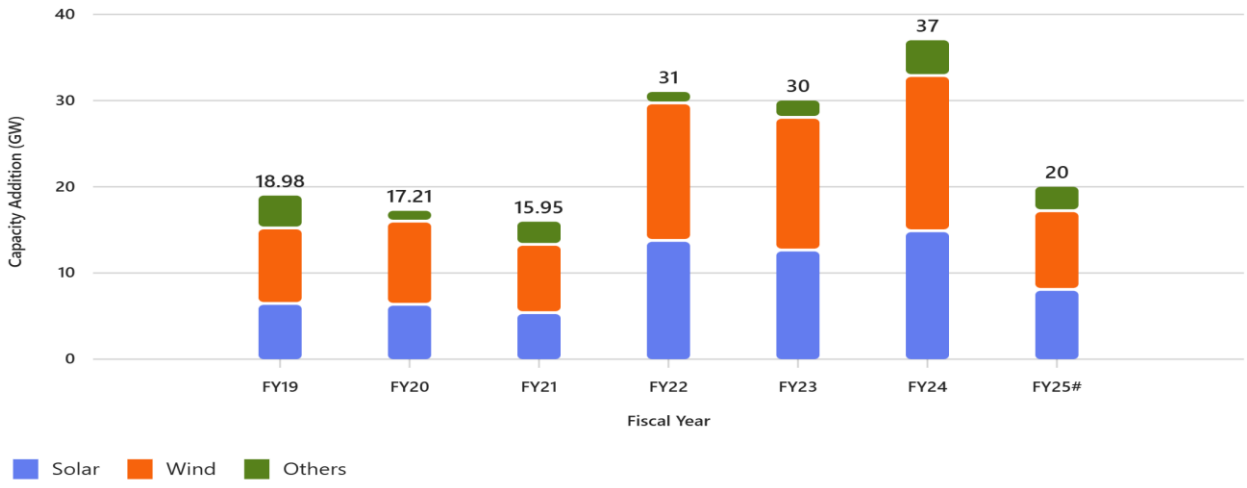
As a result, there has been rapid expansion in various renewable energy sectors, including solar, wind, biomass, biogas, and tidal power. These efforts have contributed to a significant increase in the generation capacity of renewable energy sources.

Renewable energy installations (incl. large hydro) have increased to ~247 GW as of October 2025, as compared with ~63 GW as of March 2012 (source: MNRE), led by various central and state-

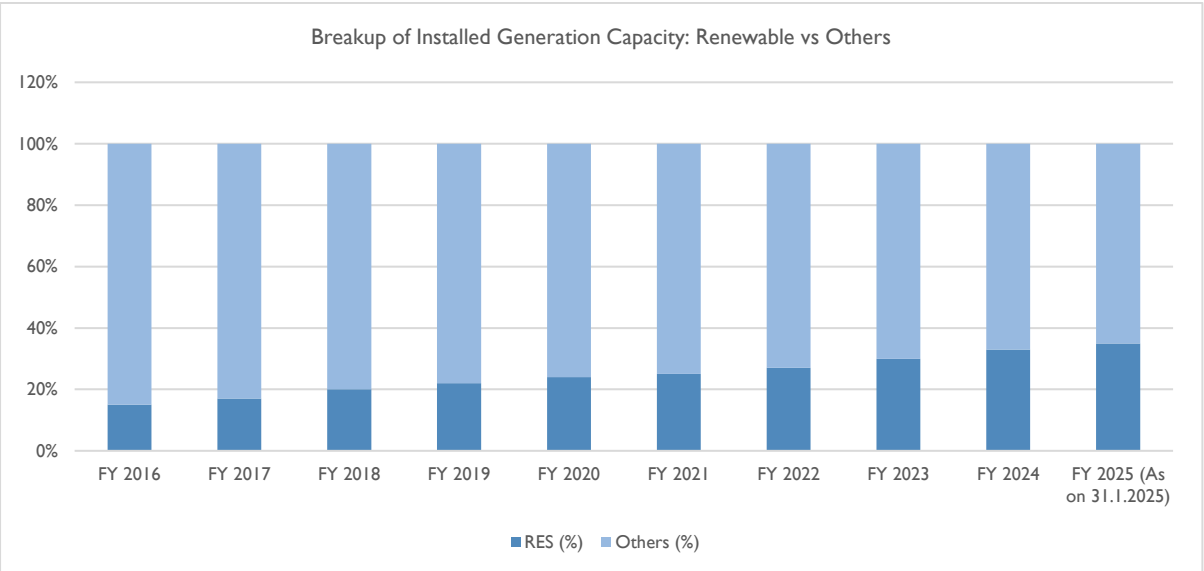
level incentives. As of October 2025, India's grid-connected renewable energy generation capacity, including large hydroelectric projects, has reached approximately 247.3 GW, which constitutes ~51.9% of the country's total installed generation capacity of 476 GW. This growth has been led by solar power, which has grown to ~127 GW from merely ~0.09 GW over the time period (i.e., from March 2012).

With the increased support of the Government and improved economics, the RE sector has become attractive from an investor's perspective. During fiscals 2018 to 2024, India added around 76 GW of RE (incl. large hydro) capacities. The installed RE (incl. large hydro) capacity has grown from 114 GW in fiscal 2018 to 247 GW as of October 2025 at a CAGR of ~12%. Solar segment led the capacity additions during the same period.

Historical RE Capacity additions in India



 # As of October 2025



Source: Central Electricity Authority (On Till 31.01.2025)

Installed Renewable Energy Capacity (MW) (Excluding Large Hydro Power) – Year Wise Achievement for India

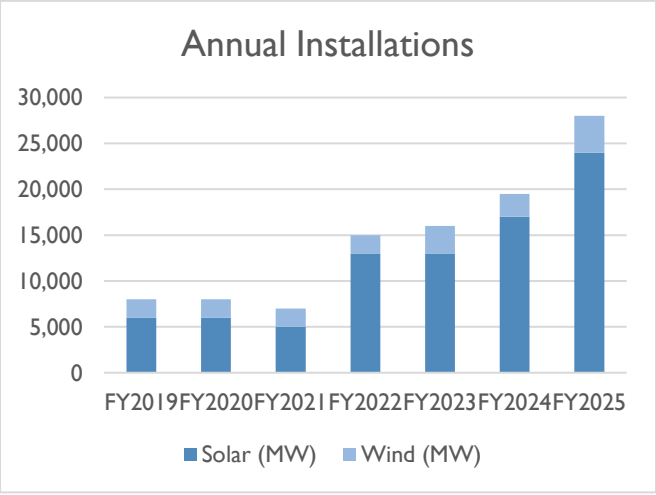
Sector	Cumulative Achievements(till-31.03.2014)	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	Apr 2024-31	Cumulative Achievements(till-31.03.2025)
Wind Power	21042.58	2311.77	3423.05	5502.37	1865.23	1480.97	2117.79	1503.3	1110.53	2275.55	3253.38	4151.31	4151.31	50037.82
Solar Power	2821.91	1171.62	3130.36	5658.63	9563.69	6750.97	6510.06	5628.8	12760.5	12783.8	15033.24	23832.87	23832.87	105646.49
Small Hydro Power	3803.68	251.68	218.11	106.38	105.95	107.34	90.01	103.65	62.09	95.4	58.95	97.3	97.3	5100.55
Biomass (Bagasse) Cogeneration	7419.23	295.67	304.85	161.95	519.1	402.7	97	173.37	59.69	0	0	387.76	387.76	9821.32
Biomass(Non-bagasse) Cogeneration	531.82	60.05	59.24	2.2	9.5	12	0	97.24	0	42.4	107.34	0	0	921.79
Waste to Power	90.58	0	0	23.5	24.22	0	9.34	21	54.5	25	1.6	59.6	59.6	309.34
Waste to Energy (Off-grid)	139.79	9.71	5.69	11.77	5.55	6.58	19.11	20.75	34.66	52.28	30.17	194.81	194.81	530.87
Total	**35849.59**	**4100.5**	**7141.3**	**11466.81**	**12093.24**	**8760.56**	**8843.31**	**7548.11**	**14081.97**	**15274.43**	**18484.68**	**28723.65**	**28723.65**	**172368.18**

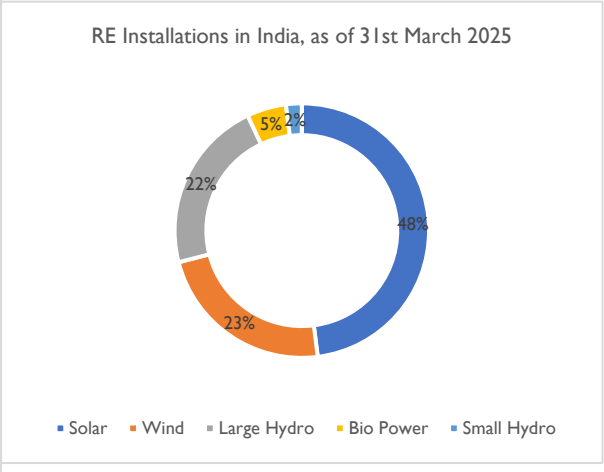
Source: NMRE

In 2024 (January to December), India added about 24.5 GW of solar and ~3.4 GW of wind capacity. This represents around twofold rise in solar installations compared to the annual solar installations of 12.8 GW in 2023 and a nearly 1.21 times increase in wind installations compared to 2023. Notably, the total solar capacity added in 2024 is the highest recorded capacity in any previous year.

With these additions, **India's total installed renewable energy (RE) capacity reached 220 GW as of March 2025. Solar energy accounts for approximately 48% of the total RE segment**, making it the most significant contributor among renewable sources.

RE installation trends in India



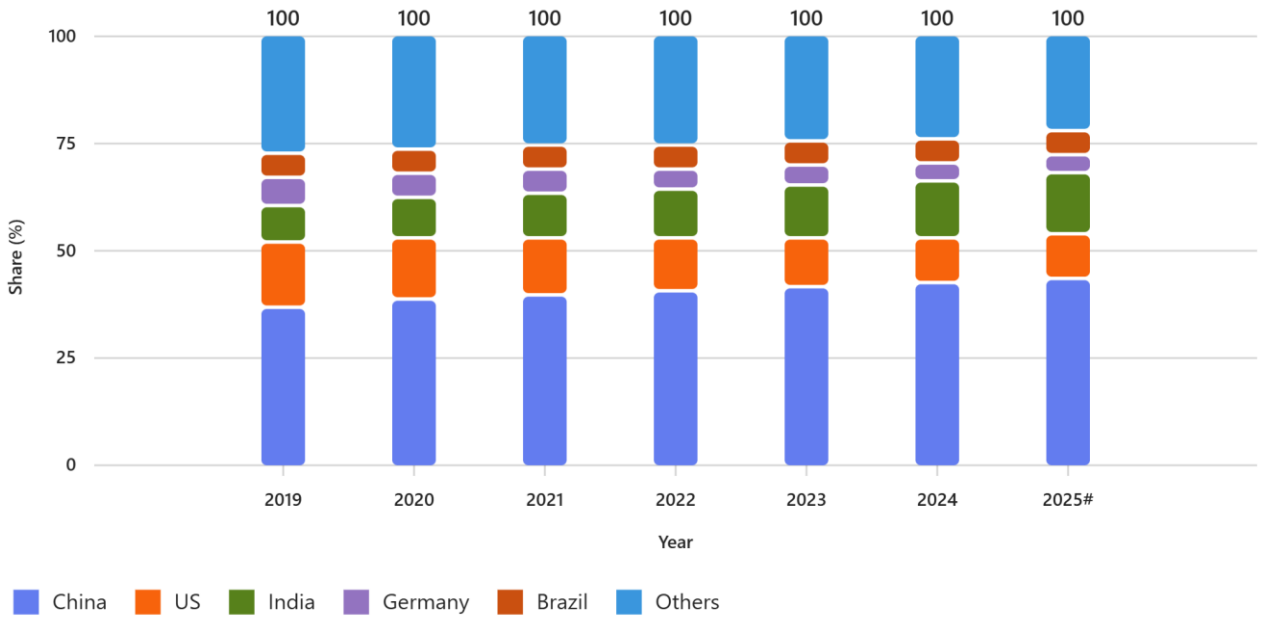


Source: JMK Reseach

RE Capacity additions in India compared to major economies

Globally, India ranks fourth in total RE capacity, wind as well as solar installations. **India has become the second largest RE market in the Asia Pacific region after China**. As per IRENA RE capacity statistics 2024, during 2023, China added ~298 GW of RE capacity followed by USA with ~31 GW of RE capacity. During the same period, Germany added around 18 GW whereas Brazil added 17 GW of RE capacity. As per MNRE, India added ~15 GW during the fiscal 2023. Thus, as against the 63% of the global RE capacity added by China, India added around 3% during the fiscal 2023.

China is leading in global RE capacity additions



up to October 2025

- **China** continues to dominate, contributing up to **45%** of global additions in 2025#.
- **India's share** has steadily increased from **8% in 2019** to **14% in 2025#**, reflecting strong growth in solar and wind installations.
- **US** and **Germany** show a gradual decline in relative share.
- **Brazil** maintains a consistent contribution.
- **Others** (including EU countries, Canada, Japan, etc.) collectively account for a shrinking share.

RE Consumption in key Indian states

With declining tariffs and government push for RE, most of the RE states have added significant RE capacity and are also purchasing RE power to meet the energy demand. However, the RE penetration in Indian states varies substantially from state to state. In the Top 10 RE Rich States, the RE penetration is higher than national average. The following table summarises the share of RE consumption in total power consumption. The share of RE in most of the States is increasing.

Trend of RE consumption in total electricity consumption in key States

State	FY19	FY20	FY21	FY22	FY23	FY24	FY25
Andhra Pradesh	34%	37%	32%	29%	26%	28%	30%
Chhattisgarh	5%	6%	9%	8%	14%	16%	18%
Gujarat	13%	15%	16%	18%	18%	20%	21%
Haryana	16%	18%	17%	19%	24%	26%	28%
Karnataka	31%	39%	44%	42%	43%	45%	46%
Madhya Pradesh	14%	17%	19%	16%	22%	24%	26%
Maharashtra	13%	14%	15%	17%	18%	20%	21%
Rajasthan	25%	27%	25%	25%	31%	33%	35%
Tamil Nadu	14%	15%	17%	15%	16%	18%	19%
Telangana	15%	19%	17%	20%	22%	24%	26%

Note: As per the ICED database, a large capacity of Solar Park in AP is discontinued from 20-21 onwards, Source: India Climate Energy Dashboard (NITI Aayog)

Solar Power Generation Scenario in India

In the renewable energy basket (including large hydro), solar energy accounted for around 55% of India's total installed renewable energy capacity as of March 2026, highlighting its dominant position in the country's clean energy transition. India has witnessed robust growth in the solar power sector over the last five years, supported by favorable government policies, increasing investments, and declining technology costs.

India achieved a historic milestone by crossing 150 GW of installed solar power capacity as of 31 March 2026, reinforcing its position among the world's leading solar power markets. This achievement reflects the nation's commitment toward a cleaner and greener energy future and represents a significant step toward achieving the target of 500 GW of non-fossil fuel-based power capacity by 2030.

During FY 2025-26 (April 2025 to March 2026), India added a record 44.61 GW of new solar capacity, nearly doubling the addition of 23.83 GW recorded in FY 2024-25. Consequently, the country's cumulative installed solar capacity increased to 150.26 GW as of 31 March 2026. The installed capacity comprised approximately 110.43 GW of utility-scale (ground-mounted) solar projects, 25.73 GW of rooftop solar systems, and 14.10 GW from off-grid/agricultural and other distributed solar projects, demonstrating broad-based growth across all segments of the solar sector.

Following is the summary of state wise Renewable Power Installed Capacity as on 31st March 2025.

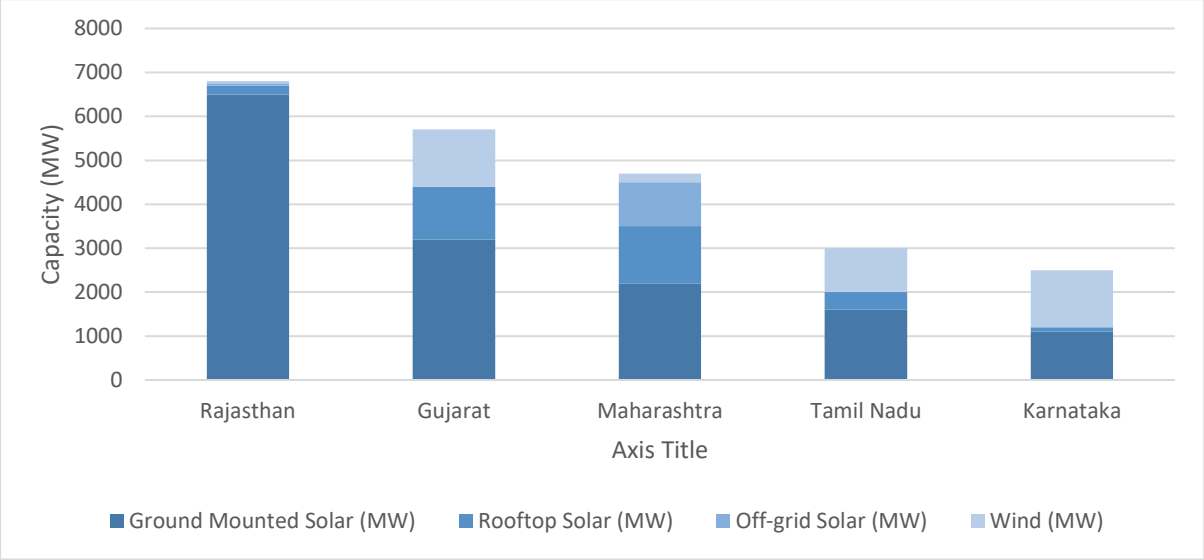
Ministry of New & Renewable Energy State-wise (Location based) installed capacity of Renewable Power as on 31.03.2025.															
S. No.	STATES / UTs	Small Hydro Power	Wind Power	Bio-Power					Solar Power				Solar Power Total	Large Hydro	Total Capacity
				Biomass Power/ Bagasse Cogeneration	Biomass Cogeneration (Non-Bagasse)	Waste to Energy	Waste to Energy (Off-grid)	Bio Power Total	Ground Mounted Solar	PM-Surya Ghar Yojna (Solar Rooftop)	Hybrid Solar Comp.	Off-grid Solar/ KUSUM			
		(MW)	(MW)	(MW)	(MW)	(MW)	(MW)	(MW)	(MW)	(MW)	(MW)	(MW)	(MW)	(MW)	(MW)
1	Andhra Pradesh	163.31	4377.15	378.10	113.57	53.16	49.19	594.02	4990.86	290.80	0.00	88.34	5370.00	1610.00	12114.48
2	Arunachal Pradesh	140.61						0.00	1.27	6.68	0.00	6.90	14.85	1115.00	1270.46
3	Assam	34.11			2.00			2.00	126.00	61.10	0.00	9.44	196.54	350.00	582.65
4	Bihar	70.70		112.50	26.40		1.32	140.22	196.06	111.00	0.00	21.28	328.34		539.26
5	Chhattisgarh	76.00		272.09	2.50		10.83	285.42	848.91	107.40	0.00	390.73	1347.04	120.00	1828.46
6	Goa	0.05				1.94		1.94	1.95	53.00	0.00	1.49	56.44		58.43
7	Gujarat	106.64	12677.48	65.30	12.00	7.50	37.45	122.25	12482.93	5105.20	813.50	95.03	18496.66	1990.00	33393.03
8	Haryana	73.50		151.40	111.26	11.20	37.61	311.47	266.80	828.50	0.00	969.67	2064.97		2449.94
9	Himachal Pradesh	1000.71			9.20		1.00	10.20	145.05	24.63	0.00	34.58	204.26	10981.02	12196.19
10	Jammu & Kashmir	189.93						0.00	2.49	42.20	0.00	29.80	74.49	3360.00	3624.42
11	Jharkhand	4.05			19.10		1.04	20.14	21.00	93.04	0.00	85.83	199.87	210.00	434.06
12	Karnataka	1284.73	7351.10	1868.91	20.20	1.00	22.84	1912.95	8862.80	696.70	81.00	39.16	9679.66	3689.20	23917.64
13	Kerala	276.52	71.27		2.27		0.23	2.50	323.21	1190.80	0.00	24.93	1538.94	1964.15	3853.38
14	Ladakh	45.79						0.00	6.00	1.80	0.00	0.00	7.80	89.00	142.59
15	Madhya Pradesh	123.71	3195.15	92.50	14.85	15.40	32.71	155.46	4503.24	513.10	0.00	102.04	5118.38	2235.00	10827.70
16	Maharashtra	384.28	5284.61	2907.30	16.40	12.59	62.01	2998.30	5994.70	3298.20	0.00	1394.37	10687.27	3047.00	22401.46
17	Manipur	5.45						0.00	0.60	7.11	0.00	6.08	13.79	105.00	124.24
18	Meghalaya	55.03			13.80			13.80	0.00	0.21	0.00	4.07	4.28	322.00	395.11
19	Mizoram	45.47						0.00	22.00	2.00	0.00	6.39	30.39	60.00	135.86
20	Nagaland	32.67						0.00	0.00	1.00	0.00	2.17	3.17	75.00	110.84
21	Odisha	115.63		50.40	8.82		5.00	64.22	512.00	70.10	0.00	42.34	624.44	2154.55	2958.84
22	Punjab	176.10		299.50	231.79	10.75	34.55	576.59	886.27	453.80	0.00	81.36	1421.43	1096.30	3270.42
23	Rajasthan	23.85	5208.75	134.15	2.00	59.60	10.52	206.27	23985.22	1515.80	1980.00	805.45	28286.47	411.00	34136.34
24	Sikkim	55.11						0.00	0.52	5.12	0.00	1.92	7.56	2282.00	2344.67
25	Tamil Nadu	123.05	11739.91	969.10	43.55	6.40	27.57	1046.62	9150.98	932.20	0.00	70.40	10153.58	2178.20	25241.36
26	Telangana	90.87	128.10	158.10	3.30	45.80	14.47	221.67	4360.49	472.90	0.00	8.71	4842.10	2405.60	7688.34
27	Tripura	16.01						0.00	5.10	4.80	0.00	11.34	21.24		37.25
28	Uttar Pradesh	49.10		1985.50	165.26		158.38	2309.14	2717.45	321.90	0.00	324.72	3364.07	501.60	6223.91
29	Uttarakhand	233.82		72.72	60.00		15.81	148.53	298.40	273.71	0.00	20.96	593.07	4035.35	5010.77
30	West Bengal	98.50		300.00	43.52		8.34	351.86	240.35	67.13	0.00	13.14	320.62	1341.20	2112.18
31	Andaman & Nicobar Islands	5.25						0.00	25.05	4.59	0.00	0.27	29.91		35.16
32	Chandigarh							0.00	6.34	71.70	0.00	0.81	78.85		78.85
33	Dadra & Nagar Haveli and			3.75				3.75	14.30	33.82	0.00	0.00	48.12		51.87
34	Delhi					84.00		84.00	9.84	302.10	0.00	1.46	313.40		397.40
35	Lakshadweep							0.00	2.45	0.00	0.00	2.52	4.97		4.97
36	Puducherry							0.00	1.03	53.30	0.00	0.18	54.51		54.51
37	Others		4.30					0.00	0.00	0.00	0.00	45.01	45.01		49.31
	Total (MW)	5100.55	50037.82	9821.32	921.79	309.34	530.87	11583.32	81011.66	17017.44	2874.50	4742.89	105646.49	47728.17	220096.35
MW = Megawatt															

Source: NMRE

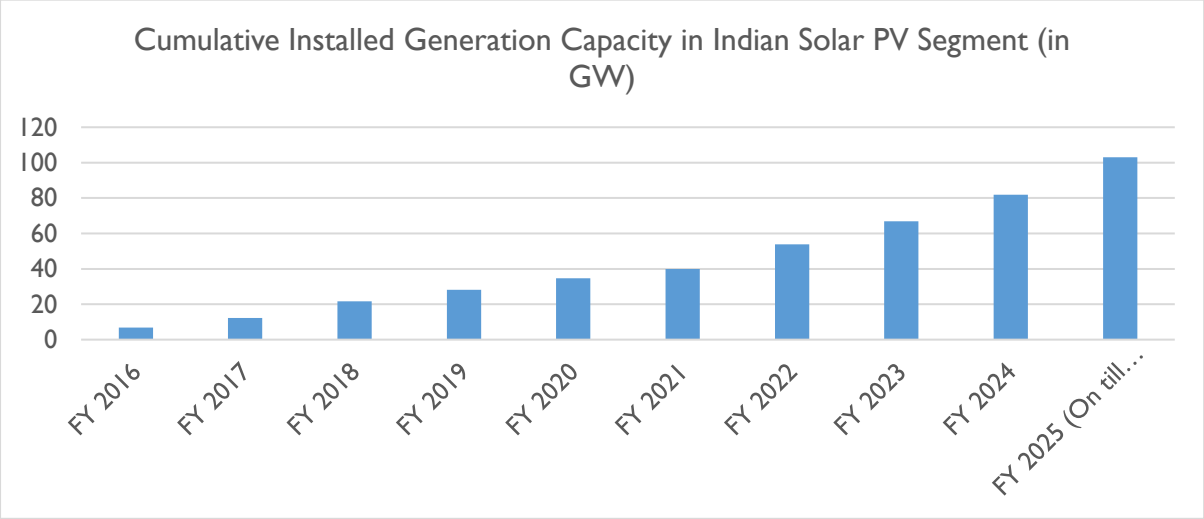
Following is the summary of top states for solar energy production in India.

State	Capacity - GW
Rajasthan	18.07
Gujarat	10.13
Tamil Nadu	7.03
Maharashtra	5
Madhya Pradesh	3.02
Karnataka	9.05
Telangana	4.66
Andhra Pradesh	4.5
Uttar Pradesh	2.5
Haryana	1.02

State-wise utility scale solar and wind capacity addition in India in FY2025



Source: JMK Reseach



Source: Ministry of New and Renewable Energy (MNRE)

Abundance of renewable energy sources:

Geographically located near the tropics, India is well endowed with natural and renewable sources such as solar, wind, biomass, small hydro and the like. Renewable energies hold a lot of potential in the context of energy security and decarbonization of the economy. It offers a plausible option to steer the energy system in the direction of sustainability by catering to energy requirements in an environmentally benign way. Consequently, renewables have become a high priority in the energy policy strategies at the national level. As per MNRE, the solar power potential in India is estimated to be approximately 750 GW, with the state of Rajasthan having the highest generation potential.

Solar Power Generation Potential in India (in GW)		
State	Potential at a height of 50 meters	Percentage Share
Rajasthan	142	19%
Jammu & Kashmir	111	15%
Maharashtra	64	9%
Madhya Pradesh	62	8%
Andhra Pradesh	38	5%
Rest of the Country	332	44%
Total Generation Potential	**749**	**100%**

Source: Ministry of New and Renewable Energy, Government of India

Solar PV Segment in India: Current Scenario

India's solar manufacturing sector has witnessed unprecedented growth over the last few years, driven by the Government of India's Production Linked Incentive (PLI) Scheme, Approved List of Models and Manufacturers (ALMM), and the growing domestic demand for solar power. **Solar module manufacturing capacity increased from approximately 74 GW in March 2025 to more than 261.7 GW by Aug-2026, while domestic solar cell manufacturing capacity expanded to around 35-36 GW during the same period.** This significant capacity addition reflects India's strategic efforts to strengthen domestic manufacturing capabilities and reduce dependence on imported solar equipment.

As per the latest industry estimates, around 225.5 GW of solar module manufacturing capacity is enlisted under ALMM List-I, while 36.5 GW of solar cell manufacturing capacity is enlisted under ALMM List-II. The industry has gradually transitioned towards high-efficiency technologies, with TOPCon technology accounting for nearly 80% of the ALMM-listed module manufacturing capacity, followed by Mono PERC, HJT and thin-film technologies.

Gujarat continues to be the leading solar manufacturing hub in the country, accounting for the largest share of installed module and cell manufacturing capacity, followed by Rajasthan and other emerging manufacturing clusters. Most newly commissioned manufacturing facilities are equipped to produce modules based on advanced wafer formats such as M10 and G12, in line with global technology trends and utility-scale project requirements

Following is the list of Solar Cell manufacturers in India

Name of Manufacturer	Estimated Solar Cell Manufacturing Capacity (GW)
Waaree Energies	5.4
Tata Power Solar (TP Solar)	4.6
Adani Solar	4.0
First Solar (Thin Film)	3.2
Emmvee Photovoltaic	2.5
Premier Energies	2.0

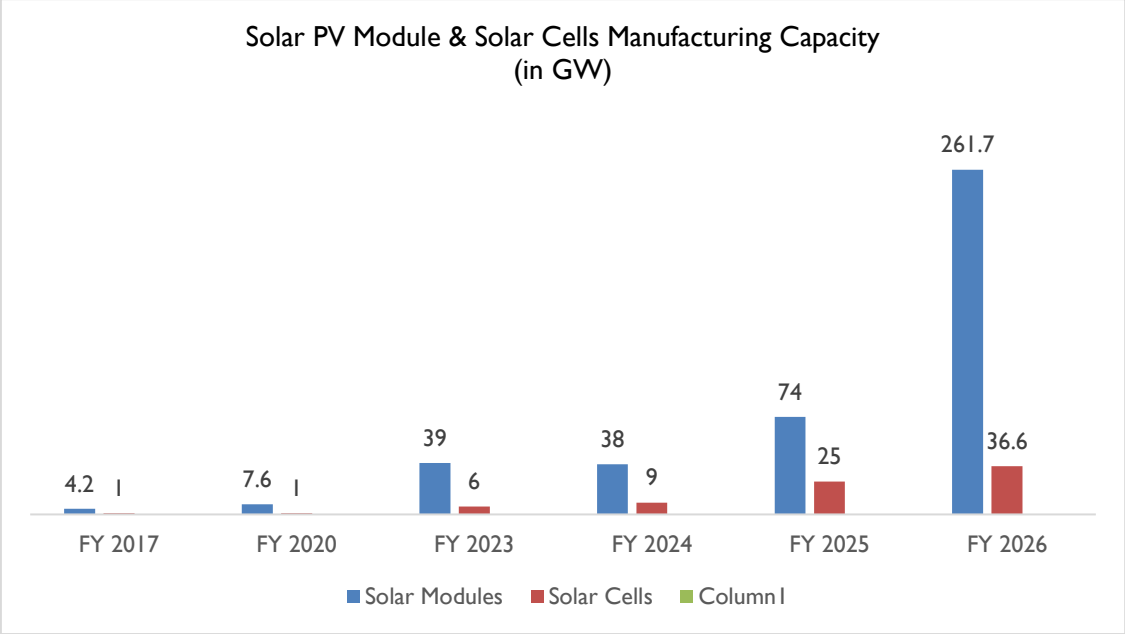
ReNew Photovoltaics	2.0
Reliance Industries (HJT Cells)	2.0
Avaada Electro	1.5
Jupiter International	0.9
Websol Energy Systems	0.6
Others (Vikram Solar, Insolation Energy, Saatvik, Goldi Solar, upcoming PLI manufacturers, etc.)	7.8
Total	**~36.5 GW**

India's solar cell manufacturing capacity has expanded significantly from approximately 25 GW in March 2025 to around 36.5 GW by mid-2026. Major manufacturers include Waaree Energies, Tata Power Solar, Adani Solar, First Solar, Premier Energies, Emmvee, ReNew, Reliance Industries and other PLI-supported manufacturers. Despite rapid growth, domestic cell manufacturing remains lower than module manufacturing capacity, indicating further opportunities for upstream integration within the solar value chain.

Solar PV Panel Manufacturing Capability in India

India has witnessed a remarkable transformation in its solar manufacturing ecosystem, driven by the Government's vision of building a self-reliant clean energy economy and reducing dependence on imported solar equipment. The domestic solar PV module manufacturing industry has expanded significantly over the last few years, supported by policy initiatives such as the Production Linked Incentive (PLI) Scheme, Basic Customs Duty (BCD) on imported solar equipment, Approved List of Models and Manufacturers (ALMM), and various state-level incentives. As a result, India's installed solar PV module manufacturing capacity increased substantially to approximately **261.7 GW by June 2026**, compared with around 74 GW at the end of FY2025, making India one of the world's fastest-growing solar manufacturing hubs. This rapid capacity addition reflects strong investor confidence, increasing participation from domestic conglomerates and independent manufacturers, and the country's strategic efforts to strengthen energy security through localized manufacturing.

The expansion has been led by major manufacturers such as Waaree Energies, Adani Solar, Tata Power Solar, Premier Energies, Vikram Solar, RenewSys, Emmvee, Avaada, and several emerging players that have announced large-scale investments in integrated manufacturing facilities. The industry has also witnessed a technological shift towards advanced N-type TOPCon modules, which now account for a majority of newly installed capacity. The rapid growth in manufacturing capabilities has positioned India not only to meet rising domestic demand but also to emerge as a significant exporter of solar modules to international markets.



Source: D&B Research, Ministry of New and Renewable Energy (MNRE),
*FY2026 capacity based on MNRE ALMM-listed manufacturing capacity as of June 2026.

Despite the strong growth in module manufacturing, the solar cell segment continues to lag behind. India's installed solar cell manufacturing capacity reached approximately **36.5 GW by June 2026**, representing a significant improvement over previous years but still substantially lower than module manufacturing capacity. This capacity gap indicates that a considerable portion of domestic module production remains dependent on imported solar cells. The cell manufacturing business requires significantly higher capital investment, advanced production technology, greater process precision, and continuous research and development investments, creating higher entry barriers compared with module assembly operations.

The challenge is further compounded by India's limited domestic availability of upstream raw materials such as polysilicon, ingots, and wafers, resulting in continued dependence on imports for critical inputs. While substantial investments have been announced across the entire solar value chain, including wafer and ingot manufacturing projects, these capacities are still in the development stage. Consequently, strengthening domestic cell manufacturing remains a key priority for achieving full supply-chain localization and reducing exposure to global supply chain disruptions.

Historically, India's solar power sector grew largely on the back of imported equipment, particularly from China, owing to cost advantages and large-scale manufacturing efficiencies enjoyed by global suppliers. Although India had an emerging solar manufacturing base during the early stages of sector development, domestic production was unable to keep pace with the rapid expansion in solar power installations. This resulted in substantial import dependence across the value chain, including modules, cells, wafers, EVA sheets, glass, and other ancillary components. The concentration of imports from a single geography exposed the industry to supply chain risks, geopolitical uncertainties, and pricing volatility.

To address these vulnerabilities, the Government adopted a dual-pronged strategy aimed at developing domestic manufacturing capabilities while simultaneously reducing import dependence. On one hand, policies such as the PLI scheme, ALMM framework, domestic content requirements for select projects, and manufacturing-linked

incentives have attracted large-scale investments into solar manufacturing. On the other hand, measures such as Basic Customs Duty on imported modules and cells have helped narrow the pricing advantage of imported products and improve the competitiveness of domestic manufacturers. These interventions have significantly accelerated capacity creation and encouraged backward integration into cells, wafers, and upstream components. Going forward, India's solar manufacturing industry is expected to enter a phase of consolidation and technological advancement. While module manufacturing capacity has already exceeded domestic demand requirements, future competitiveness will increasingly depend on vertical integration, operational efficiency, advanced cell technologies, and localization of upstream raw materials. Companies with integrated manufacturing capabilities across cells and modules are likely to benefit from stronger margins, improved supply security, and greater resilience against global market fluctuations. Consequently, the continued expansion of solar cell, wafer, and polysilicon manufacturing will be critical in establishing India as a globally competitive and self-reliant solar manufacturing powerhouse.

Solar Cell Consumption Pattern and Demand – Supply Gap

Indian Solar Cell consumption, GW and USD billion, FY2022 – FY2028E

Year	Consumption Volume (GW)	Consumption Value (USD Billion)
FY 2022	8.9	1.3
FY 2023	14.9	1.6
FY 2024	22.1	2.2
FY 2025	40.4	3.6
FY 2026	49.8	4.5
FY 2027 (E)	60.8	5.6
FY 2028 (E)	78.3	6.7

Source: Frost and Sullivan and D&B Research

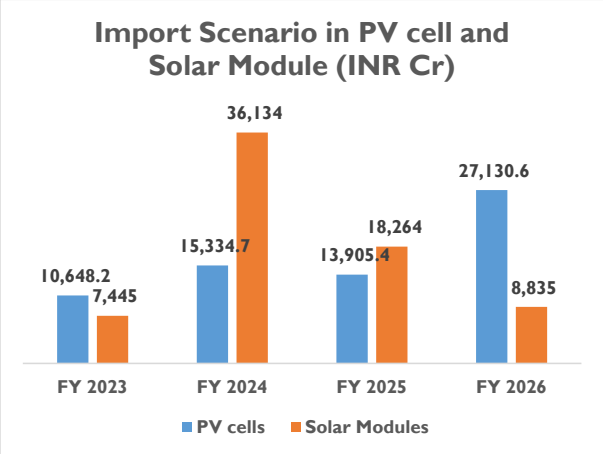
Indian Solar Cell demand-supply balance, GW, FY2022 – FY2028E

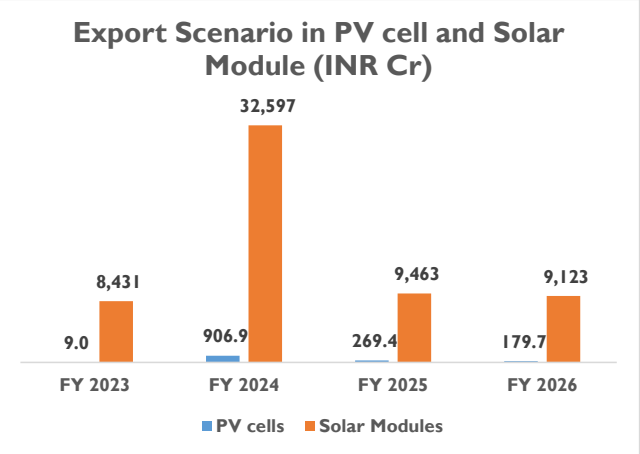
Year	Consumption	Export	Production	Import	Export as % of total Demand	Import as % of total Supply
FY 2022	8.9	0	1.3	7.6	0%	85%
FY 2023	18.9	0	3	11.9	0%	80%
FY 2024	20.6	0.4	3.9	18.5	2%	83%
FY 2025	31-35	0.7-0.9	7.5-8	32-35	2%	81%
FY 2026 (E)	46-50	1.3-1.7	16-18	36-40	3%	69%
FY 2027 (E)	65-69	2.2-2.8	30-33	35-39	4%	54%
FY 2028 (E)	80-84	3.7-4.3	40-47	35-39	5%	45%

Solar cell consumption in India witnessed a significant upward trend, increasing from 8.9 GW in FY2022 to approximately ~35 GW in FY2025. This more than 300% increase in consumption in

just three years highlights the booming demand for solar power in the country. As the country builds domestic Solar Module capacity, import of Solar module is expected to decline in the coming years which will boost the Domestic Solar Cell consumption market. Government schemes like PM Suryaghar Yojana, CPSU Scheme and KUSUM have generated demand for DCR modules in India outpacing the current 35 GW of installed production capacity of solar cells in India. This market is expected to grow approximately 3.5 times to 78 GW by FY2028.

Foreign Trade[m]





Sources: DGFT

India's solar trade data highlights the ongoing transition from a predominantly import-dependent market to an emerging manufacturing and export hub. While imports continue to play a critical role in meeting domestic requirements, particularly for solar cells, exports of solar modules have grown substantially, supported by capacity expansion and policy-driven manufacturing investments.

Import Scenario

Imports of **PV cells** increased consistently during the period, rising from **INR 10,648 crore in FY2023** to **INR 27,131 crore in FY2026**, representing a CAGR of approximately 37%. The sharp increase reflects the widening gap between domestic module manufacturing capacity and solar-cell production capacity. As module manufacturers rapidly expanded operations under the PLI scheme and ALMM framework, demand for cells outpaced domestic supply, resulting in greater dependence on imported cells.

In contrast, **solar module imports** displayed significant volatility. Imports increased sharply from **INR 7,445 crore in FY2023** to **INR 36,134 crore in FY2024**, likely driven by project developers stocking inventory ahead of regulatory changes and rising installation activity. However, imports declined substantially thereafter to

[m] HSN code 85414300: Photovoltaic cells assembled in modules or made up into panels or Solar Module
HSN 85414200: Photovoltaic cells not assembled in modules or made up into panels or Solar/PV Cell

INR18,264 crore in FY2025 and further to **INR 8,835 crore in FY2026**. The decline coincides with the rapid expansion of domestic module manufacturing capacity and the impact of import duties, which improved the competitiveness of locally manufactured modules.

Export Scenario

The export performance of India's solar manufacturing sector improved significantly over the period, particularly in solar modules. **Solar module exports** surged from **INR 8,431 crore in FY2023** to an exceptional **INR 32,597 crore in FY2024**, reflecting growing international acceptance of Indian-made modules and strong demand from overseas markets. Although exports moderated to **INR 9,463 crore in FY2025** and **INR 9,123 crore in FY2026**, they remained above FY2023 levels, indicating that India has established a notable presence in global solar supply chains.

Exports of **PV cells** remained comparatively small, reaching **INR 906.9 crore in FY2024** before declining to **INR 269.4 crore in FY2025** and **INR 179.7 crore in FY2026**. The limited export activity reflects the relatively low domestic cell manufacturing base and the prioritization of available cell production toward domestic module manufacturing requirements.

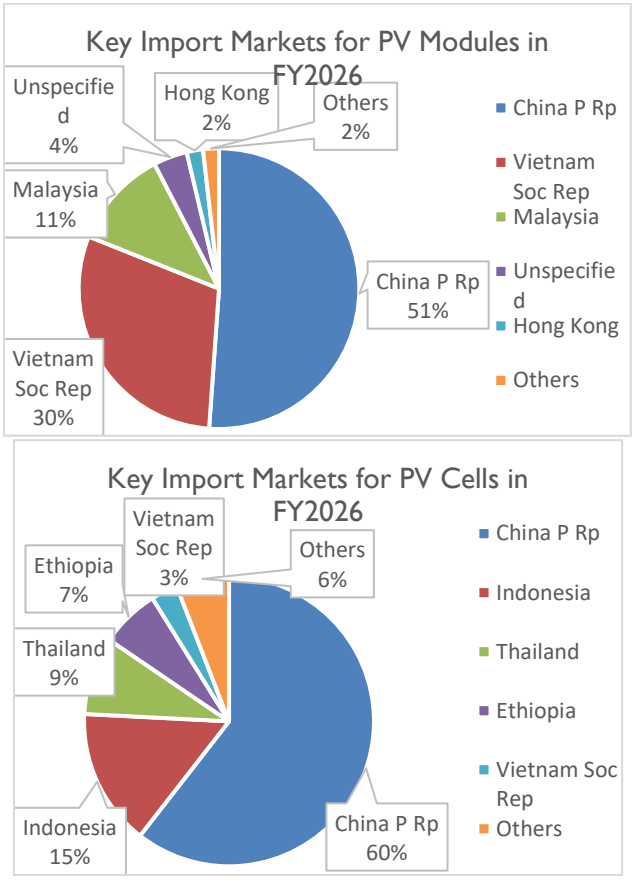
Trade Pattern Analysis

A key structural trend emerging from the data is the gradual shift in India's import dependence from finished modules to intermediate products such as solar cells. While domestic manufacturing capacity has become increasingly capable of supplying module requirements, cell manufacturing has not expanded at the same pace. Consequently, the industry continues to rely on imported cells despite becoming increasingly self-sufficient in module assembly.

Furthermore, the data indicates that India's solar manufacturing sector is moving up the value chain. The reduction in module imports and growth in module exports demonstrate the effectiveness of policy support measures aimed at encouraging domestic manufacturing. However, the rising import bill for cells highlights the need for accelerated investments in upstream manufacturing segments, including cells, wafers, ingots, and polysilicon.

Going forward, the competitiveness and self-reliance of India's solar manufacturing ecosystem will increasingly depend on the ability to scale cell and upstream component manufacturing, thereby reducing reliance on imports and creating a fully integrated domestic solar supply chain.

Trading Partner



Sources DGFT

In FY2026, India's solar import mix remained concentrated in Asian supply chains, with China leading both **PV module imports at 51%** and **PV cell imports at 60%;** however, the pattern differs by product category—module imports were followed by Vietnam at 30% and Malaysia at 11%, while cell imports were followed by Indonesia at 15%, Thailand at 9%, and Ethiopia at 7%. This indicates that India is gradually reducing reliance on imported finished PV modules as domestic module and panel manufacturing expands but still depends significantly on imported PV cells to support local module assembly; accordingly, policy measures such as ALMM List-II for PV cells and future upstream integration into wafers and ingots are expected to strengthen domestic value addition and reshape India's solar manufacturing ecosystem.

Regulatory Framework

Regulating Bodies

Key Government Ministries and Agencies Overseeing the Solar Sector

The regulatory framework for the solar energy sector in India is administered by a multi-layered structure of government ministries and agencies. The **Ministry of New and Renewable Energy (MNRE)** stands as the

nodal ministry, holding the primary responsibility for all matters pertaining to new and renewable energy sources. Its role encompasses policy formulation, implementation, and overall coordination of the renewable energy sector. The MNRE is instrumental in administering key schemes such as the National Solar Mission and the various Production-Linked Incentive (PLI) schemes designed to boost domestic manufacturing. Furthermore, the ministry oversees several important institutes and agencies, including the National Institute of Solar Energy (NISE), the National Institute of Wind Energy (NIWE), the Indian Renewable Energy Development Agency (IREDA), and the Solar Energy Corporation of India (SECI).

The **Solar Energy Corporation of India (SECI)** plays a crucial role in the practical implementation of government schemes and the development of renewable energy projects across various technologies, including solar, wind, and hybrid projects. SECI is the key implementing agency for Tranche II of the PLI Scheme for Solar PV Modules. The **Indian Renewable Energy Development Agency (IREDA)**, a non-banking financial institution under the MNRE, is responsible for providing financial assistance for the establishment of renewable energy projects. IREDA served as the implementing agency for Tranche I of the PLI Scheme.

The **Ministry of Power** also has a significant role to play, particularly in the aspects of grid connectivity and the broader development of the power sector, ensuring the integration of solar power into the national grid. The **Ministry of Commerce and Industry** is involved through its formulation of trade policies, including the imposition of import duties and the implementation of anti-dumping measures that affect the solar component manufacturing industry. This ministry has been responsible for imposing anti-dumping duties on solar glass imports from countries like China and Vietnam and for crafting broader policies aimed at reducing India's reliance on imports across various sectors.

Environmental oversight for solar module manufacturing falls under the purview of the **Ministry of Environment, Forest and Climate Change (MoEFCC)**. This ministry is responsible for setting environmental regulations, granting necessary clearances for setting up manufacturing plants, and administering rules related to the management of e-waste, including solar waste. Notably, the MoEFCC has provided exemptions for solar module manufacturing units from certain environmental clearances to streamline the regulatory process.

Ensuring the quality of solar modules manufactured and sold in India is the mandate of the **Bureau of Indian Standards (BIS)**. BIS sets the national standards and mandates certifications for various products, including solar modules, which are compulsory under the Compulsory Registration Order (CRO) issued in 2017. The BIS has recently notified a revised Quality Control Order (QCO) in 2025, which supersedes the 2017 order and introduces updated standards along with minimum efficiency criteria for solar PV modules.

The **National Institute of Solar Energy (NISE)**, an autonomous institution under the MNRE, serves as the apex body for research and development in the field of solar energy. NISE also plays a crucial role in conducting inspections for the Approved List of Models and Manufacturers (ALMM).

The involvement of multiple government bodies underscores the complexity of the regulatory landscape for solar module manufacturing in India. Businesses intending to operate in this sector must possess a clear understanding of the roles and responsibilities of each of these entities to effectively navigate the various approval processes. While the MNRE serves as the central coordinating ministry, the policies and regulations set forth by the Ministries of Commerce and Environment, as well as the standards mandated by BIS, significantly shape the manufacturing ecosystem.

Government Initiatives

During the last few years, the renewable energy sector landscape in India has, witnessed a lot of traction in the policy framework with accelerated and ambitious plans to increase the contribution of renewable energy.

Foreign investors are allowed to set up Wind /Solar energy-based power generation projects on Build, Own and Operate (BOO) basis and can enter a financial or technical joint venture with an Indian company. Up to 100% equity investment is allowed in the sector.

Production Linked Incentive (PLI)

The Indian Govt. has implemented Production Linked Incentive (PLI) Scheme for national programme on high efficiency Solar PV modules, for achieving manufacturing capacity of Giga Watt (GW) scale with an outlay of INR 240 billion. The scheme offers incentives to the selected Solar PV module manufacturers on manufacture and sale of high efficiency Solar PV modules. The scheme is applicable for the first five years from the actual commissioning date or from the scheduled commissioning date, whichever is earlier. The objectives of the scheme include the following:

- To build up Solar PV manufacturing capacity of high efficiency modules.
- To bring cutting-edge technology to India for manufacturing of high efficiency modules. The scheme will be technology agnostic however, the technologies that would yield better module performance will be incentivized.
- To promote setting up of integrated plants for better quality control and competitiveness.
- To develop an ecosystem for sourcing of local material in solar manufacturing.
- Employment generation and technological self-sufficiency.

The PLI Scheme is being implemented in two tranches as follows:

- Tranche-I: Under this tranche, Indian Renewable Energy Development Agency Limited (IREDA), the implementing agency on behalf of MNRE for the PLI Scheme, issued Letters of Award (LOA) in November and December 2021 to three successful bidders for setting up of 8,737 MW capacity of fully integrated Solar PV Module manufacturing units with an outlay of INR 45 billion.

- Tranche-II: MNRE, on 30th September 2022, has issued guidelines for implementation of Tranche-II with an outlay of INR 195 billion. In this tranche, Solar Energy Corporation of India (SECI), the implementing agency on behalf of MNRE, issued Letters of Award (LOA) to 11 bidders in April 2023 for setting up 39,600 MW of fully / partially integrated solar PV module manufacturing units.

Domestic Content Requirements (DCR)

The Domestic Content Requirement (DCR) is a policy implemented by the Indian government that mandates a specific percentage of components including Cells and Modules used in solar power projects, particularly those funded by the government, to be sourced from domestic manufacturers. This percentage has been steadily increasing over the years and going forward, the 40% minimum domestic content requirement is set to increase annually, to 45% for projects starting construction in CY2025, 50% in CY2026 and 55% thereafter.

The Domestic Content Requirement (DCR) policy in India mandates the use of domestically manufactured components in specific government-funded projects. This policy aims to boost domestic manufacturing, create jobs, and reduce dependence on imports.

A solar PV cell is considered domestically manufactured if it's made in India from undiffused silicon wafers (black wafers) and all processing steps occur within the country. However, cells manufactured in India from an imported diffused silicon wafer, commonly called a blue wafer, will not qualify as domestically manufactured under MNRE programs.

In August last year, the Ministry waived off domestic requirement norms for projects awarded on or before June 20, 2023. However, not all sectors are subject to DCR, and certain exemptions exist. DCR is applicable for grid-connected solar power plants, rooftop solar installations on government buildings, and off-grid solar solutions. The DCR policy serves the following benefits to the Indian Solar Cell and Module manufacturers:

- Guaranteed market: DCR acts as a powerful market driver by ensuring a guaranteed demand for domestically produced solar cells and modules. This provides manufacturers with the confidence and stability needed to invest in setting up new facilities, expanding existing ones, and adopting advanced technologies. This leads to a significant increase in overall domestic manufacturing capabilities.
- Reduced competition: By making imported components less competitive, DCR fosters a level playing field for domestic manufacturers. This reduces the threat from cheaper imports, allowing Indian companies to establish themselves in the market and improve their competitiveness through economies of scale and technological advancements.
- Technology development: DCR incentivizes manufacturers to invest in research and development (R&D) activities to enhance the efficiency and quality of their products. This not only helps them compete effectively in the domestic market but also positions them for global competition, fostering technological innovation and a future-proof industry.

As per a recent briefing, Indian government is planning to set up data repository of India made solar modules. The objective of this initiative is to check imports and ensure adherence to domestic content rules (DCR) for solar projects under central government schemes.

Approved List of Models and Manufacturers (ALMM)

The ALMM program establishes a pre-approved list of reliable solar photovoltaic (PV) modules and cell manufacturers. This program ensures quality and efficiency of solar installations in India by requiring developers and investors to source their equipment from ALMM-listed vendors. By promoting high- quality domestic and imported products, ALMM fosters trust and encourages the adoption of reliable solar solutions throughout the country. ALMM policy to be in effect from April 1, 2024 for solar Module and as per the latest list published by MNRE, the ALMM list still does not have any foreign manufacturer. The Ministry of New and Renewable Energy (MNRE) has updated the Approved List of Models and Manufacturers (ALMM) where Solar Module Capacity under ALMM has raised to 116.50 GW as on October 2025.

The government is aiming to make the second list (List II) under the ALMM for solar PV cells effective June 1, 2026, the Ministry of New and Renewable Energy (MNRE) said in a statement. From June 2026, all solar PV modules used in projects including government-backed schemes, net-metering projects, and open-access renewable energy initiatives will be required to source their solar cells from ALMM List-II, ensuring quality and reliability in solar PV cells used in India's energy infrastructure, the MNRE said.

In May 2024, the MNRE introduced significant reforms to the Approved List of Models and Manufacturers (ALMM) for Solar Photovoltaic Modules. These reforms stipulate that only those solar PV module manufacturers whose models meet BIS standards and achieve the specified minimum module efficiency will be included in the ALMM:

Category	Application/ Use	Minimum Module Efficiency requirement for crystalline-Silicon technology based Solar PV Modules	Minimum Module Efficiency requirement for Cadmium Telluride Thin Film technology [based Solar PV Modules
Category I	Utility / Grid Scale Power Plants	20%	19%
Category II	Rooftop and Solar Pumping	19.5%	18.5%
Category III	Solar Lighting	19.0%	18%

Following the office memorandum dated May 10, 2023, and the subsequent memorandum dated March 22, 2024, only those models of solar PV modules that meet the specified module efficiency criteria have been considered for enlistment under ALMM List-I.

Import Duties

India levies various duties on imported solar cells and modules, effectively acting as a protective shield for domestic manufacturers. These duties are applied irrespective of the origin country thus making domestically produced solar cells and solar modules more attractive to domestic solar players.

Basic Customs Duty (BCD): This tax levied on the customs value of imported cells and modules significantly impacts affordability. The basic customs duty (BCD) on imported solar modules in India is currently 20%. This reduction was implemented in the Union Budget 2025. Additionally, there is a 20% Additional Import Duty (AIDC) and a 4% Social Welfare Surcharge (SWS). Taking these components together, the effective total duty as of 2025 stands at approximately 30% for solar cells and 44% for solar modules.

Item	Basic Customs Duty (BCD) (%)	Agriculture Infrastructure and Development Cess (AIDC) (%)	Social Welfare Surcharge (SWS) (%)
Solar Cells	20	7.5	2.5
Solar Modules	20	20	4

BCD plays a crucial role in driving domestic solar manufacturing industry through:

- Cost competitiveness: By raising the cost of imported components, duties tilt the scales in favour of domestic manufacturers, making their products more financially attractive to project developers. As seen with the BCD implementation, this can lead to increased demand for domestic products, stimulating domestic production.
- Investment incentive: The higher costs associated with imported products make it more profitable to invest in and establish domestic solar manufacturing units. This in turn attracts investments into the sector, leading to growth in production capacity and creation of jobs.

The Union Government, through a two-pronged strategy, has changed the solar PV landscape in India, nudging it away from completely import-dominated to one where domestic manufacture too stands a chance to compete. However, the drop in polysilicon prices globally in 2022, due to a supply glut in China as production in the country exceeded demand as well as excess inventory of modules in Europe, meant the price of solar PV modules & cells manufactured in China dropped. Consequently, even with the BCD the imported solar PV modules is posing a stiff competition to domestically manufactured modules. Unless and until the prices of polysilicon picks up, the domestic manufacturers will not be able to take advantage of the BCD measure.

Standards & Labelling (S&L) Program for solar panels

In October 2023, the Bureau of Energy Efficiency (BEE) introduced the Standards & Labelling (S&L) Program specifically tailored for solar panels. This program complements the existing initiative for solar inverters and aims

to enhance the efficiency of solar photovoltaic (PV) systems. By providing consumers with clear information about the efficiency and performance of solar panels, the program empowers them to make informed decisions when purchasing or using these panels.

The implementation of the Standards & Labelling Program for solar panels is expected to generate substantial energy savings amounting to 21.1 billion kWh between the fiscal years 2024-25 and 2033-2034. Additionally, it is anticipated to lead to a potential reduction in carbon dioxide emissions by approximately 15.1 million tonnes during this period. These outcomes underscore the program's significance in promoting sustainability and reducing environmental impact.

Government Schemes to Increase Solar Power Generation & Consumption in India

To create demand for domestically manufactured PV modules, the Government has implemented a host of initiatives. These include mandatory procurement from domestic sources for select projects, procurement from Government approved list of manufacturers as well as imposing customs duty & other measures to make imports expensive.

PM Surya Ghar Muft Bijli Yojna

With an allocation of over INR 750 billion, the PM Suryagrah Mu Bijli Yojana aims to provide financial assistance through capital subsidies for the installation of rooftop solar panels. This scheme targets approximately 10 million households, offering up to 300 units of free electricity monthly. The objective is to reduce household electricity costs and decrease reliance on traditional energy sources. It specifically mandates the use of Domestic Content Requirement (DCR) solar modules, promoting local manufacturing. Analysts expect this scheme to generate 25-30 GW of rooftop solar installation opportunities over the next 2-3 years.

PM-KUSUM Scheme

The PM-KUSUM scheme focuses on de-dieselizing the agricultural sector while providing energy security to farmers. This initiative aims for a solar power capacity addition of 34.8 GW by March 2026, supported by a central financial backing of INR 344 billion. The scheme includes three components: decentralized solar power plants on barren land, installation of standalone solar water pumps, and solarizing grid-connected agricultural pumps. This multifaceted approach not only enhances farmers' incomes but also curbs environmental pollution.

Component A: Establishment of 10,000 MW of decentralized solar power plants on barren, fallow, pasture, marshy, and cultivable land owned by farmers. These installations can be undertaken by individual farmers, solar power developers, cooperatives, panchayats, and farmers' producer organizations.

Component B: Deployment of 1.4 million standalone solar water pumps in off-grid areas, providing reliable water access for irrigation and other agricultural needs.

Component C: Solarization of 3.5 million grid-connected agricultural pumps through two approaches: (i) Individual pump solarization and (ii) Feeder-level solarization, enhancing energy efficiency and sustainability in agricultural practices.

Components	Sanctioned	Installed
Component A (MW)	10,000	700 MW+
Component B (Nos.)	12,24,229	9.50 lakhs
Components C (Nos.)	Individual Pump Solarization (IPS)– 95,308 Feeder-level Solarization (FLS) – 35,78,874	Individual Pump Solarization (IPS)– ~15000 Feeder-level Solarization (FLS)– ~5,00,000

Source – MNRE / PM-KUSUM Scheme Progress Reports, FY 2025-26

FDI Policy

The Indian government's FDI policy allows up to 100% foreign investment in renewable energy projects, including solar power generation and distribution. This policy enables foreign investors to enter the market without prior government approval, enhancing the flow of capital into the solar sector.

Renewable Purchase Obligation

The RPO framework mandates a gradual increase in renewable energy purchase percentages for each state until FY2030. By imposing penalties for non-compliance, the RPO provides clarity and security for investors, encouraging them to invest in solar projects. This initiative aims to diversify India's energy mix and reduce dependency on imported fossil fuels.

GST reduction

From September 22, 2025, the goods and services tax (GST) rate on solar equipment will be cut from 12 percent to 5 percent. The reduction applies to modules, cells, and related renewable devices, which will see lower capital costs of projects.

Impact of recent USA Tariffs on India Solar Industry

The recent **U.S. tariffs on Indian solar exports**—including a **26% reciprocal tariff** on solar PV modules—have created both **challenges and strategic opportunities** for India's solar industry. Here's a summary of the impact:

🔍 **Immediate Impact**

- **Total tariff burden** on Indian solar modules now stands at **~40%**, combining the new 26% reciprocal tariff with the existing 14.5% Section 201 duty.

- **Export margins** to the U.S. are expected to shrink, making Indian products less price-competitive compared to Southeast Asian countries like Malaysia and Vietnam.
- **Export volumes may dip** in the short term, especially since the U.S. accounted for **99.5% of India's solar exports** in Q1 FY2025.

🌎 **Strategic Shifts**

- Indian manufacturers are **diversifying export markets**, targeting Europe, the Middle East, and Africa to offset U.S. losses.
- Companies like **Waaree Energies** and **ReNew** are expanding domestic manufacturing and building **resilient supply chains**, including U.S.-based facilities.

📈 **Long-Term Outlook**

- Despite the tariffs, India remains **more competitive** than many Southeast Asian exporters, who face tariffs ranging from **36% to 49%**.
- The tariffs may **accelerate India's push for self-reliance**, vertical integration, and global leadership in solar manufacturing.
- Domestic demand is strong, helping **absorb excess capacity** and reduce dependence on exports

Solar Industry Growth Drivers

The Indian solar industry's growth is fuelled by a combination of factors, including supportive government policies, declining solar panel costs, favourable weather conditions, and rising energy demand. Government initiatives like the National Solar Mission and Solar Park Scheme, coupled with competitive tariffs, are key drivers. Additionally, technological advancements, increased flexibility of solar systems, and growing private investment further contribute to the sector's expansion.

Key Drivers of India's Solar Industry Growth:

- **Supportive Government Policies:**

The Indian government has implemented various policies and schemes to promote solar energy, including the National Solar Mission, Solar Park Scheme, and the PLI (Production Linked Incentive) scheme for solar PV modules. These initiatives provide financial incentives, subsidies, and regulatory support to encourage solar energy adoption.

- **Declining Solar Panel Costs:**

The cost of solar photovoltaic (PV) panels has significantly decreased due to advancements in manufacturing technologies and economies of scale, making solar energy more affordable and competitive with traditional power sources.

- **Favourable Weather Conditions:**

India's abundant solar irradiance throughout the year provides a significant advantage for solar energy production.

- **Rising Energy Demand:**

India's growing population and expanding economy are driving up energy demand, creating a need for alternative energy sources like solar power.

- **Increased Flexibility of Solar Systems:**

Solar systems are becoming more flexible and adaptable for various applications, including residential, commercial, and utility-scale projects.

- **Government Initiatives:**

Initiatives like the PM-KUSUM scheme and the National Green Hydrogen Mission are further accelerating the transition to renewable energy and creating job opportunities.

- **Technological Advancements:**

Continuous innovation in solar technologies, including the development of more efficient and durable solar panels, is making solar power more reliable and cost-effective.

- **Private Investment:**

Increasing private investment in the solar sector is driving the expansion of solar power projects and creating a competitive market.

- **Rural Electrification and Green Energy Corridors:**

Government efforts to electrify rural areas and develop green energy corridors are promoting the use of solar energy in underserved regions.

- **Global Climate Goals:**

India's commitment to reducing carbon emissions and increasing its reliance on renewable energy is aligning with global climate objectives and driving the growth of the solar industry.

Market research reports present a wide range of projections for the Indian solar industry's market size over the next decade. One highly optimistic forecast suggests that the market is likely to

surpass USD 1254 Billion by 2033, registering a remarkable CAGR of 41.5% from 2024. Another report anticipates the market reaching around USD 50.4 Billion by 2031, with a robust CAGR of 21.9% from 2024.

In terms of installed capacity, the Indian government has set an ambitious target of achieving 500 GW of non-fossil fuel capacity by 2030, with a significant portion expected to come from solar energy. Specifically for solar, the National Solar Mission aims to achieve 280 GW of installed capacity by 2030.

Project Cost

The break-up of the project cost of INR 455.85 Crores for the proposed project has been provided below:

Particulars	INR Crores	Proportion
Land Cost	-	*0.00%*
Building & Civil Works	89.20	*19.57%*
Plant & Machinery incl. Utilities	248.95	*54.61%*
Electrification & Miscelleanous Fixed Asset	63.21	*13.87%*
Contingency	12.04	*2.64%*
Hard Cost	**413.40**	***90.69%***
Preliminary & Preoperative Expenses	25.25	*5.54%*
Interest during construction	17.20	*3.77%*
Soft Cost	**42.45**	***9.31%***
Total Project Cost	**455.85**	***100.00%***

Details of the sub-head of the project cost are discussed in the sub-sections below

Land Cost

OSEPL has entered into a registered lease agreement with Radhika Gupta for acquiring **114 Kanal 7 Marla (approximately 14.29 acres)** of land located at **Khewat No. 55, Rect. No. 63 Killa Nos. 12, 13, 18, 19, 20, 21, 22 & 23; Rect. No. 64 Killa Nos. 16, 17, 22, 23, 24, 25 & 21 Min North; and Rect. No. 65 Killa No. 25/1 Min North**, situated near Sawariya Overseas, Karnal-Munak Road, Village Munak, Sub-Tehsil Ballah, District Karnal, Haryana, for establishment of the proposed solar cell manufacturing facility. The lease has been executed for a period of **99 years** commencing from **06 October 2026** at an annual lease rental of **INR 97.24 lakh**.

Building & Civil Works

The cost of factory building and civil works is estimated at INR 89.20 crores as per the estimate submitted by the Company. The civil estimate as provided by the Company is tabulated below:

Particular	Area required (SQM)	Rate/sqm Rs	Amount excl GST in INR
CIVIL			
1.2 GW Cell Line	12988.654	8500	110403555.60
Locker and change Room	191.250	6500	1243125.00
RM Store	408.000	6500	2652000.00
Male/Female Wash Room	212.500	6500	1381250.00
Gas and Chemical Distribution	935.000	6500	6077500.00
Gas and Chemical Distribution	680.000	6500	4420000.00
Utility-Cell	1707.518	7000	11952622.50
Office Block G+1	1572.000	23681	37226532.00

Commercial Block G+1	1440.000	23681	34100640.00
Kitchen Area	400.000	23681	9472400.00
Dinning Area	600.000	23681	14208600.00
Security Room	24.000	40903	981672.00
Parking	1140.000	2000	2280000.00
Underground Tanks	410.000	18000	22140000.00
Pump Room	140.000	18000	8820000.00
Meter Room	20.000	26910	538200.00
HT/LT Room	282.750	23681	6695802.75
Transformer and DG Yard	540.000	6000	3240000.00
ETP+STP+ZLD+Wastewater-Underground Tanks	742.170	18000	53436240.00
ETP+STP+ZLD+ Wastewater-Shed Above	1764.000	7000	12348000.00
N2, O2 Open Yard	1182.440	6000	7094640.00
NH3-PH3- Shed	1736.350	5500	9549925.00
Roads With Walkways/pathways	3256.000	3800	12372800.00
	1920.000	3800	7296000.00
	640.000	3800	2432000.00
	640.000	3800	2432000.00
	1408.000	3800	5350400.00
	480.000	3800	1824000.00
	835.000	3800	3173000.00
	125.000	3800	475000.00
	125.000	3800	475000.00
Soil Filling Phase-1	48100.000	700	23569000.00
Green Area Phase-1	7215.000	550	3968250.00
PEB			
1.2 GW Cell Line	17067.938	12,055.68	205765592.76
Locker and change Room	191.250	9,493.85	1815698.81
RM Store	408.000	9,493.85	3873490.80
Male/Female Washroom	212.500	9,493.85	2017443.13
Gas and Chemical Distribution	935.000	9,493.85	8876749.75
Gas and Chemical Distribution	680.000	9,493.85	6455818.00
Utility-Cell	1707.518	11,000.81	18784075.59
ETP+STP+ZLD+Wastewater-Shed Above	2488.200	6,781.32	16873280.42
NH3-PH3- Shed	1736.350	6,027.84	10466439.98
RWH	17	10,00,000	17000000.00
PHE	30367	1,000.00	30367000.00

Machine Foundations	1	1,00,00,000.00	10000000.00
TOTAL in INR			**755925744.09**
GST in INR			136066633.9
Total Cost incl. GST in INR			891992378.03
Total Cost incl. GST in INR Crs			89.20

Source: OSEPL

The estimated Factory Building & Civil Works cost for the proposed built-up area of **30367 sq. meters** translates to **INR 2729 per sq. ft.**, which is slightly higher than the prevailing market rates.

Plant and Machinery including Utilities

The Company has proposed P&M cost of INR 248.95 Cr (1.2 GW Cell line) for the proposed project. The details of the same is discussed hereunder:

Sr No	Name of the Machinery	Supplier	Remark	Quantity	Rate / Unit	Currency Rate	Basic Amount	IGST	Amount (INR)
1	Production equipment	Cliantech Solutions	Import	1	$70,00,000.00	96	67,20,00,000	18%	₹ 79,29,60,000.00
2	ALD (New Equipment)	Cliantech Solutions	Import	1	$15,00,000.00	96	14,40,00,000	18%	₹ 16,99,20,000.00
3	AGV System	Cliantech Solutions	Import	1	$3,20,000.00	96	3,07,20,000	18%	₹ 3,62,49,600.00
4	Work fixtures (210R)	Cliantech Solutions	Import	1	$6,00,000.00	96	5,76,00,000	18%	₹ 6,79,68,000.00
5	Offline Equipment	Cliantech Solutions	Import	1	$4,40,000.00	96	4,22,40,000	18%	₹ 4,98,43,200.00
6	Testing and detection equipment	Cliantech Solutions	Import	1	$4,58,000.00	96	4,39,68,000	18%	₹ 5,18,82,240.00
7	Design of Drawing and Schema	Cliantech Solutions	Import	1	$2,40,000.00	96	2,30,40,000	18%	₹ 2,71,87,200.00
8	Utility Machinery (Equipment)	Cliantech Solutions	Import	1	$74,24,480.00	96	71,27,50,080	18%	₹ 84,10,45,094.40
9	Electromechanical Works - Primary Distribution Main &	Cliantech Solutions	Import	1	$22,79,170.00	96	21,88,00,320	18%	₹ 25,81,84,377.60
10	Electromechanical Works - Secondary Distribution Main & Auxiliary Materials	Cliantech Solutions	Import	1	$5,49,500.00	96	5,27,52,000	18%	₹ 6,22,47,360.00
11	Electromechanical Works - Primary Distribution Labor (Labor + Equipment)	Cliantech Solutions	Import	1	$31,22,150.00	96	29,97,26,400	18%	₹ 35,36,77,152.00
12	Electromechanical Works - Secondary Distribution Labor	Cliantech Solutions	Import	1	$2,00,000.00	96	1,92,00,000	18%	₹ 2,26,56,000.00
13	Utility Engineering (Programming)	Cliantech Solutions	Import	1	$1,25,000.00	96	1,20,00,000	18%	₹ 1,41,60,000.00
14	Packing	Cliantech Solutions	Import	1	$3,00,000.00	96	2,88,00,000	18%	₹ 3,39,84,000.00
15	Freight (FOB SHANGHAI)	Cliantech Solutions	Import	1	$1,50,000.00	96	1,44,00,000	18%	₹ 1,69,92,000.00
16	On-site Support Service (After the installation and commissioning are completed, the service will commence, with 8 people stationed on-site for 1 Year)	Cliantech Solutions	Import	1					
	Discount				-$29,08,300.00	96	-27,91,96,800	18%	-₹ 32,94,52,224.00

17	Freight from FOB China to Factory								₹ 2,00,00,000.00
	Total				$2,18,00,000.00				₹ 2,48,95,04,000.00

Electrification and MFA

The Company has proposed Electrification and MFA cost of INR 63.21 Cr for the proposed project. The details of the same is discussed hereunder:

S. No	Name of the Machinery	Name of Supplier	Basic Amount in INR	GST	GST in INR	Amount (INR)
1	33kV Switchboard & Cable	Simartech Projects and Services Ltd.	15391675	18%	2770501.5	18162176.50
2	Transformer 33/0.4 kV		44988820	18%	8097987.6	53086807.60
3	Busduct		14335000	18%	2580300	16915300.00
4	451 V LV Panel		73750000	18%	13275000	87025000.00
5	Cable Tray		18645850	18%	3356253	22002103.00
6	Cables & Termination		66764610	18%	12017629.8	78782239.80
7	Earthing		8845000	18%	1592100	10437100.00
8	Lighting		11381470	18%	2048664.6	13430134.60
9	Electrical Safety & Miscellaneous Items		1381000	18%	248580	1629580.00
10	DG Set		152301060	18%	27414190.8	179715250.80
11	Fire Hydrant/ Fire Fighting		30713000	18%	5528340	36241340.00
12	Data & Voice		1549000	18%	278820	1827820.00
13	CCTV		2060000	18%	370800	2430800.00
14	UPS system		93600000	18%	16848000	110448000.00
	Total		**535706485.00**		**45987016.50**	**632,133,652**

Contingency

The Company has already acquired the land for setting up the proposed project. The total building and civil construction works cost is estimated at INR 89.20 crores as per the estimate of M/s ECR Buildtech Pvt. Ltd. submitted by the Company. Further, the Company has estimated a cost of INR 248.95 crores for the plant and machinery including utilities for the proposed project. Considering the current status of the project and discussions with key management personnel of the Company, a contingency of 3.00% on the project hard cost has been factored in to address potential cost escalations due to unforeseen circumstances.

The Contingency amount is worked out at INR 12.04 crores in the project cost.

Preliminary & Pre-operative Expenses

The preliminary and pre-operative expenses of the project have been estimated at INR 25.25 crores which includes following items.

(INR Crores)

Sr. No	Particulars	Description	Amount (In Crores)
1	Statutory Fee & Licensing	Licenses, approvals, regulatory clearances	100,000,000
2	Pre-Ops	Pre-operative and trial-run expenses	152,500,000
	Total		**252,500,000**

Source: OSEPL

Interest during construction

The Company proposes to raise a total of INR 296.00 Crores as term loan from bank towards debt financing for the project. The disbursement of term loan is expected to start from December 2026; accordingly, the IDC has been worked out to INR 17.20 crores, considering rate of interest of 8.25% on the term loan.

Project Cost Rationale

Factory Building and Civil Works

The cost of factory building and civil works is estimated at INR 89.20 crores as per the estimate of M/s ECR Buildtech Pvt. Ltd. submitted by the Company.

The estimated Factory Building & Civil Works cost for the proposed built-up area of **30367 sq. meters** translates to **INR 2729 per sq. ft.**, which is slightly higher than the prevailing market rates.

The proposed civil cost of INR 73.64 Cr per GW seems to be slightly on the higher side compared to industry benchmark range of INR 55 Cr to 70 Cr per GW subject to project-specific factors such as terrain characteristics, soil profile, foundation requirements, structural design specifications and the proposed built-up area.

P&M incl. Utilities and MFA

As per D&B-India's assessment of similar projects in the past, the proposed P&M and Utilities cost incl. MFA for the proposed project seems to be on the lower side as the per GW cost of P&M including Utilities, Electrification and MFA for the proposed project comes to around INR 257.71 crores against the industry average of INR 425.00 crores to INR 500.00 crores.

Overall Hard Cost

The estimated project hard cost (Building, Plant and Machinery & Utilities incl. Electrification and MFA cost excl. land) of INR 401.36 Cr (i.e., INR 331.35 Cr per GW) seems to be lower compared to industry benchmark range of INR 500 Cr to 550 Cr per GW.

As informed by the Company, the same is mainly on account of procurement pre-owned/used Plant and machinery.

Means of Finance

The project is proposed to be funded through proceeds from the Initial Public Offering (IPO) and Term Loan from Bank.

The proposed means of finance is detailed in the table given below:

Particulars	Amount (INR Crores)
Equity from IPO proceeds	159.85
Term Loan	296.00
Total Funds Required	**455.85**

Promoter Contribution

The promoters' contribution will be in the form of Share Capital (Equity from IPO proceeds) of INR 159.85 crores.

Debt

The Company proposes to avail total Debt of INR 296.00 Crore. The Company proposes to raise the term loan from bank to part finance the Project.

Proposed Term Loan

The disbursement and repayment pattern for Term Loan is as under:

Debt Profile	
Particulars	**Details**
Term Loan	296.00
Proposed start of disbursement	Dec-26
Proposed end of disbursement	Mar-28
COD	01-Apr-28
Repayment Moratorium	24 Months
Repayment Period (Quarters)	6.67
Repayment starts	1/Apr/30
Repayment End	31/Mar/35
Rate of Interest	8.25%
Door to Door Tenure	8 Years 4 months

The repayment schedule of the loan is as under:

(INR Cr)

Particulars	Projected									
	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31	31-Mar-32	31-Mar-33	31-Mar-34	31-Mar-35
Opening	-	-	118.40	296.00	296.00	246.67	197.33	148.00	98.67	49.33

Disbursal	-	118.40	177.60	-	-	-	-	-	-	-
Repayment	-	-	-	-	49.33	49.33	49.33	49.33	49.33	49.33
Closing	-	118.40	296.00	296.00	246.67	197.33	148.00	98.67	49.33	0.00
Total Interest	-	1.93	15.26	24.42	22.72	18.65	14.58	10.51	6.44	2.37
Interest Capitalized (IDCP)	-	1.93	15.26	-	-	-	-	-	-	-
Interest Charged to P&L	-	-	-	24.42	22.72	18.65	14.58	10.51	6.44	2.37
Repayment proportion	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*16.67%*	*16.67%*	*16.67%*	*16.67%*	*16.67%*	*16.67%*

Economic Viability

The Standalone assessment of the proposed 1.2 GW Solar Cell plant is discussed hereunder:

Capacity and Production

The commercial production of the proposed Cell Manufacturing Line would commence **from 1st April 2028**.

The detailed production calculation and projected capacity utilization is given in the table below:

Particulars	Units	31/Mar/29	31/Mar/30	31/Mar/31	31/Mar/32	31/Mar/33	31/Mar/34	31/Mar/35
Total Installed Capacity								
Total Capacity Per Annum (Cell)	Nos	120,975,400	120,975,400	120,975,400	120,975,400	120,975,400	120,975,400	120,975,400
Annual Installed Capacity in MW	MW	998	998	998	998	998	998	998
No. of Months of Operation	Nos	12	12	12	12	12	12	12
Capacity Utilisation	%	81%	84%	89%	90%	90%	90%	90%
Total Cell Production Per Annum	**Nos**	**97,388,914**	**101,690,951**	**108,170,460**	**108,894,407**	**108,877,473**	**108,877,869**	**108,877,860**

Source: OSEPL and D&B-India Estimates

The Capacity Utilization of Cell plant has been arrived basis the utilization of the 1.0 GW and 0.60 GW PV module manufacturing plant.

Revenues

The projected revenue of the project is mentioned below:

Particulars	Units	31/Mar/29	31/Mar/30	31/Mar/31	31/Mar/32	31/Mar/33	31/Mar/34	31/Mar/35
Total Installed Capacity								
Total Capacity Per Annum (Cell)	Nos	120,975,400	120,975,400	120,975,400	120,975,400	120,975,400	120,975,400	120,975,400
Annual Installed Capacity in MW	MW	998	998	998	998	998	998	998
No. of Months of Operation	Nos	12	12	12	12	12	12	12
Capacity Utilisation	%	81%	84%	89%	90%	90%	90%	90%
Total Cell Production Per Annum	**Nos**	**97,388,914**	**101,690,951**	**108,170,460**	**108,894,407**	**108,877,473**	**108,877,869**	**108,877,860**
Add: Opening Stock of WIP	Nos	-	834,762	871,637	927,175	933,381	933,235	933,239
Less: Closing Stock of WIP	Nos	834,762	871,637	927,175	933,381	933,235	933,239	933,239
Sub - Total	**Nos**	**96,554,152**	**101,654,077**	**108,114,921**	**108,888,202**	**108,877,618**	**108,877,866**	**108,877,860**
Add: Opening Stock of Finished Goods	Nos	-	1,391,270	1,452,728	1,545,292	1,555,634	1,555,392	1,555,398
Less: Closing Stock of Finished Goods	Nos	1,391,270	1,452,728	1,545,292	1,555,634	1,555,392	1,555,398	1,555,398
Total Saleable Qty of Cell Per Annum	**Nos**	**95,162,882**	**101,592,619**	**108,022,357**	**108,877,860**	**108,877,860**	**108,877,860**	**108,877,860**
Transfer to Module Division	**Nos**	**95,162,882**	**101,592,619**	**108,022,357**	**108,877,860**	**108,877,860**	**108,877,860**	**108,877,860**
		100%	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Net Saleable Qty of Cell Per Annum in Open Market	**Nos**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Sales Price Per Cell	**INR**	**78.38**	**78.38**	**78.38**	**78.38**	**78.38**	**78.38**	**78.38**
Domestic Sales (Open Market)	100%	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Domestic Sales	0%	745.84	796.23	846.63	853.33	853.33	853.33	853.33
Total Revenue	**INR in Crores**	**745.84**	**796.23**	**846.63**	**853.33**	**853.33**	**853.33**	**853.33**

Source: OSEPL and D&B-India Estimates

The selling price of 8.25 Wp Solar Cell (N-Type TOPCon) to be manufactured is considered at INR 9.50 per Wp for the projection purpose which is reasonable basis the information received from the Company and D&B India's secondary research.

The Solar cells manufactured by the Company will be consumed captively however, for the purpose of standalone assessment the same is assumed to be sold in the open market at a price of INR 9.50/Wp.

Operating Costs

Raw material cost

Basic raw material required for manufacturing of Solar cells is Wafers. The Company intends to procure wafers from the international market at competitive prices at high volumes.

Following is the typical cell costing for the 8.25 Wp cells to be manufactured:

Sl No	Material	Consumption Qty./Cell	UOM	Yield %	Total Consumption/ Cell	Cost/ UoM (INR/USD)	USD	Total Cost/ Cell (INR)	Freight (%)	Clearing	Total Landed Cost/ Cell (INR)

1	Wafer	1	Nos	96%	1.041667	0.16	96	15.75	2.50%	0.50%	16.22
3	HF	0.0070000	Kg	96%	0.007292	218.00	1	1.59			1.59
4	HCl	0.0030000	Kg	96%	0.003125	76.00	1	0.24			0.24
5	KOH/NaOH	0.0000000	Kg	96%	0.000000	149.8	1	0.00			0.00
6	H2O2	0.0080000	Kg	96%	0.008333	51.47	1	0.43			0.43
7	BCl3	0.0000800	Kg	96%	0.000083	7500.00	1	0.63			0.63
8	N2	0.0600000	Mtr3	96%	0.062500	9	1	0.56			0.56
9	O2	0.0004000	Kg	96%	0.000417	600	1	0.25			0.25
10	SiH4	0.0002000	Kg	96%	0.000208	4500	1	0.94			0.94
11	NH3	0.0004500	Kg	96%	0.000469	750	1	0.35			0.35
12	N2O	0.0005500	Kg	96%	0.000573	650	1	0.37			0.37
13	TMA	0.0000040	Kg	96%	0.000004	16000	1	0.07			0.07
14	5% PH3+H2 mix	0.0000300	Kg	96%	0.000031	29000	1	0.91			0.91
15	H2	0.0000025	Mtr3	96%	0.000003	220	1	0.00			0.00
16	Ar	0.0003000	Kg	96%	0.000313	250	1	0.08			0.08
17	Rear Ag Paste Finger (TOPCOn)	0.0000550	Kg	99%	0.000056	200000	1	11.11			11.11
18	Rear Ag Paste Busbar (TOPCOn)	0.0000150	Kg	99%	0.000015	180000	1	2.73			2.73
19	Front Ag - Paste Finger (TOPCOn)	0.0000550	Kg	99%	0.000056	200000	1	11.11			11.11
20	Front Ag - Paste Busbar (TOPCOn)	0.0000150	Kg	99%	0.000015	180000	1	2.73			2.73
21	Front Ag - Screen -Finger	0.0000050	Nos	99%	0.000005	60000	1	0.30			0.30
22	Front Ag - Screen -Busbar	0.0000033	Nos	99%	0.000003	15000	1	0.05			0.05
23	Rear Ag -Screen - Finger	0.0000050	Nos	99%	0.000005	20000	1	0.10			0.10
24	Rear Ag -Screen - Busbar	0.0000033	Nos	99%	0.000003	15000	1	0.05			0.05
25	Altex Additive-MQT809A	0.0006137	Kg	96%	0.000639	548	1	0.35			0.35
26	Alkaline Polish Additive	0.0004500	Kg	96%	0.000469	490	1	0.23			0.23

27	Cleaning Agent Altex-SPR361	0.0001690	Kg	96%	0.000176	382	1	0.07			0.07
28	Cleaning Agent Altex-ECL101	0.0002490	Kg	96%	0.000259	333	1	0.09			0.09
29	RCA Additive	0.0006250	Kg	96%	0.000651	550	1	0.36			0.36
30											
											51.90
	Packing Cost										
31	Packing Box	0.0080400	Nos	99%	0.008121	8	1	0.064969697	0.00%	0.00%	0.06
32	Carton Box	0.0005700	Nos	99%	0.000576	85	1	0.04893939	0.00%	0.00%	0.05
33	Pallet	0.0000200	Nos	99%	0.000020	1660	1	0.033535354	0.00%	0.00%	0.03
	Total										**0.15**

The above BOM cost is inclusive of Sea Freight, Insurance and custom duties applicable to imported items.

Raw Material Costs		31/Mar/29	31/Mar/30	31/Mar/31	31/Mar/32	31/Mar/33	31/Mar/34	31/Mar/35
Total Cell Production Per Annum	Nos	97,388,914	101,690,951	108,170,460	108,894,407	108,877,473	108,877,869	108,877,860
Raw Material Cost per Cell	INR	51.90	51.90	51.90	51.90	51.90	51.90	51.90
Total Raw Material Consumed Per Annum	**INR in Crores**	**505.47**	**527.80**	**561.43**	**565.19**	**565.10**	**565.10**	**565.10**

Source: OSEPL and D&B-India Estimates

Other Manufacturing Expenses

The other manufacturing expenses for the project have been considered at 1.50% of RM Consumed. This includes cost towards labour, testing & certification, transportation and other manufacturing expenses and the same are reasonable.

Other Manufacturing Expenses	Units	31/Mar/29	31/Mar/30	31/Mar/31	31/Mar/32	31/Mar/33	31/Mar/34	31/Mar/35
Total Raw Material Consumed	INR in Crores	505.47	527.80	561.43	565.19	565.10	565.10	565.10
Other Manufacturing Expenses	% of RM Consumed	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%
Total Other Manufacturing Expenses	**INR in Crores**	**7.58**	**7.92**	**8.42**	**8.48**	**8.48**	**8.48**	**8.48**

Power

The Company will source the power for proposed project from local discom. The per unit power cost is considered on an average INR 9.50. Below table shows the net power requirement along with power cost for the project.

POWER CONSUMPTION	Units	31/Mar/29	31/Mar/30	31/Mar/31	31/Mar/32	31/Mar/33	31/Mar/34	31/Mar/35
Total Proposed Connected Load	**kVA**	**15,000.00**	**15,000.00**	**15,000.00**	**15,000.00**	**15,000.00**	**15,000.00**	**15,000.00**
Billing Demand Load	kVA	9,000.00	9,000.00	9,000.00	9,000.00	9,000.00	9,000.00	9,000.00
Number of Operating Hours	Nos	23.00	23.00	23.00	23.00	23.00	23.00	23.00
No. of Operating Days	Nos	**350.00**	**350.00**	**350.00**	**350.00**	**350.00**	**350.00**	**350.00**
Capacity Utilisation	Percentage	81%	84%	89%	90%	90%	90%	90%
Total Units Consumed	Units	58,324,476	60,900,889	64,781,351	65,214,910	65,204,768	65,205,005	65,205,000
Power Cost per unit for units consumed from GRID	INR	9.50	9.50	9.50	9.50	9.50	9.50	9.50
Total Power Costs	**INR Crores**	**55.41**	**57.86**	**61.54**	**61.95**	**61.94**	**61.94**	**61.94**

Source: OSEPL & D&B-India Estimate

Manpower Cost

The total manpower required for operating the proposed 1.2 GW solar cell plant is 495 employees. The proposed salaries have been provided in the exhibit below –

Manpower Details

Cell Plant			
Function	**Total Manpower Required**	**Salary (Avg/PA) Per position**	**Total Proposed Budget INR**
Production			
HOD- Production	1	18,00,000	18,00,000
Shift Incharge	2	7,20,000	14,40,000

Engineer/ Sr. Engineer	14	4,80,000	67,20,000
Sr. Technician	90	4,00,000	3,60,00,000
Technician	90	3,00,000	2,70,00,000
Helper	9	2,40,000	21,60,000
Total	**206**	**39,40,000**	**7,51,20,000**
Maintenance			
HOD- Maintenance	1	18,00,000	18,00,000
Shift Incharge	2	7,20,000	14,40,000
Engineer/ Sr. Engineer	5	4,80,000	24,00,000
Sr. Technician	24	4,00,000	96,00,000
Total	**32**	**34,00,000**	**1,52,40,000**
Process			
HOD	1	18,00,000	18,00,000
Shift Incharge	2	7,20,000	14,40,000
Engineer/ Sr. Engineer	5	4,80,000	24,00,000
Sr. Technician	16	4,00,000	64,00,000
Total	**24**	**34,00,000**	**1,20,40,000**
Quality			
HOD- Quality	1	20,00,000	20,00,000
Shift Incharge	2	9,00,000	18,00,000
Shift Engineer	3	480000	14,40,000
OQA Engineer	3	480000	14,40,000
IPQC Engineer	3	480000	14,40,000
IQC Engineer	3	480000	14,40,000
ITI Technician	16	300000	48,00,000
Total	**31**	**51,20,000**	**1,43,60,000**

Restricted Confidential

Utility			
HOD- Utility	1	18,00,000	18,00,000
Shift Incharge	2	7,20,000	14,40,000
Shift Engineer	3	4,80,000	14,40,000
Technician	13	4,00,000	52,00,000
Welder	2	3,00,000	6,00,000
Total	**21**	**37,00,000**	**1,04,80,000**
Facility			
HOD- Facility	1	18,00,000	18,00,000
Shift Incharge	2	7,20,000	14,40,000
Shift Engineer	5	4,80,000	24,00,000
Sr Technician/ Technician	24	4,00,000	96,00,000
Helper	9	2,40,000	21,60,000
Welder	2	3,00,000	6,00,000
Total	**43**	**39,40,000**	**1,80,00,000**
Safety	**5**	**600000**	**30,00,000**
Commercial	**20**	**720000**	**1,44,00,000**
HR	**6**	**480000**	**28,80,000**
Admin	**12**	**360000**	**43,20,000**
Contract employees	**95**	**240000**	**2,28,00,000**
Total	**495**		**19,26,40,000**

Source: OSEPL& D&B India Estimates

An escalation of 5% has been provided every year on the manpower cost.

Repairs and Maintenance Costs

The repairs and maintenance costs for the project have been considered at 1.00% of gross fixed assets per annum and an escalation of 5% per annum has been provided in repairs and maintenance costs which seems reasonable.

Lease Rent

The lease rent for acquiring the land on long term lease is considered at INR 1.02 Crs incl. duties and taxes with an escalation of 5% yoy basis.

Total SG&A Expenses		31/Mar/29	31/Mar/30	31/Mar/31	31/Mar/32	31/Mar/33	31/Mar/34	31/Mar/35
Lease Rental per Sq Mtr per Annum	INR	1.02	1.07	1.12	1.18	1.24	1.30	1.37
No. of Months of Operations	Nos	12	12	12	12	12	12	12
Total Lease Rental Per Annum	**INR in Crores**	**1.02**	**1.07**	**1.12**	**1.18**	**1.24**	**1.30**	**1.37**

Selling, General and Admin Expenses

Various expenses under selling, general and admin expenses for the project is considered as a % of sales which is reasonable & mentioned below:

Particulars	Proposed	
Marketing & Sales Expenses	1.50%	% of Sales
Corporate Admin Expenses	0.50%	% of Sales

Total SG&A Expenses		31/Mar/29	31/Mar/30	31/Mar/31	31/Mar/32	31/Mar/33	31/Mar/34	31/Mar/35
Marketing & Sales Expenses	INR in Crores	11.19	11.94	12.70	12.80	12.80	12.80	12.80
Corporate Admin Expenses	INR in Crores	3.73	3.98	4.23	4.27	4.27	4.27	4.27
Total SG&A Costs	**INR Crores**	**14.92**	**15.92**	**16.93**	**17.07**	**17.07**	**17.07**	**17.07**

Working Capital

The working capital requirement for the project have been estimated based the inputs received from the Company. The margin money requirement is estimated as net current assets less proposed bank finance, which has been estimated considering 75% of paid stock and 75% of debtors. The inventory holding norms considered for the project have been provided below –

Particulars	Holding Period (Days) for Captive Consumption	Holding Period (Days) for open market sale
Raw Material & Consumables	60.00	*60.00*
Finished Goods	5.00	*20.00*
Work in Progress	3.00	*3.00*
Debtors	-	30.00
Creditors for Expenses	30.00	30.00
Creditors for Raw Materials	30.00	60.00

The estimated working capital requirement is mentioned in the table below:

Particulars	Norms	Projected						
		31/Mar/29	31/Mar/30	31/Mar/31	31/Mar/32	31/Mar/33	31/Mar/34	31/Mar/35
Current Assets								
Raw Material & Consumables		84.25	86.76	92.29	92.91	92.89	92.89	92.89
Finished Goods		32.71	33.97	36.11	36.43	36.50	36.58	36.66
Work in Progress		4.95	5.10	5.42	5.46	5.47	5.49	5.50
Debtors		62.15	68.25	72.57	73.14	73.14	73.14	73.14
Other CA								
Total Current Assets		**184.05**	**194.08**	**206.38**	**207.94**	**208.01**	**208.10**	**208.20**
Current Liabilities								
Creditors for Expenses		7.85	8.12	8.61	8.76	8.87	8.99	9.12

RM Creditors		84.25	86.76	92.29	92.91	92.89	92.89	92.89
Total Current Liabilities		**92.09**	**94.88**	**100.90**	**101.67**	**101.77**	**101.89**	**102.01**
Working Capital		**91.96**	**99.19**	**105.48**	**106.27**	**106.24**	**106.21**	**106.18**
Margin	*25.00%*	22.99	24.80	26.37	26.57	26.56	26.55	26.55
Bank Borrowing Required		68.97	74.40	79.11	79.70	79.68	79.66	79.64
Bank Borrowing Eligible		*74.86*	*80.49*	*85.57*	*86.27*	*86.34*	*86.40*	*86.48*
Bank Borrowing Proposed	**-**	**75.00**	**75.00**	**75.00**	**75.00**	**75.00**	**75.00**	**75.00**
Actual Margin Money		**16.96**	**24.19**	**30.48**	**31.27**	**31.24**	**31.21**	**31.18**

Depreciation

The following depreciation rate has been assumed while preparing the depreciation schedule detailed below:

Description	SLM Method (Company's Act)	WDV Method (IT Act)
Land Cost	*0.00%*	*0.00%*
Building & Civil Works	*3.17%*	*10.00%*
Plant & Machinery incl. Utilities	*9.50%*	*15.00%*
Electrification & Miscellaneous Fixed Asset	*9.50%*	*10.00%*

The useful life of P&M and Utilities is considered at 10 years as per Chartered Engineer certificate submitted by the Company. The useful life of Building and Civil works and Electrification & Miscellaneous Fixed Asset is considered at 30 years and 10 years respectively.

Income Tax

Following assumption has been considered while estimating the income tax for the project –

Income Tax	
Particulars	**Rate**
Base Rate	15.00%
Surcharge	10.00%
Education cess	4.00%
Total	**17.16%**

Projected Financial Highlights (Standalone 1.2 GW Cell Plant)

The financial highlights of the proposed project are mentioned in the table below;

Particulars	Projected						
	31/Mar/29	31/Mar/30	31/Mar/31	31/Mar/32	31/Mar/33	31/Mar/34	31/Mar/35
Net Sales	745.84	796.23	846.63	853.33	853.33	853.33	853.33
% Growth	*NA*	*6.76%*	*6.33%*	*0.79%*	*0.00%*	*0.00%*	*0.00%*
EBITDA	173.87	160.56	171.77	170.64	169.02	167.52	165.94
EBITDA Margin	*23.31%*	*20.17%*	*20.29%*	*20.00%*	*19.81%*	*19.63%*	*19.45%*
PBT	106.37	94.76	110.04	112.98	115.43	118.00	120.49
Net Profit	92.04	81.03	92.49	93.90	95.04	96.40	97.80
Net Profit Margin	*12.34%*	*10.18%*	*10.92%*	*11.00%*	*11.14%*	*11.30%*	*11.46%*
Cash Accrual	128.93	117.92	129.38	130.79	131.93	133.29	134.69
Share Capital/Share premium/Internal Accruals	159.85	159.85	159.85	159.85	159.85	159.85	159.85
USL	-	-	-	-	-	-	-
Reserves and Surplus	92.04	173.06	265.56	359.46	454.50	550.90	648.70
Total Net Worth (TNW)	251.89	332.91	425.41	519.31	614.35	710.75	808.55
Term Loan	296.00	246.67	197.33	148.00	98.67	49.33	0.00
Debt-Equity Ratio	1.18	0.74	0.46	0.28	0.16	0.07	0.00
Total Outside Liabilities (TOL)	463.09	416.55	373.23	324.67	275.43	226.22	177.01
TOL/ TNW	1.84	1.25	0.88	0.63	0.45	0.32	0.22
Cash / Bank Balance	111.96	173.32	247.08	327.74	410.37	494.36	579.75
Current Ratio	1.37	1.68	2.01	2.37	2.73	3.11	4.45
Interest Coverage Ratio	5.68	5.55	6.91	8.22	10.12	13.26	19.38
DSCR	6.28	1.95	2.18	2.27	2.38	2.51	2.65

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Minimum DSCR	1.95						
Average DSCR	2.54						
IRR	*26.65%*						
COC	*10.08%*						
Contribution	183.62	171.37	183.64	182.70	181.14	179.70	178.18
Contribution Margin	*24.62%*	*21.52%*	*21.69%*	*21.41%*	*21.23%*	*21.06%*	*20.88%*
BEP in Sales	313.77	355.95	339.31	325.64	309.55	293.00	276.32
BEP in % Installed Capacity	*42.07%*	*44.70%*	*40.08%*	*38.16%*	*36.28%*	*34.34%*	*32.38%*
Cash BEP in Sales	163.93	184.55	169.25	153.34	135.77	117.83	99.65
Cash BEP in % Installed Capacity	*21.98%*	*23.18%*	*19.99%*	*17.97%*	*15.91%*	*13.81%*	*11.68%*
Margin of Safety in Sales	432.07	440.28	507.31	527.69	543.78	560.33	577.01
Margin of Safety in Installed Capacity	*57.93%*	*55.30%*	*59.92%*	*61.84%*	*63.72%*	*65.66%*	*67.62%*

Financial Analysis

Margins

As per D&B India's assessment, the average EBIDTA margin for the project is ~20.33%. The margins are reasonable. It is important to note that the aforementioned EBITDA margins are considering the standalone solar cell manufacturing unit with reasonable scale and size of operations considering the solar cells will be sold in the open market.

The average net margin for the project is ~ 11.18% which is reasonable considering nature of the industry.

Debt Equity Ratio

The estimated cost of the project is INR 455.85 crores which is proposed to be funded by term loan of INR 296.00 crores and promoters' contribution in the form of Equity from IPO proceeds of total INR 159.85. The debt equity ratio is worked out to 1.85:1.

Debt Service Coverage Ratio

As per D&B-India's assessment, the average debt service coverage ratio of the Proposed project is depicted in the following exhibit:

Particulars	Projected						
	31/Mar/29	31/Mar/30	31/Mar/31	31/Mar/32	31/Mar/33	31/Mar/34	31/Mar/35
PAT	92.04	81.03	92.49	93.90	95.04	96.40	97.80
Add: Depreciation	36.89	36.89	36.89	36.89	36.89	36.89	36.89
Add: Interest on Term Loan	24.42	22.72	18.65	14.58	10.51	6.44	2.37
Total Accruals (A)	**153.35**	**140.64**	**148.04**	**145.37**	**142.44**	**139.74**	**137.07**
Interest on Term Loan	24.42	22.72	18.65	14.58	10.51	6.44	2.37
Repayment of Term Loan	-	49.33	49.33	49.33	49.33	49.33	49.33

Total Obligation (B)	**24.42**	**72.06**	**67.99**	**63.92**	**59.85**	**55.78**	**51.71**
DSCR (A/B)	**6.28**	**1.95**	**2.18**	**2.27**	**2.38**	**2.51**	**2.65**
Minimum DSCR	**1.95**						
Average DSCR (overall period)	**2.54**						

The minimum debt service coverage ratio of the proposed solar cell project is 1.95, and the average debt service coverage ratio of the Project is 2.54 which is comfortable.

Internal Rate of Return

As per D&B India's assessment, the IRR of the proposed project is estimated at 26.65% as mentioned below is reasonable.

(INR Crore)

Particulars	Projected								
	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31	31-Mar-32	31-Mar-33	31-Mar-34	31-Mar-35
Cash Outflow:									
Capital Employed	-182.34	-273.51				-			
Total Outflow	**-182.34**	**-273.51**	**-**	**-**	**-**	**-**	**-**		**-**
Cash Inflow:									
PAT	-	-	92.04	81.03	92.49	93.90	95.04	96.40	97.80
Finance Cost	-	-	30.61	28.91	24.84	20.77	16.70	12.63	8.56
Depreciation/amortization	-	-	36.89	36.89	36.89	36.89	36.89	36.89	36.89
Total Inflow	**-**	**-**	**159.53**	**146.83**	**154.22**	**151.56**	**148.63**	**145.92**	**143.26**
Terminal Value									228.81
Net Cash Inflow	-182.34	-273.51	159.53	146.83	154.22	151.56	148.63	145.92	372.06
IRR (after Tax)	**26.65%**								

Economic Life

The economic life of the Solar cell manufacturing line has been considered as 10 years for the purpose of financial projections under the project. The proposed term loan repayment tenor has been assumed for 7 years from the Commercial Operation Date (COD). The repayment tenure represents approximately 70% of the estimated economic life of the machinery, which is well within the 85% ceiling prescribed under the applicable Reserve Bank of India (RBI) guidelines.

Weighted Average Cost of Capital

As per D&B-India's assessment, the cost of capital is depicted in the following exhibit:

Loans	Amount (INR Crores)	Cost of Fund	Tax rate	Post tax Cost of Capital %	Proportion	WACC
Share Capital	159.85	*16.00%*	*0.00%*	*16.00%*	*35.07%*	***5.61%***
Unsecured Loans	-	*0.00%*	*0.00%*	*0.00%*	*0.00%*	***0.00%***
Term Loan	296.00	*8.25%*	*16.63%*	*6.88%*	*64.93%*	***4.47%***
Post tax COC	**455.85**				***100.00%***	***10.08%***

Gap between IRR & COC	***16.58%***

Breakeven Analysis

The Standalone breakeven analysis for the **proposed solar cell project** is shown in the exhibit below:

Particulars	Projected						
	31/Mar/29	31/Mar/30	31/Mar/31	31/Mar/32	31/Mar/33	31/Mar/34	31/Mar/35
Sales	**745.84**	**796.23**	**846.63**	**853.33**	**853.33**	**853.33**	**853.33**

Restricted Confidential

Variable Costs							
Raw Material Consumed	505.47	527.80	561.43	565.19	565.10	565.10	565.10
Salaries and Wages Expenses	19.26	20.23	21.24	22.30	23.42	24.59	25.82
Power & Fuel Costs	55.41	57.86	61.54	61.95	61.94	61.94	61.94
Repairs & Mainteance	4.56	4.79	5.03	5.28	5.54	5.82	6.11
Working Capital Interest	6.19	6.19	6.19	6.19	6.19	6.19	6.19
Packing Costs	1.40	1.50	1.59	1.61	1.61	1.61	1.61
Changes in Inventory	-37.66	-1.41	-2.46	-0.36	-0.08	-0.09	-0.10
Other Manufacturing Expenses	7.58	7.92	8.42	8.48	8.48	8.48	8.48
Total Variable Cost	**562.22**	**624.86**	**662.98**	**670.63**	**672.19**	**673.63**	**675.15**
Contribution	**183.62**	**171.37**	**183.64**	**182.70**	**181.14**	**179.70**	**178.18**
Fixed Costs							
SG&A Expenses	14.92	15.92	16.93	17.07	17.07	17.07	17.07
Lease Rent	1.02	1.07	1.12	1.18	1.24	1.30	1.37
Depreciation	36.89	36.89	36.89	36.89	36.89	36.89	36.89
Interest on TL	24.42	22.72	18.65	14.58	10.51	6.44	2.37
Interest on Unsecured Loans	-	-	-	-	-	-	-
LC & BG Charges @ 1%	-	-	-	-	-	-	-
Total Fixed Costs	**77.25**	**76.61**	**73.60**	**69.72**	**65.71**	**61.70**	**57.70**
Profit	**106.37**	**94.76**	**110.04**	**112.98**	**115.43**	**118.00**	**120.49**
Cash Fixed Cost	**40.36**	**39.72**	**36.71**	**32.83**	**28.82**	**24.81**	**20.81**

PV Ratio	***24.62%***	***21.52%***	***21.69%***	***21.41%***	***21.23%***	***21.06%***	***20.88%***
Break even							
Sales	313.77	355.95	339.31	325.64	309.55	293.00	276.32
Capacity	*42.07%*	*44.70%*	*40.08%*	*38.16%*	*36.28%*	*34.34%*	*32.38%*
Cash Break Even							
Sales	163.93	184.55	169.25	153.34	135.77	117.83	99.65
Capacity	*21.98%*	*23.18%*	*19.99%*	*17.97%*	*15.91%*	*13.81%*	*11.68%*
Margin of Safety							
Sales	432.07	440.28	507.31	527.69	543.78	560.33	577.01
Capacity	*57.93%*	*55.30%*	*59.92%*	*61.84%*	*63.72%*	*65.66%*	*67.62%*

Interest Coverage Ratio

As per D&B-India's assessment, the Interest Coverage Ratio is depicted in the following exhibit:

(INR Crore)

Particulars	Projected						
	31/Mar/29	31/Mar/30	31/Mar/31	31/Mar/32	31/Mar/33	31/Mar/34	31/Mar/35
EBIDTA (A)	173.87	160.56	171.77	170.64	169.02	167.52	165.94
Interest (B)	30.61	28.91	24.84	20.77	16.70	12.63	8.56
Interest Coverage Ratio (A/B)	**5.68**	**5.55**	**6.91**	**8.22**	**10.12**	**13.26**	**19.38**

Sensitivity Analysis

The table below depicts the sensitivity analysis for the proposed project on standalone basis:

Particulars		Avg. DSCR	Min DSCR	IRR
Base Case		2.54	1.95	26.65%
Decrease in Sales Price	5.00%	1.95	1.50	19.82%
Decrease in Capacity Utilisation	10.00%	2.25	1.56	22.33%
Increase in Raw Material Price	3.00%	2.14	1.64	22.14%
Increase in Interest Cost	2.00%	2.39	1.81	26.58%

The sensitivity analysis shows that project IRR and DSCR are more sensitive to reduction in sales and increase in raw material prices. D&B India recommends the Company to plan their sales appropriately to avoid erosion in profit.

Risk Analysis & Mitigation

Details of Risk Analysis & their mitigation is given below:

Key Risks	Risk Carrier	Proposed Mitigation of Risk
Experience & Capability	OSEPL	The promoters of the Company possess prior experience in Solar PV module manufacturing. The Company currently operates an existing 600 MW solar module facility, with an additional 1 GW of module line expected to commission post Q3 FY 2027. The utilization levels of the Company have progressively improved, standing at ~40% in FY 2025, ~70% in FY 2026, and >70% in FY 2027 till Aug 2026 as informed by the Company. Between April and August 2026, the Company has already achieved a topline exceeding INR 400 crore. The existing key management team and staff possess expertise in various aspects of Solar PV module manufacturing. However, it is noteworthy that this will be the Company's first venture into solar cell manufacturing. Moreover, the Company already hired experienced professional related to sector to oversee the project operations. D&B notes that the promoters of the Company are considered to have the required experience and understanding of the dynamics of the sector. *However, it should suitably plan to further recruit & retain professionals who can assist in implementation & operations of the project.*
Time Over-run	OSEPL	The Company has already acquired the land admeasuring 14.29 acres for setting up the proposed project on long term lease. Further, the Company has also obtained quotations for the main cell line equipments incl. Utilities, Building & Civil works and Electrification and MFA. OSEPL has estimated an implementation period of **18 months** for the proposed **1.2 GW solar cell manufacturing facility**, with project execution envisaged to commence in **October 2026**. Considering the current stage of project development, the status of project planning, and the activities pending for completion, the proposed **Commercial Operation Date (COD) of 1 April 2028** appears achievable, provided the Company will obtain all necessary / statutory approvals and permissions in time and would procure all critical plant and

Key Risks	Risk Carrier	Proposed Mitigation of Risk
		machineries including delivery of all plant and machineries as indicated in the implementation schedule. **D&B India advises the Company to strictly adhere to the implementation schedule, obtain necessary approvals, funds on time to avoid any time over-run.**
Cost Over-run	OSEPL	Cost overrun could arise on account of three principal factors: a) Escalation in the estimated capital cost b) Unforeseen additional capital cost c) Time over-run. The Company has already acquired the land for setting up the proposed project. The total building and civil construction works cost is estimated at INR 89.20 crores as per the estimate of M/s ECR Buildtech Pvt. Ltd. submitted by the Company. Further, the Company has estimated a cost of INR 248.95 crores for the plant and machinery including utilities for the proposed project. Considering the current status of the project and discussions with key management personnel of the Company, a contingency of 3.00% on the project hard cost has been factored in to address potential cost escalations due to unforeseen circumstances. In case of any overrun above the Project Cost due to any unforeseen circumstances or substantial delay, the lenders may insist on the promoters to meet the cost over-run out of promoters' contribution from the existing net worth of Individual promoters.
Technology Risk	OSEPL	TOPCon Solar cell technology is the state of art cell technology apart from being latest one in the Indian market. As per the machinery proposal submitted by the Company, a significant portion of the core production equipment (mother tools) proposed for the 1.2 GW TOPCon solar cell manufacturing line comprises pre-owned/used machinery. The proposal indicates that most of the key process equipment and automation systems for Texturing, Boron Diffusion, BSG Removal, Alkaline Polishing, PE-Poly, Annealing, PSG

Key Risks	Risk Carrier	Proposed Mitigation of Risk
		Removal, RCA, Front PECVD, Rear PECVD, Printing and associated production processes are of Year of Use: 2023, while the ALD system is proposed to be sourced as new system. The supplier has also separately issued an option to upgrade certain tooling and fixtures from used to brand-new condition at an additional cost. Accordingly, the proposed project implementation is expected to be based substantially on refurbished/used production equipment, the performance and reliability of which would be contingent upon the residual life, operating condition, refurbishment quality, and successful recommissioning of the machinery. ***The Company has submitted an independent Chartered Engineer's Certificate issued by Vinod Kumar Goel dtd. 06th October 2026, certifying the identification, valuation, condition and residual useful life of the proposed pre-owned plant and machinery. The Chartered Engineer has assessed the residual useful life of the key production equipment at not less than 10 years from the proposed COD and has opined that the machinery is suitable for the proposed TOPCon solar cell manufacturing facility.*** ***Further, the draft turnkey supply agreement incorporates performance commitments relating to the proposed 1.2 GW production capacity, cell efficiency, line yield, equipment uptime, warranty obligations, training and post-commissioning technical support. The agreement also provides for liquidated damages at the rate of 0.5% per week of delay, subject to a maximum cap of 10% of the Purchase Order value, along with termination rights in case of prolonged delays. However, D&B India advises the Company to seek confirmation regarding the mechanism for compensation, if any, in the event of non-achievement of guaranteed production capacity, cell efficiency, yield and equipment availability parameters during operational performance testing. As informed by the Company, discussions with the OEM are currently underway, and the Company expects to execute the supply agreement by the end of October 2026.***

Key Risks	Risk Carrier	Proposed Mitigation of Risk
Off take/ Demand Risk	OSEPL	OSEPL proposes to use the cells for captive consumption through their Module Manufacturing Facility of 1600 MW. Hence, the company will have reasonable cell requirement for its own operations. Currently, the company is utilizing almost ~75% of the installed capacity of its existing 600 MW Solar PV module manufacturing line. This is evident from the fact that company has already achieved sales of more than INR 400 Crs during April 26 – Aug 26. Apart from existing production line, company has also received enquiries for the new Solar PV module line currently under installation and expected to be commissioned post Q3 FY 2027. However, the Company has not shared any confirmed order book, executed supply agreements, off-take arrangements, or customer commitments pertaining to the output from the proposed 1.0 GW module manufacturing facility for independent verification by D&B India. As informed, the company will confirm orders with potential customers for new production line post erection and commissioning of new production line. Moreover, its existing sales team are continuously targeting new customers and because of an established brand, the company expects good response from the market. Aggressive push for clean technology for sustainable development adopted by the Government to achieve the twin objective of reduction of carbon footprint as well as to reduce dependency on hydrocarbon-based power generation will continue to augment growth of the renewable energy sector. The Govt. has committed to reduce carbon emissions by 30% to 35% and increase renewables to 40% of the energy mix by 2030. Progressing with bullish approach on renewables, India has raised 500 GW of renewable energy by 2030. Moreover, a significant portion of new power installations will continue to come from renewables led by solar. Of the FY 2030 target, 293 GW of total 500 GW would come from solar power. To achieve the pledged target, around 32 GW of solar energy capacity is needed to be installed every year, till 2030.

Key Risks	Risk Carrier	Proposed Mitigation of Risk
		However, considering projected demand of solar power generation and investment plan in module manufacturing capacity in coming years, domestic market may be oversupplied considering demand supply gap. However, the company has advantage in such kind of adverse scenarios due to – • The Company has proposed TOPCon technology, which is comparatively new and efficient technology and estimated to have a longer tenure compared to poly silicon and PERC. • The Company can explore export market considering location and experience of group in EPC across the globe. ***D&B India notes that there might be significant impact on the project viability if the company is not able to achieve the projected sales.***
Operational Risk	OSEPL	The proposed manufacturing unit enjoys the advantage of being well located, having good linkages with state and national highways thus ensuring an uninterrupted movement of raw materials and finished products. Apart from the above requirements, other considerations such as water availability, good transportation facilities for receipt of goods are also met. Further, the Company must continuously evaluate options to reduce its production cost and achieve the economies of scale. The Company has already recruited experienced & well qualified personnel for implementation and day-to-day operation of plant post COD.
Marketing Risk	OSEPL	The proposed manufacturing unit of the Company is planned to operate at a specific capacity utilization level, in order to achieve the projected production and subsequently the sales value for the respective operational year. Any significant deviation from the planned capacity utilization and sales over the projected year, will affect the overall operations of the plant and subsequently the financials of the Company. The proposed capacity utilization levels are critical to the project so in

Key Risks	Risk Carrier	Proposed Mitigation of Risk
		order to achieve the same, the Company has to make proper marketing arrangements to maintain the regular off-take of finished products and considering stiff competition in the market robust sales and marketing plan would be required. The Company should augment the sales team and develop robust distribution network to capture the market share. The Company can also make its presence felt participating in exhibitions, conferences, social media, direct contact with buyer & contract manufacturing for other brands. Progressing with bullish approach on renewables, India has raised 450 GW of renewable energy by 2030. Moreover, a significant portion of new power installations will continue to come from renewables led by solar. Of the FY 2030 target, 293 GW of total 500 GW would come from solar power. To achieve the pledged target, around 32 GW of solar energy capacity is needed to be installed every year, till 2030. The proposed Project of the Company is expected to benefit from the aforementioned growth in the Solar energy sector in India.
Pricing level and sustainability	OSEPL	The Government of India's move to impose a Basic Customs Duty (BCD) of 20% plus 7.5% AIDC on imported solar PV cells and BCD of 20% plus 20% AIDC on imported solar PV modules, with effect from April 01, 2025, has offered support to domestic Original Equipment Manufacturers (OEMs), who in turn could compete with international players respect to solar (cell & module) tariffs. The development follows the government announcing a production-linked incentive (PLI) scheme that offers manufacturers in 10 sectors, including those of high-efficiency solar modules. The imposition of BCD on imported solar cells and modules is expected to improve the competitiveness of domestic cell/module manufacturers but the extent of benefit would also depend upon the imported PV module prices, especially from China. Presently, India's solar sector, just like in any other country, is reliant on imports of solar equipment.

Key Risks	Risk Carrier	Proposed Mitigation of Risk
		In past the prices of modules fluctuated along with raw material prices considerably. PV solar cell will constitute the major percentage of the total cost of production for the Project. The Company needs to focus on product innovation and higher efficiency products to mitigate the pricing risk to some extent. The finished goods pricing has been projected based on market rates anticipated to prevail after the next 2–3 years. This assumption considers the ongoing aggressive expansion in cell manufacturing capacity, which is expected to lead to price stabilization in the medium term. Further, the downside impact, if any, on the pricing level or capacity utilization of the proposed Project has been captured in terms of Sensitivity Analysis section of this report. The selling price of Solar Cell is considered at INR 9.50 per Wp for the proposed project, which is reasonable basis the D&B India's secondary research. The Company has to maintain adequate pricing to meet the projected revenue. **The price of key raw material i.e. wafers and sale price of solar cell is volatile in nature. The Company should make proper arrangements to minimize the price volatility effect on the profitability of the project.**
Raw Material Availability	OSEPL	For the manufacturing of Solar Cells, wafers are the principal raw material which the company has proposed to import. China is leading supplier of wafers and availability of the same is not challenge in domestic market. No company manufactures solar wafers in India currently. Solar wafers, usually made using silicon, are in great demand all over the world as governments are looking to switch to renewable ways of producing electricity. The cell manufacturing capacity in the country is currently insufficient to meet the demand created by programs mandating DCR. In February 2019, the government introduced the Kisan Urja Suraksha Evam Utthaan Mahabhiyan (KUSUM) program. The program has been divided

Key Risks	Risk Carrier	Proposed Mitigation of Risk
		into three components and aims to add a solar capacity of 25.75 GW by 2022 (which is still on-going to due to slow implementation) and subsequently 34.8 GW by 2026. In March 2019, the second phase of the Central Public Sector Undertaking (CPSU) program was launched to set up 12.00 GW of grid-connected solar power projects for self-use or use by government entities. These programs have a domestic content requirement mandate and are mainly driving the demand for locally manufactured solar cells. Module manufacturers are unable to participate in some tenders due to the shortage of cells that meet the DCR specifications. Accordingly, the Company has planned to setup a facility for manufacturing solar cell. The solar cells will be consumed internally. The Company proposes to procure the material from established and well-known raw material suppliers, however the Company is yet to identify potential raw material suppliers for the proposed project. The Company will have to strategically plan raw material procurement in order to mitigate the price volatility. Moreover, the end product prices generally move in tandem with the raw material price and the industry is able to pass on the price hike, albeit, with a time lag.
Competition Risk	OSEPL	Relative to the globally installed production capacity of solar PV cells/modules, India's share in the same is minuscule. Domestically, as of August 2026, India has about 36.5 GW of cell and 261.00 GW of module manufacturing capacity. Here, for domestic manufacturers, majority of the business comes from Central and DISCOMS and undertakings, with the non-government retail market constituting the balance portion of the total sales. Further, successive capacity addition in recent years has led to increasing demand for companies offering a multitude of products – solar PV cells/modules. Mundra Solar, Websol Energy System, Waaree Energies Ltd, Jupiter International Ltd, RenewSys, Premier, Tata Solar are some of the major companies operating in the sector. The solar manufacturing industry faces competition from imports from

Key Risks	Risk Carrier	Proposed Mitigation of Risk
		various countries like China, Malaysia etc., which are able to offer their products at cheaper prices with compromise in quality. However, the Government is supporting the sector by imposing safeguard duties and other protective measures.
Statutory Approvals	OSEPL	It is to be noted that the Company is yet to apply for majority of the approvals required for the project. The Company has planned to obtain all relevant approvals at appropriate stages as per the requirement. Detailed note on the status of Statutory Approvals has been provided in the Technical Section of this report. D&B India, advice the Company to complete the process in timely manner to avoid any adverse impact on project. Lenders may insist on the Company to obtain critical approvals required for establishment of the plant before disbursement of funds.
Foreign Exchange Fluctuation	OSEPL	The proposed project is exposed to forex risk during both implementation phase (while procuring P&M from foreign suppliers) and operational phase (while purchasing raw material from foreign suppliers). The Company proposes to import part of the raw material required for the project. Unfavourable fluctuation in exchange rate may affect the profitability of the project. OSEPL may consider entering into appropriate forward contracts as required and hedge its position to mitigate the risk. Generally, the end-product prices generally move in tandem with the raw material price and the industry is able to pass on the price hike albeit with a time lag.
Force Majeure Risk	OSEPL /Insurers	The lenders may insist upon the Company to take adequate insurance cover for insurable Force Majeure risks.

SWOT Analysis

Strength	Weakness
• The promoters of the Company have been operating in the solar PV Energy sector/segment for the past few years with a combined Module Manufacturing Facility of 1600 MW (600 MW operational and 1000 MW under implementation) in Karnal. • The proposed project is coming up in Karnal Haryana, which is having access to basic infrastructure pertaining to connectivity, utilities and skilled manpower, which will lead to economies of scale. • The Company has identified the required raw material sources (multiple suppliers) and is assured of the continuous supply.	• The Company will have to implement a comprehensive sales & marketing plan for the sale of its proposed products to achieve the projected sales levels. • The Solar power generation industry is also evolving hence it is undergoing frequent technological changes so any major technological change may lead to additional capex which may impact the overall financials of the Company. • The price of key raw material i.e. wafers is volatile in nature and the Company is dependent on China for the same. *(The Company should make proper arrangements to minimize the price volatility effect on the profitability of the project.)*
Opportunity	**Threat**
• In the renewable energy basket (including large hydro) as of March 2026, solar energy accounted for a share of ~50%. Growth in the solar power sector over the last five years has been robust. • India's solar module manufacturing capacity increased nearly 7x from 38 GW in March 2024 to 261.7 GW in Aug 2026. PV cell manufacturing capacity increased 4x from 9 GW to ~36.5 GW during the same period. • Indian Solar Module consumption market has grown over 35% CAGR in FY2024 and is all set for an accelerated growth over the next 4 years. In volume terms, Consumption of Modules in FY 2026 was appx. ~45 GW, ~38 GW in FY2025 compared to 28.3 GW in FY 2024.	• Capacity additions by other players, or new entrants in the market, are expected to lead to increased competition. • The industry is characterized by the volatility in the prices of inputs and finished products impacting profitability of the manufactures. • Any adverse changes in Government incentives & policies would affect the financials of the Project. • Change in the duty structure by the Government of India (GOI), for the imported solar panel products or components. • Limited availability of upstream supply chain in India and total dependence on foreign sources.

• The Indian solar industry's growth is fuelled by a combination of factors, including supportive government policies, declining solar panel costs, favourable weather conditions, and rising energy demand. Government initiatives like the National Solar Mission and Solar Park Scheme, coupled with competitive tariffs, are key drivers. Additionally, technological advancements, increased flexibility of solar systems, and growing private investment further contribute to the sector's expansion.	

Conclusion

The objective of the study was to assess techno economic viability of the solar cell manufacturing project of OSEPL.

D&B India has assessed the techno economic viability of the project based on the data provided by the Company and other market information based on secondary research.

While assessing the techno economic viability of the project, D&B India considered the following major factors:

- Project specific attributes, both positive and negative.
- Appropriateness of the selected technology.
- Reasonableness of the Project Cost.
- Economic viability of the unit.

Market Assessment Summary

- The Government of India has set up a capacity target of 145 GW solar installed capacity by 2025 and 293 GW of installed solar capacity by 2030. Further, India Energy Security Scenarios 2047 of the NITI Aayog pegs India's solar energy potential at about 750 GW, and a possibility of achieving a high of 479 GW of solar PV by 2047. This signifies the potential for the solar photovoltaic power sector to contribute to India's energy security.
- In the renewable energy basket (including large hydro) as of March 2025, solar energy accounted for a share of ~50%. Growth in the solar power sector over the last five years has been robust.
- India's solar module manufacturing capacity nearly doubled from 38 GW in March 2024 to 261.7 GW in August 2026. PV cell manufacturing capacity tripled from 9 GW to ~36.5 GW during the same period.
- Indian Solar Module consumption market has grown over 35% CAGR in FY2024 and is all set for an accelerated growth over the next 4 years. In volume terms, Consumption of Modules in FY 2026 was appx. ~45 GW, ~38 GW in FY2025 compared to 28.3 GW in FY 2024.
- Interestingly, in the past few years, India has experienced a significant increase in PV exports, primarily high-efficiency PV modules to the US. The export value of PV modules has risen exponentially by more than 23 times in just two years between FY2022 and FY2024. In FY2024, India exported approximately a third of its PV modules to various countries.

Technical Assessment Summary

Project Configuration

OSEPL is a wholly owned subsidiary of Oswal Pumps Limited (OPL) and is engaged in manufacturing and selling photovoltaic (PV) modules along with balance components such as inverters, etc. The parent Company Oswal Pumps Limited manufactures and sells a wide range of pumps and motors, such as submersible pumps, monobloc pumps, solar pumps, electric motors etc.

OSEPL currently operates a solar PV module manufacturing facility at Karnal, Haryana, with an installed capacity of 600 MW. To enhance its production capabilities, the Company is undertaking the expansion of its module manufacturing operations through the installation of an additional 1.0 GW PV module production line adjacent to the existing facility. As informed by the Company, the 1.0 GW solar PV module manufacturing plant is expected to commence its commercial production post Q3 FY 2027. Post the completion of under execution solar module plant of 1.0 GW, the total solar module capacity of the Company will be 1.60 GW.

Under the current project, the company has proposed setting up a 1.2 GW solar cell manufacturing plant to strengthen its integrated renewable energy capabilities. The solar cells produced will primarily be used for captive consumption in its 1.60 GW PV module plant.

Sr. No.	Parameter	Cell plant
1	Project Title	Topcon cell manufacturing plant
2	Major components	N type wafer, Silver, Aluminium paste and gases.
3	Capacity of plant	1200 MW per annum
4	Manufacturing facility	Wafer to cell manufacturing using Texturing, diffusion, annealing, metallization and screen printing equipment
5	Technology	Topcon cells using N type wafers

Raw Material Details

The Company intends to procure raw material from the national/international market at competitive prices at high volumes. The Company is yet to identify key raw materials suppliers for the proposed project.

Land

OSEPL has entered into a registered lease agreement with Radhika Gupta for acquiring **114 Kanal 7 Marla (approximately 14.29 acres)** of land located at **Khewat No. 55, Rect. No. 63 Killa Nos. 12, 13, 18, 19, 20, 21, 22 & 23; Rect. No. 64 Killa Nos. 16, 17, 22, 23, 24, 25 & 21 Min North; and Rect. No. 65 Killa No. 25/1 Min North**, situated near Sawariya Overseas, Karnal-Munak Road, Village Munak, Sub-Tehsil Ballah, District Karnal, Haryana, for establishment of the proposed solar cell manufacturing facility. The lease has been executed for a period of **99 years** commencing from **06 October 2026** at an annual lease rental of **INR 97.24 lakh**.

Building and Civil works

The cost of factory building and civil works is estimated at INR 89.20 crores as per the estimate of M/s ECR Buildtech Pvt. Ltd. submitted by the Company.

The estimated Factory Building & Civil Works cost for the proposed built-up area of **30367 sq. meters** translates to **INR 2729 per sq. ft.**, which is slightly higher than the prevailing market rates.

The proposed civil cost of INR 73.64 Cr per GW seems to be slightly on the higher side compared to industry benchmark range of INR 55 Cr to 70 Cr per GW subject to project-specific factors such as terrain characteristics, soil profile, foundation requirements, structural design specifications and the proposed built-up area.

Plant & Machinery, Electrification and MFA

The Company has proposed P&M and Utilities cost of INR 248.95 Cr (for 1.2 GW Cell line) and Electrification & MFA cost of INR 63.21 Cr. Further, the Company has already obtained quotations for the main cell line equipment, Utilities, Electrification and MFA. The Cell line supplier has adequate experience and expertise in providing after sales service.

Power

The total power requirement is of 15,000 KVA for the proposed solar cell project. The Company has proposed to source the power from local discom. The per unit power cost is considered INR 9.50.

Water

The Water requirement for the project is 900 m3/day for DI water make up and domestic usage. As informed by the Company, this requirement will be met through water sourced from a nearby canal and groundwater extracted through borewells.

Manpower Requirement

The total manpower required for operating the project is estimated at 495 persons. D&B India considers the manpower requirement estimated to be adequate for the proposed project. The project location is developed and therefore it is envisaged that skilled and unskilled manpower is available for the project in the region. D&B India considers the manpower requirement estimated to be adequate for the project.

Statutory Approvals

D&B India, advice the Company to complete the process in timely manner to avoid any adverse impact on project. The list of approvals has been provided as part of "Status of Statutory Approvals" section of the report.

Implementation Schedule

As indicated in the implementation schedule, the Company has already acquired the land for the proposed project. Further, the Company has also obtained quotations for major project components, including factory building and civil works, plant and machinery, utilities, electrification and MFA. The implementation period for the proposed 1.2 GW solar cell manufacturing facility has been estimated at 18 months, with project execution scheduled to commence in October 2026. Considering the current stage of project development and the activities pending for completion, the proposed Commercial Operation Date (COD) of 1 April 2028 appears achievable, provided the Company will obtain all necessary / statutory approvals and permissions in time and would procure all critical plant and machineries including delivery of all plant and machineries as indicated in the implementation schedule.

D&B India advises the Company to strictly adhere to the implementation schedule, obtain necessary approvals, funds on time to avoid any time over-run.

Project Cost Rationale

Factory Building and Civil Works

The cost of factory building and civil works is estimated at INR 89.20 crores as per the estimate of M/s ECR Buildtech Pvt. Ltd. submitted by the Company.

The estimated Factory Building & Civil Works cost for the proposed built-up area of **30367 sq. meters** translates to **INR 2729 per sq. ft.**, which is slightly higher than the prevailing market rates.

The proposed civil cost of INR 73.64 Cr per GW seems to be slightly on the higher side compared to industry benchmark range of INR 55 Cr to 70 Cr per GW subject to project-specific factors such as terrain characteristics, soil profile, foundation requirements, structural design specifications and the proposed built-up area.

P&M incl. Utilities and MFA

As per D&B-India's assessment of similar projects in the past, the proposed P&M and Utilities cost incl. MFA for the proposed project seems to be on the lower side as the per GW cost of P&M including Utilities, Electrification and MFA for the proposed project comes to around INR 257.71 crores against the industry average of INR 425.00 crores to INR 500.00 crores.

Overall Hard Cost

The estimated project hard cost (Building, Plant and Machinery & Utilities incl. Electrification and MFA cost excl. land) of INR 401.36Cr (i.e., INR 331.35 Cr per GW) seems to be lower compared to industry benchmark range of INR 500 Cr to 550 Cr per GW.

As informed by the Company, the same is mainly on account of procurement pre-owned/used Plant and machinery.

Financial Assessment Summary

- As per D&B India's assessment, the average EBIDTA margin for the project is ~20.33%. The margins are reasonable.
- The average net margin for the project is ~11.18% which is reasonable considering nature of the industry.
- The estimated cost of the project is INR 455.85 crores which is proposed to be funded by term loan of INR 296.00 crores and promoters' contribution in the form of Equity from IPO proceeds of total INR 159.85 crores.
- The debt equity ratio is worked out to 1.85:1 for the proposed project.
- As per D&B India's assessment, the IRR of the project is estimated at 26.65% which is reasonable.
- The minimum debt service coverage ratio of the proposed solar cell project is 1.95, and the average debt service coverage ratio of the Project is 2.54 which provides marginal safety to the lenders.

Critical Success Factors

- **The Company should adhere to the implementation Schedule**

  Considering the time required for these kinds of projects, the implementation schedule appears to be reasonable. The Company plans achieve COD from April 2028 for proposed project. It is necessary to make a detailed schedule of things for each activity and allocate a time frame for each activity. The Company has to rigorously monitor implementation activity to achieve planned implementation schedule. The lenders may further keep a close follow up for the same.

- **The promoters will make proper arrangement for fund infusion as and when required**

  As a part of project financing, the Company has proposed to bring in the promoters' contribution for the proposed project in the form of Equity Proceeds from IPO. The time bound infusion of the same is critical towards the timely execution of the project. However, in case there is any shortfall, the Company has to contribute the promoters' contribution either as additional Share Capital or internal accruals or unsecured loans.

- **The management should plan to deploy standard operating practices & good management practices**

  The management will have to deploy the standard operating practices for the project which are followed in the industry and ensure employment, training & retaining of qualified & experienced people to run the project.

- **Timely delivery of plant and machinery**

  D&B-India notes that the Company has identified the suppliers and obtained quotations for the main plant and machineries incl. Utilities, Electrification and MFA. The Company should ensure procurement of all critical plant and machineries including placement of orders and delivery of all plant and machineries as indicated in the implementation schedules.

- **Approvals**

  The Company has planned to obtain all relevant approvals at appropriate stages as per the requirement. D&B India advises the Company to monitor the same to avoid any adverse impact on the project.

- **Capacity Utilization**

  The proposed manufacturing unit of the Company is planned to operate at a specific capacity utilization level, in order to achieve the projected production and subsequently the sales value for the respective operational year (between FY 2029 and FY 2035). Any significant deviation from the planned capacity utilization and sales over the projected year, will affect the overall operations of the plant and subsequently the financials of the Company. The proposed capacity utilization levels are critical to the project as the Company has proposed to use the entire output from the proposed project for captive consumption so the output for the project will depend on the demand of the solar modules where the output will be captively used so the Company has to make proper marketing arrangements to maintain the regular off-take of solar modules.

- **Volatility in the Raw Material and Sales Prices**

The price of key raw material i.e. wafers and sale price of solar module is volatile in nature hence the Company should make proper arrangements to minimize the price volatility effect on the profitability of the project.

Subject to the above assessment & Critical Success Factors, various scenarios mentioned in sensitivity analysis, SWOT analysis and Risk analysis, D&B India is of the opinion that the project is technically feasible and economically viable.

Annexure 1: Projected Profitability Statement – Standalone 1.2 GW Cell Plant

INR Crores

Particulars	Projected						
	31/Mar/29	31/Mar/30	31/Mar/31	31/Mar/32	31/Mar/33	31/Mar/34	31/Mar/35
Revenue / Sales:							
Domestic Sales (Open Market)	-	-	-	-	-	-	-
Domestic Sales	745.84	796.23	846.63	853.33	853.33	853.33	853.33
Total Gross Revenue from Operations	**745.84**	**796.23**	**846.63**	**853.33**	**853.33**	**853.33**	**853.33**
Add: Other Income	-	-	-	-	-	-	-
Total Net Revenue	**745.84**	**796.23**	**846.63**	**853.33**	**853.33**	**853.33**	**853.33**
Cost of Sales:							
Raw Material Consumed	505.47	527.80	561.43	565.19	565.10	565.10	565.10
Salaries and Wages Expenses	19.26	20.23	21.24	22.30	23.42	24.59	25.82
Power & Fuel Costs	55.41	57.86	61.54	61.95	61.94	61.94	61.94
Repairs & Mainteance	4.56	4.79	5.03	5.28	5.54	5.82	6.11
Packing Costs	1.40	1.50	1.59	1.61	1.61	1.61	1.61
Other Manufacturing Expenses	7.58	7.92	8.42	8.48	8.48	8.48	8.48
Sub-Total	**593.69**	**620.09**	**659.25**	**664.80**	**666.08**	**667.53**	**669.05**
Add: Opening WIP	-	4.95	5.10	5.42	5.46	5.47	5.49
Less: Closing WIP	4.95	5.10	5.42	5.46	5.47	5.49	5.50
Cost of Production	**588.74**	**619.94**	**658.93**	**664.76**	**666.07**	**667.52**	**669.04**
Add: Opening FG	-	32.71	33.97	36.11	36.43	36.50	36.58
Less: Closing FG	32.71	33.97	36.11	36.43	36.50	36.58	36.66

Cost of Sales	**556.03**	**618.68**	**656.79**	**664.44**	**666.00**	**667.44**	**668.96**
Gross Profit	**189.81**	**177.56**	**189.83**	**188.89**	**187.33**	**185.89**	**184.37**
Operating Expenses							
SG&A Expenses	14.92	15.92	16.93	17.07	17.07	17.07	17.07
Lease Rent	1.02	1.07	1.12	1.18	1.24	1.30	1.37
Sub - Total	**15.94**	**17.00**	**18.06**	**18.25**	**18.31**	**18.37**	**18.43**
EBITDA	**173.87**	**160.56**	**171.77**	**170.64**	**169.02**	**167.52**	**165.94**
EBITDA Margin (%)	*23.31%*	*20.17%*	*20.29%*	*20.00%*	*19.81%*	*19.63%*	*19.45%*
Depreciation / Amortization	36.89	36.89	36.89	36.89	36.89	36.89	36.89
Operating Profit (EBIT)	**136.98**	**123.67**	**134.88**	**133.75**	**132.13**	**130.63**	**129.05**
Financial Charges:							
Interest on Working Capital	6.19	6.19	6.19	6.19	6.19	6.19	6.19
Interest on Term Loan	24.42	22.72	18.65	14.58	10.51	6.44	2.37
Interest on Unsecured Loans	-	-	-	-	-	-	-
LC & BG Charges @ 1%	-	-	-	-	-	-	-
Total Financial Charges	**30.61**	**28.91**	**24.84**	**20.77**	**16.70**	**12.63**	**8.56**
Profit Before Tax	**106.37**	**94.76**	**110.04**	**112.98**	**115.43**	**118.00**	**120.49**
Current Tax	14.34	13.73	17.55	19.08	20.39	21.60	22.68
Profit After Tax	**92.04**	**81.03**	**92.49**	**93.90**	**95.04**	**96.40**	**97.80**
Dividend paid + IT on Dividend	-	-	-	-	-	-	-
Retained Profit	**92.04**	**81.03**	**92.49**	**93.90**	**95.04**	**96.40**	**97.80**
PAT Margin (%)	*12.34%*	*10.18%*	*10.92%*	*11.00%*	*11.14%*	*11.30%*	*11.46%*

Annexure 2: Projected Balance Sheet – Standalone 1.2 GW Cell Plant

INR Crores

Particulars	Projected								
	31/Mar/27	31/Mar/28	31/Mar/29	31/Mar/30	31/Mar/31	31/Mar/32	31/Mar/33	31/Mar/34	31/Mar/35
LIABILITIES:									
Current Liabilities:									
Working Capital Loan	-	-	75.00	75.00	75.00	75.00	75.00	75.00	75.00
Creditors - Expenses	-	-	7.85	8.12	8.61	8.76	8.87	8.99	9.12
Term Loan (installments due in one year)	-	-	49.33	49.33	49.33	49.33	49.33	49.33	-
RM Creditors	-	-	84.25	86.76	92.29	92.91	92.89	92.89	92.89
TOTAL CURRENT LIABILITIES (A)	**-**	**-**	**216.42**	**219.22**	**225.23**	**226.00**	**226.10**	**226.22**	**177.01**
Term Liabilities:									
Term Loan (less next year installments)	118.40	296.00	246.67	197.33	148.00	98.67	49.33	0.00	0.00
Deferred tax liability		-	-	-	-	-	-	-	-
Unsecured Loans	-	-	-	-	-	-	-	-	-
TOTAL TERM LIABILITIES (B)	**118.40**	**296.00**	**246.67**	**197.33**	**148.00**	**98.67**	**49.33**	**0.00**	**0.00**
TOTAL OF OUTSIDE LIABILITIES (C = A + B)	**118.40**	**296.00**	**463.09**	**416.55**	**373.23**	**324.67**	**275.43**	**226.22**	**177.01**
NET WORTH:									
Share Capital	63.94	159.85	159.85	159.85	159.85	159.85	159.85	159.85	159.85
Internal Accruals	-	-	-	-	-	-	-	-	-
Share Premium	-	-	-	-	-	-	-	-	-
Surplus (+) or deficit (-) in Profit & Loss a/c	-	-	92.04	173.06	265.56	359.46	454.50	550.90	648.70
TOTAL NET WORTH (D)	**63.94**	**159.85**	**251.89**	**332.91**	**425.41**	**519.31**	**614.35**	**710.75**	**808.55**

TOTAL LIABILITIES (E = C + D)	**182.34**	**455.85**	**714.98**	**749.46**	**798.64**	**843.98**	**889.78**	**936.97**	**985.56**
ASSETS:									
Current Assets:									
Cash & Bank Balances	-	-	111.96	173.32	247.08	327.74	410.37	494.36	579.75
Raw Material & Consumables	-	-	84.25	86.76	92.29	92.91	92.89	92.89	92.89
Finished Goods	-	-	32.71	33.97	36.11	36.43	36.50	36.58	36.66
Work in Progress	-	-	4.95	5.10	5.42	5.46	5.47	5.49	5.50
Debtors	-	-	62.15	68.25	72.57	73.14	73.14	73.14	73.14
Bank FDR (Security against LC&BG)	-	-	-	-	-	-	-	-	-
TOTAL CURRENT ASSETS	**-**	**-**	**296.02**	**367.39**	**453.46**	**535.68**	**618.38**	**702.46**	**787.94**
FIXED ASSETS:									
Gross Block (Land & Building, Machinery)	-	-	455.85	455.85	455.85	455.85	455.85	455.85	455.85
Less: Accumulated Depreciation	-	-	36.89	73.78	110.67	147.56	184.45	221.34	258.23
Net Block	**-**	**-**	**418.96**	**382.07**	**345.18**	**308.29**	**271.40**	**234.51**	**197.62**
Capital Work In Progress	182.34	455.85	-	-	-	-	-	-	
Bank DSRA	-	-	-	-	-	-	-	-	-
Long term Investments						-	-	-	-
TOTAL ASSETS	**182.34**	**455.85**	**714.98**	**749.46**	**798.64**	**843.98**	**889.78**	**936.97**	**985.56**

Annexure 3: Projected Cashflow Statement – Standalone 1.2 GW Cell Plant

INR Crores

Particulars	Projected									
	31/Mar/26	31/Mar/27	31/Mar/28	31/Mar/29	31/Mar/30	31/Mar/31	31/Mar/32	31/Mar/33	31/Mar/34	31/Mar/35
Cash Flow from Operations										
Profit After Tax	-	-		92.04	81.03	92.49	93.90	95.04	96.40	97.80
Depreciation	-	-	-	36.89	36.89	36.89	36.89	36.89	36.89	36.89
Changes in DTL	-	-	-	-	-	-	-	-	-	-
Change in Working Capital	-	-		-91.96	-7.23	-6.29	-0.79	0.03	0.03	0.03
Total Cashflow from Operations	**-**	**-**	**-**	**36.96**	**110.69**	**123.09**	**130.00**	**131.96**	**133.32**	**134.72**
Cash Flow from Investing										
Changes in Fixed Assets	-	-182.34	-273.51	-	-	-	-	-	-	-
Change in LC & BG Margin	-	-	-	-	-	-	-	-	-	-
Changes in Bank FDR	-	-	-	-	-	-	-	-	-	-
Changes in bank FDR (USL)	-	-	-	-	-	-	-	-	-	-
Changes in Capital Advances	-	-	-	-	-	-	-	-	-	-
Changes in Capital Creditors										
Change in Long term Investments	-	-	-	-	-	-	-	-	-	-
Total Cashflow from Investing	**-**	**-182.34**	**-273.51**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Cash Flow from Financing										
Changes in Share Capital	-	63.94	95.91	-	-	-	-	-	-	-
Changes in Term Loan	-	118.40	177.60	-	-49.33	-49.33	-49.33	-49.33	-49.33	-49.33
Chnages in Internal Accruals	-	-	-							
Changes in USL	-		-							
Changes in Working Capital Loan	-		-	75.00	-	-	-	-	-	-
Changes in Share Premium	-	-	-	-	-	-	-	-	-	-
Total Cash Flow from Financing	**-**	**182.34**	**273.51**	**75.00**	**-49.33**	**-49.33**	**-49.33**	**-49.33**	**-49.33**	**-49.33**

Net Cash Flow	-	-	-	111.96	61.35	73.76	80.67	82.63	83.99	85.39
Opening Cash Balance	-	-	-	-	111.96	173.32	247.08	327.74	410.37	494.36
Closing Cash Balance	-	-	-	111.96	173.32	247.08	327.74	410.37	494.36	579.75

Annexure 4: Term Loan Schedule

INR Crores

Date	Quarter	Year	Opening Balance	Disbursement	Repayment	Closing	Interest	IDCP
31/Aug/26	-	31/Mar/27	-			-	-	-
30/Sep/26	Q2	31/Mar/27	-			-	-	-
31/Oct/26	-	31/Mar/27	-			-	-	-
30/Nov/26	-	31/Mar/27	-			-	-	-
30/Dec/26	Q3	31/Mar/27	-	44.40		44.40	0.15	0.15
31/Jan/27	-	31/Mar/27	44.40	44.40		88.80	0.46	0.46
28/Feb/27	-	31/Mar/27	88.80			88.80	0.61	0.61
31/Mar/27	Q4	31/Mar/27	88.80	29.60		118.40	0.71	0.71
30/Apr/27	-	31/Mar/28	118.40			118.40	0.81	0.81
31/May/27	-	31/Mar/28	118.40			118.40	0.81	0.81
30/Jun/27	Q1	31/Mar/28	118.40	29.60		148.00	0.92	0.92
31/Jul/27	-	31/Mar/28	148.00			148.00	1.02	1.02
31/Aug/27	-	31/Mar/28	148.00			148.00	1.02	1.02
30/Sep/27	Q2	31/Mar/28	148.00	29.60		177.60	1.12	1.12
31/Oct/27	-	31/Mar/28	177.60			177.60	1.22	1.22
30/Nov/27	-	31/Mar/28	177.60			177.60	1.22	1.22
31/Dec/27	Q3	31/Mar/28	177.60	88.80		266.40	1.53	1.53
31/Jan/28	-	31/Mar/28	266.40			266.40	1.83	1.83
29/Feb/28	-	31/Mar/28	266.40			266.40	1.83	1.83
31/Mar/28	Q4	31/Mar/28	266.40	29.60		296.00	1.93	1.93
30/Apr/28	-	31/Mar/29	296.00			296.00	2.04	-
31/May/28	-	31/Mar/29	296.00			296.00	2.04	-
30/Jun/28	Q1	31/Mar/29	296.00			296.00	2.04	-
31/Jul/28	-	31/Mar/29	296.00			296.00	2.04	-

31/Aug/28	-	31/Mar/29	296.00			296.00	2.04	-
30/Sep/28	Q2	31/Mar/29	296.00			296.00	2.04	-
31/Oct/28	-	31/Mar/29	296.00			296.00	2.04	-
30/Nov/28	-	31/Mar/29	296.00			296.00	2.04	-
31/Dec/28	Q3	31/Mar/29	296.00			296.00	2.04	-
31/Jan/29	-	31/Mar/29	296.00			296.00	2.04	-
28/Feb/29	-	31/Mar/29	296.00			296.00	2.04	-
31/Mar/29	Q4	31/Mar/29	296.00			296.00	2.04	-
30/Apr/29	-	31/Mar/30	296.00			296.00	2.04	-
31/May/29	-	31/Mar/30	296.00			296.00	2.04	-
30/Jun/29	Q1	31/Mar/30	296.00		12.33	283.67	1.99	-
31/Jul/29	-	31/Mar/30	283.67			283.67	1.95	-
31/Aug/29	-	31/Mar/30	283.67			283.67	1.95	-
30/Sep/29	Q2	31/Mar/30	283.67		12.33	271.33	1.91	-
31/Oct/29	-	31/Mar/30	271.33			271.33	1.87	-
30/Nov/29	-	31/Mar/30	271.33			271.33	1.87	-
31/Dec/29	Q3	31/Mar/30	271.33		12.33	259.00	1.82	-
31/Jan/30	-	31/Mar/30	259.00			259.00	1.78	-
28/Feb/30	-	31/Mar/30	259.00			259.00	1.78	-
31/Mar/30	Q4	31/Mar/30	259.00		12.33	246.67	1.74	-
30/Apr/30	-	31/Mar/31	246.67			246.67	1.70	-
31/May/30	-	31/Mar/31	246.67			246.67	1.70	-
30/Jun/30	Q1	31/Mar/31	246.67		12.33	234.33	1.65	-
31/Jul/30	-	31/Mar/31	234.33			234.33	1.61	-
31/Aug/30	-	31/Mar/31	234.33			234.33	1.61	-
30/Sep/30	Q2	31/Mar/31	234.33		12.33	222.00	1.57	-
31/Oct/30	-	31/Mar/31	222.00			222.00	1.53	-

30/Nov/30	-	31/Mar/31	222.00			222.00	1.53	-
31/Dec/30	Q3	31/Mar/31	222.00		12.33	209.67	1.48	-
31/Jan/31	-	31/Mar/31	209.67			209.67	1.44	-
28/Feb/31	-	31/Mar/31	209.67			209.67	1.44	-
31/Mar/31	Q4	31/Mar/31	209.67		12.33	197.33	1.40	-
30/Apr/31	-	31/Mar/32	197.33			197.33	1.36	-
31/May/31	-	31/Mar/32	197.33			197.33	1.36	-
30/Jun/31	Q1	31/Mar/32	197.33		12.33	185.00	1.31	-
31/Jul/31	-	31/Mar/32	185.00			185.00	1.27	-
31/Aug/31	-	31/Mar/32	185.00			185.00	1.27	-
30/Sep/31	Q2	31/Mar/32	185.00		12.33	172.67	1.23	-
31/Oct/31	-	31/Mar/32	172.67			172.67	1.19	-
30/Nov/31	-	31/Mar/32	172.67			172.67	1.19	-
31/Dec/31	Q3	31/Mar/32	172.67		12.33	160.33	1.14	-
31/Jan/32	-	31/Mar/32	160.33			160.33	1.10	-
29/Feb/32	-	31/Mar/32	160.33			160.33	1.10	-
31/Mar/32	Q4	31/Mar/32	160.33		12.33	148.00	1.06	-
30/Apr/32	-	31/Mar/33	148.00			148.00	1.02	-
31/May/32	-	31/Mar/33	148.00			148.00	1.02	-
30/Jun/32	Q1	31/Mar/33	148.00		12.33	135.67	0.98	-
31/Jul/32	-	31/Mar/33	135.67			135.67	0.93	-
31/Aug/32	-	31/Mar/33	135.67			135.67	0.93	-
30/Sep/32	Q2	31/Mar/33	135.67		12.33	123.33	0.89	-
31/Oct/32	-	31/Mar/33	123.33			123.33	0.85	-
30/Nov/32	-	31/Mar/33	123.33			123.33	0.85	-
31/Dec/32	Q3	31/Mar/33	123.33		12.33	111.00	0.81	-
31/Jan/33	-	31/Mar/33	111.00			111.00	0.76	-

28/Feb/33	-	31/Mar/33	111.00			111.00	0.76	-
31/Mar/33	Q4	31/Mar/33	111.00		12.33	98.67	0.72	-
30/Apr/33	-	31/Mar/34	98.67			98.67	0.68	-
31/May/33	-	31/Mar/34	98.67			98.67	0.68	-
30/Jun/33	Q1	31/Mar/34	98.67		12.33	86.33	0.64	-
31/Jul/33	-	31/Mar/34	86.33			86.33	0.59	-
31/Aug/33	-	31/Mar/34	86.33			86.33	0.59	-
30/Sep/33	Q2	31/Mar/34	86.33		12.33	74.00	0.55	-
31/Oct/33	-	31/Mar/34	74.00			74.00	0.51	-
30/Nov/33	-	31/Mar/34	74.00			74.00	0.51	-
31/Dec/33	Q3	31/Mar/34	74.00		12.33	61.67	0.47	-
31/Jan/34	-	31/Mar/34	61.67			61.67	0.42	-
28/Feb/34	-	31/Mar/34	61.67			61.67	0.42	-
31/Mar/34	Q4	31/Mar/34	61.67		12.33	49.33	0.38	-
30/Apr/34	-	31/Mar/35	49.33			49.33	0.34	-
31/May/34	-	31/Mar/35	49.33			49.33	0.34	-
30/Jun/34	Q1	31/Mar/35	49.33		12.33	37.00	0.30	-
31/Jul/34	-	31/Mar/35	37.00			37.00	0.25	-
31/Aug/34	-	31/Mar/35	37.00			37.00	0.25	-
30/Sep/34	Q2	31/Mar/35	37.00		12.33	24.67	0.21	-
31/Oct/34	-	31/Mar/35	24.67			24.67	0.17	-
30/Nov/34	-	31/Mar/35	24.67			24.67	0.17	-
31/Dec/34	Q3	31/Mar/35	24.67		12.33	12.33	0.13	-
31/Jan/35	-	31/Mar/35	12.33			12.33	0.08	-
28/Feb/35	-	31/Mar/35	12.33			12.33	0.08	-
31/Mar/35	Q4	31/Mar/35	12.33		12.33	-	0.04	-

Annexure 5: Projected Profitability Statement – Consolidated (1.2 GW Cell + 1.0 GW Module + 0.6 GW Module)

The proposed profitability projections of the Company as a whole, considering the projections of the existing operations of the Company, on as provided by the Company basis, is tabulated below:

INR Crores

Particulars	Audited	Provisional	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected
	31/Mar/ 25	31/Mar/ 26	31/Mar/ 27	31/Mar/ 28	31/Mar/ 29	31/Mar/ 30	31/Mar/ 31	31/Mar/ 32	31/Mar/ 33	31/Mar/ 34	31/Mar/ 35
Revenue / Sales:											
Export Sales	-		5.62	55.15	58.87	67.33	75.80	84.27	92.74	101.21	109.68
Domestic Sales	406.31	812.50	920.77	1,379.07	1,347.02	1,433.85	1,520.69	1,607.52	1,684.25	1,760.46	1,836.68
Traded goods	44.67	24.74	25.97	27.27	28.64	30.07	31.57	33.15	34.81	36.55	38.38
Total Gross Revenue from Operations	**450.98**	**837.24**	**952.37**	**1461.50**	**1434.52**	**1531.26**	**1628.06**	**1724.94**	**1811.80**	**1898.22**	**1984.73**
EPC Sales	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Add: Other Income	2.32	13.40	10.72	8.58	6.86	5.49	4.39	3.51	2.81	2.25	1.80
Total Net Revenue	**453.31**	**850.64**	**963.09**	**1470.08**	**1441.39**	**1536.75**	**1632.45**	**1728.46**	**1814.61**	**1900.47**	**1986.53**
Cost of Sales:											
Raw Material Purchased	-	-	*868.95*	*1250.12*	*970.45*	*1006.98*	*1073.63*	*1157.01*	*1234.42*	*1312.74*	*1391.05*
Opening Stock of RM	-	-	-	*66.00*	*99.96*	*120.75*	*125.74*	*133.73*	*140.96*	*147.38*	*153.81*
Closing Stock of RM	-	-	*66.00*	*99.96*	*120.75*	*125.74*	*133.73*	*140.96*	*147.38*	*153.81*	*160.25*
Raw Material Consumed	332.42	664.21	802.95	1,216.16	949.65	1,001.99	1,065.63	1,149.78	1,228.00	1,306.31	1,384.61
Stock in trade Purchased	46.25	22.48	23.60	24.78	26.02	27.32	28.69	30.12	31.63	33.21	34.87
Opening Stock of Stock in trade	-	4.20	3.26	3.42	3.60	3.78	3.96	4.16	4.37	4.59	4.82
Closing Stock of Stock in trade	4.20	3.26	3.42	3.60	3.78	3.96	4.16	4.37	4.59	4.82	5.06
Stock in trade Consumed	42.05	23.42	23.44	24.61	25.84	27.13	28.49	29.91	31.41	32.98	34.63

Salaries and Wages Expenses	10.02	17.75	22.48	23.61	44.05	46.25	48.57	51.00	53.55	56.22	59.03
Power & Fuel Costs	3.79	5.14	7.22	13.22	69.86	73.53	78.45	80.10	81.23	82.38	83.53
Repairs & Mainteance	2.13	3.41	4.36	10.04	15.10	15.86	16.65	17.48	18.36	19.28	20.24
Cell Packing Cost	-	-		-	1.40	1.50	1.59	1.61	1.61	1.61	1.61
Other Manufacturing Expenses	6.47	18.60	25.48	39.44	46.24	49.20	52.32	55.00	57.34	59.67	62.00
Sub-Total	**401.08**	**731.58**	**886.09**	**1,327.25**	**1,152.33**	**1,215.66**	**1,291.91**	**1,385.09**	**1,471.72**	**1,558.68**	**1,645.89**
Add: Opening WIP	0.98	2.89	1.91	2.43	3.64	8.10	8.43	8.96	9.26	9.51	9.76
Less: Closing WIP	2.89	1.91	2.43	3.64	8.10	8.43	8.96	9.26	9.51	9.76	10.01
Cost of Production	**399.16**	**732.56**	**885.57**	**1,326.04**	**1,147.86**	**1,215.34**	**1,291.38**	**1,384.79**	**1,471.47**	**1,558.43**	**1,645.64**
Add: Opening FG	0.08	16.34	24.17	36.39	54.49	47.17	49.95	53.07	56.91	60.47	64.04
Less: Closing FG	16.34	24.17	36.39	54.49	47.17	49.95	53.07	56.91	60.47	64.04	67.63
Cost of Sales	**378.69**	**725.67**	**873.19**	**1,307.77**	**1,155.00**	**1,212.37**	**1,288.06**	**1,380.74**	**1,467.69**	**1,554.62**	**1,641.82**
Gross Profit	**74.61**	**124.97**	**89.90**	**162.31**	**286.38**	**324.37**	**344.40**	**347.71**	**346.92**	**345.84**	**344.71**
Operating Expenses											
SG&A Expenses	3.86	3.15	4.63	7.17	21.95	23.43	24.91	25.53	25.95	26.37	26.80
Transfer Cost				-	-	-	-	-	-	-	-
Lease Rent	0.01	0.63	0.63	0.63	1.65	1.70	1.75	1.81	1.87	1.93	2.00
Sub - Total	**3.86**	**3.78**	**5.26**	**7.80**	**23.59**	**25.13**	**26.67**	**27.33**	**27.82**	**28.31**	**28.79**
EBITDA	**70.75**	**121.18**	**84.64**	**154.51**	**262.79**	**299.24**	**317.73**	**320.38**	**319.10**	**317.54**	**315.92**
EBITDA Margin (%)	*15.61%*	*14.25%*	*8.79%*	*10.51%*	*18.23%*	*19.47%*	*19.46%*	*18.54%*	*17.59%*	*16.71%*	*15.90%*
Depreciation / Amortization	4.42	5.86	4.14	7.44	44.33	44.33	44.33	44.33	44.33	44.24	44.11
Operating Profit (EBIT)	**66.33**	**115.33**	**80.50**	**147.07**	**218.46**	**254.92**	**273.40**	**276.05**	**274.77**	**273.30**	**271.81**

Financial Charges:											
Interest on Working Capital	-	-	4.95	7.01	8.25	10.31	10.31	10.31	10.31	10.31	10.31
Other Finance Cost	0.74	0.73									
Interest on Term Loan	4.82	4.19	0.01	0.01	24.45	22.77	18.65	14.58	10.51	6.44	2.37
Interest on Unsecured Loan	-	-									
Total Financial Charges	**5.55**	**4.92**	**4.96**	**7.02**	**32.70**	**33.08**	**28.97**	**24.90**	**20.83**	**16.76**	**12.69**
Add: Interest on subsidy	-	0	0	0	0	0	0	0	0	0	0
Profit Before Tax	**60.78**	**110.40**	**75.54**	**140.05**	**185.76**	**221.84**	**244.44**	**251.16**	**253.95**	**256.54**	**259.12**
Current Tax	10.47	19.50	11.28	21.71	26.16	34.18	39.64	42.14	43.79	45.22	46.50
Profit After Tax	**50.31**	**90.90**	**64.26**	**118.34**	**159.60**	**187.65**	**204.80**	**209.01**	**210.16**	**211.32**	**212.62**

Annexure 6: Projected Balance Sheet – Consolidated (1.2 GW Cell + 1.0 GW Module + 0.6 GW Module)

The proposed Balance sheet of the Company as a whole, considering the projections of the existing operations of the Company, on as provided by the Company basis, is tabulated below:

INR Crores

Particulars	Audited	Prov	Projected								
	31/Mar/25	31/Mar/26	31/Mar/27	31/Mar/28	31/Mar/29	31/Mar/30	31/Mar/31	31/Mar/32	31/Mar/33	31/Mar/34	31/Mar/35
LIABILITIES:											
Current Liabilities:											
Working Capital Loan	44.17	9.29	60.00	85.00	100.00	125.00	125.00	125.00	125.00	125.00	125.00
Unsecured Loan	-	-	-	-	-	-	-	-	-	-	-
Lease Liability	0.64	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Sundry Creditors	19.38	32.61	66.00	99.96	78.63	82.36	87.59	94.50	100.93	107.37	113.80
Creditors for Capital Goods	2.02	5.06	-	-	-	-	-	-	-	-	-
Other Current Liabilities	8.21	4.18	3.18	4.44	12.41	13.07	13.86	14.31	14.72	15.14	15.58
Advance from Customer	-	-	-	-	-	-	-	-	-	-	-
Instalment of New TL	-	-	-	-	49.33	49.33	49.33	49.33	49.33	49.33	-
Installment Term Loan - Existing	1.43	4.46	5.17	5.17	-	-	-	-	-	-	-
Provision for Taxes and Gratuity	3.54	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.35	2.35
TOTAL CURRENT LIABILITIES (A)	**79.39**	**58.05**	**136.79**	**197.02**	**242.82**	**272.21**	**278.23**	**285.59**	**292.43**	**299.29**	**256.84**
Term Liabilities: (less next year installments)											
New Term Loan	-	-	118.40	296.00	246.67	197.33	148.00	98.67	49.33	0.00	0.00
Lease Liabilities	5.08	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Term Loan - Existing	11.92	11.05	5.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Provisions	1.26	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42

Deferred Tax Liabilities	0.21	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Non Current Liability	1.66	5.89	5.89	5.89	5.89	5.89	5.89	5.89	5.89	5.89	5.89
Unsecured Loans from promoters			-	-	-	-	-	-	-	-	-
TOTAL TERM LIABILITIES (B)	**20.13**	**22.85**	**135.37**	**307.80**	**258.47**	**209.13**	**159.80**	**110.47**	**61.13**	**11.80**	**11.80**
TOTAL OF OUTSIDE LIABILITIES (C = A + B)	**99.52**	**80.90**	**272.16**	**504.82**	**501.29**	**481.35**	**438.03**	**396.06**	**353.57**	**311.10**	**268.64**
NET WORTH:											
Share Capital	12.50	64.87	64.87	64.87	64.87	64.87	64.87	64.87	64.87	64.87	64.87
Other Equity	-	59.69	59.69	59.69	59.69	59.69	59.69	59.69	59.69	59.69	59.69
Share Premium	0.11	251.39	251.39	251.39	251.39	251.39	251.39	251.39	251.39	251.39	251.39
Changes in accounting policies	9.19	-	-	-	-	-	-	-	-	-	-
Surplus (+) or deficit (-) in Profit & Loss a/c	50.31	90.90	155.16	273.50	433.11	620.76	825.56	1,034.57	1,244.73	1,456.05	1,668.67
TOTAL NET WORTH (D)	**72.11**	**466.85**	**531.11**	**649.46**	**809.06**	**996.71**	**1,201.51**	**1,410.52**	**1,620.68**	**1,832.00**	**2,044.62**
TOTAL LIABILITIES (E = C + D)	**171.63**	**547.75**	**803.27**	**1,154.27**	**1,310.35**	**1,478.06**	**1,639.54**	**1,806.59**	**1,974.25**	**2,143.10**	**2,313.26**
ASSETS:											
Current Assets:											
Cash & Bank Balances	0.03	204.76	219.65	230.38	413.95	613.93	804.11	1,000.14	1,198.33	1,397.61	1,598.05
Raw Material & Consumables	52.24	56.42	66.00	99.96	120.75	125.74	133.73	140.96	147.38	153.81	160.25
Work In Progress	2.89	1.91	2.43	3.64	8.10	8.43	8.96	9.26	9.51	9.76	10.01
Finished Goods	20.55	27.44	36.39	54.49	47.17	49.95	53.07	56.91	60.47	64.04	67.63
Other Current Assets	27.91	86.40	86.40	86.40	86.40	86.40	86.40	86.40	86.40	86.40	86.40
Debtors	22.11	35.95	39.14	60.06	58.95	62.93	66.91	70.89	74.46	78.01	81.56
TOTAL CURRENT ASSETS	**125.72**	**412.87**	**450.01**	**534.94**	**735.33**	**947.37**	**1,153.18**	**1,364.55**	**1,576.54**	**1,789.63**	**2,003.90**

FIXED ASSETS:											
Gross Block (Land & Building, Machinery)	43.02	54.53	179.53	179.53	635.38	635.38	635.38	635.38	635.38	635.38	635.38
Less: Accumulated Depreciation	4.59	10.14	14.27	21.71	66.04	110.36	154.69	199.02	243.34	287.59	331.69
Net Block	**38.43**	**44.40**	**165.25**	**157.82**	**569.34**	**525.01**	**480.69**	**436.36**	**392.03**	**347.79**	**303.69**
Capital Work In Progress	0.16	41.90	182.34	455.85	-	-	-	-	-	-	-
Right of Use assets	5.42	2.42	2.42	2.42	2.42	2.42	2.42	2.42	2.42	2.42	2.42
Other Intangible assets	0.16	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
Capital Advances	0.14	42.91	-	-	-	-	-	-	-	-	-
Deferred Tax Assets	-	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Deposits	1.61	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39
Other Non Current Assets	-	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Long term Investments										-	-
TOTAL ASSETS	**171.64**	**547.75**	**803.28**	**1,154.28**	**1,310.35**	**1,478.06**	**1,639.54**	**1,806.59**	**1,974.25**	**2,143.10**	**2,313.26**

Annexure 7: Projected Cashflow Statement – Consolidated (1.2 GW Cell + 1.0 GW Module + 0.6 GW Module)

INR Crores

Particulars	Prov.	Projected								
	31/Mar/26	31/Mar/27	31/Mar/28	31/Mar/29	31/Mar/30	31/Mar/31	31/Mar/32	31/Mar/33	31/Mar/34	31/Mar/35
Cash Flow from Operations										
Profit After Tax	90.90	64.26	118.34	159.60	187.65	204.80	209.01	210.16	211.32	212.62
Depreciation	5.86	4.14	7.44	44.33	44.33	44.33	44.33	44.33	44.24	44.11
Change in Working Capital	-71.92	5.09	-38.97	-30.19	-7.66	-9.62	-7.98	-6.96	-6.95	-6.95
Total Cashflow from Operations	**24.84**	**73.48**	**86.81**	**173.74**	**224.32**	**239.51**	**245.36**	**247.52**	**248.61**	**249.78**
Cash Flow from Investing										
Changes in Fixed Assets	-8.95	-125.00	-	-455.85	-	-	-	-	-	-
Changes in WIP	-41.74	-140.44	-273.51	455.85	-	-	-	-	-	-
Change in Long term Investments	-43.83	42.91	-	-	-	-	-	-	-	-
Total Cashflow from Investing	**-94.51**	**-222.53**	**-273.51**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Cash Flow from Financing										
Changes in Promoter Contribution	52.37	-	-	-	-	-	-	-	-	-
Changes in Share Premium	251.28	-	-	-	-	-	-	-	-	-
Changes in Other Equity	9.38	-	-	-	-	-	-	-	-	-
Changes in Accounting Policies	-9.19	-	-	-	-	-	-	-	-	-
Transfer of Internal Accruals to Expansion project										
Changes in Term Loan	2.16	113.23	172.43	-5.17	-49.33	-49.33	-49.33	-49.33	-49.33	-49.33
Changes in Other term liabilities	3.59	-	-	-	-	-	-	-	-	-
Changes in Working Capital Loan	-34.88	50.71	25.00	15.00	25.00	-	-	-	-	-
Changes in USL	-	-	-	-	-	-	-	-	-	-
Total Cash Flow from Financing	**274.71**	**163.94**	**197.43**	**9.83**	**-24.33**	**-49.33**	**-49.33**	**-49.33**	**-49.33**	**-49.33**

Net Cash Flow	205.04	14.90	10.73	183.57	199.98	190.18	196.03	198.19	199.28	200.44
Opening Cash Balance	0.03	204.76	219.65	230.38	413.95	613.93	804.11	1,000.14	1,198.33	1,397.61
Closing Cash Balance	205.07	219.65	230.38	413.95	613.93	804.11	1,000.14	1,198.33	1,397.61	1,598.05

Annexure 8: Projected Financial Highlights – Consolidated (1.2 GW Cell + 1.0 GW Module + 0.6 GW Module)

Particulars	Audited	Prov.	Projected								
	31/Mar/ 25	31/Mar/ 26	31/Mar/ 27	31/Mar/ 28	31/Mar/ 29	31/Mar/ 30	31/Mar/ 31	31/Mar/ 32	31/Mar/ 33	31/Mar/ 34	31/Mar/ 35
Net Sales	453.31	850.64	963.09	1,470.08	1,441.39	1,536.75	1,632.45	1,728.46	1,814.61	1,900.47	1,986.53
EBITDA	70.75	121.18	84.64	154.51	262.79	299.24	317.73	320.38	319.10	317.54	315.92
EBITDA Margin	*15.61%*	*14.25%*	*8.79%*	*10.51%*	*18.23%*	*19.47%*	*19.46%*	*18.54%*	*17.59%*	*16.71%*	*15.90%*
PBT	60.78	110.40	75.54	140.05	185.76	221.84	244.44	251.16	253.95	256.54	259.12
Net Profit	50.31	90.90	64.26	118.34	159.60	187.65	204.80	209.01	210.16	211.32	212.62
Net Profit Margin	*11.10%*	*10.69%*	*6.67%*	*8.05%*	*11.07%*	*12.21%*	*12.55%*	*12.09%*	*11.58%*	*11.12%*	*10.70%*
Cash Accrual	54.74	96.76	68.40	125.78	203.93	231.98	249.13	253.34	254.49	255.56	256.73
Share Capital	12.50	64.87	64.87	64.87	64.87	64.87	64.87	64.87	64.87	64.87	64.87
Unsecured Loans from promoters	-	-	-	-	-	-	-	-	-	-	-
Reserves and Surplus	50.31	90.90	155.16	273.50	433.11	620.76	825.56	1,034.57	1,244.73	1,456.05	1,668.67
Total Net Worth (TNW)	62.81	155.77	220.03	338.38	497.98	685.63	890.43	1,099.44	1,309.60	1,520.92	1,733.54
Term Loan	18.42	18.00	131.23	303.66	298.50	249.16	199.83	150.50	101.16	51.83	2.50
Debt-Equity Ratio	0.29	0.12	0.60	0.90	0.60	0.36	0.22	0.14	0.08	0.03	0.00
Total Outside Liabilities (TOL)	99.52	80.90	272.16	504.82	501.29	481.35	438.03	396.06	353.57	311.10	268.64
TOL/ TNW	1.58	0.52	1.24	1.49	1.01	0.70	0.49	0.36	0.27	0.20	0.15
Cash / Bank Balance	0.03	204.76	219.65	230.38	413.95	613.93	804.11	1,000.14	1,198.33	1,397.61	1,598.05
Current Ratio	1.58	7.11	3.29	2.72	3.03	3.48	4.14	4.78	5.39	5.98	7.80
Interest Coverage Ratio	12.75	24.61	17.07	22.02	8.04	9.05	10.97	12.87	15.32	18.95	24.90
DSCR	12.37	17.95	15.33	24.31	7.71	3.53	3.94	4.19	4.43	4.70	5.01
Minimum DSCR						3.53					
Average DSCR						4.87					

IRR	*52.71%*										
COC	*11.36%*										
Contribution	74.61	124.97	84.95	155.30	278.13	314.06	334.09	337.40	336.61	335.53	334.40
Contribution Margin	*16.46%*	*14.69%*	*8.82%*	*10.56%*	*19.30%*	*20.44%*	*20.47%*	*19.52%*	*18.55%*	*17.66%*	*16.83%*
BEP in Sales	84.07	99.12	106.64	144.28	478.69	451.27	438.05	441.82	445.61	447.41	447.18
BEP in % Installed Capacity	*18.55%*	*11.65%*	*11.07%*	*9.81%*	*33.21%*	*29.37%*	*26.83%*	*25.56%*	*24.56%*	*23.54%*	*22.51%*
Cash BEP in Sales	57.19	59.26	59.72	73.88	248.97	234.37	221.46	214.74	206.65	196.82	185.16
Cash BEP in % Installed Capacity	*12.62%*	*6.97%*	*6.20%*	*5.03%*	*17.27%*	*15.25%*	*13.57%*	*12.42%*	*11.39%*	*10.36%*	*9.32%*
Margin of Safety in Sales	369.24	751.52	856.45	1,325.80	962.69	1,085.48	1,194.40	1,286.63	1,369.00	1,453.06	1,539.35
Margin of Safety in Installed Capacity	*81.45%*	*88.35%*	*88.93%*	*90.19%*	*66.79%*	*70.63%*	*73.17%*	*74.44%*	*75.44%*	*76.46%*	*77.49%*

LIMITING CONDITIONS

The revenue and cost estimates for the proposed project are given on the basis of assumptions and not on the basis of actual calculations. The revenue and costs considered are based on the findings from primary survey and secondary research, as detailed in the methodology section. There may be changes in the revenue and cost estimates depending on the market conditions. The revenue and costs are comparable to the industry benchmarks.

BASIS:

D&B-India's assumptions are based on the information obtained from owners, prevailing rules and regulations of statutory authorities, prevailing site conditions on the date of inspection.

DOCUMENTATION:

D&B-India does not normally read leases or documents of title. D&B-India assumes, unless informed to the contrary, that each Structure has good and marketable title, that all documentation are satisfactorily drawn and that there are no encumbrances, restrictions, easements or other outgoing of an onerous nature which would have a material effect on the value of interest under consideration, nor material litigation pending. Where D&B-India has been provided with documentation, D&B-India recommends that reliance should not be placed on its interpretation without verification by legal advisors.

TOWN PLANNING AND OTHER STATUTORY REGULATIONS:

D&B-India recommends that verification be obtained from legal advisors to the effect that:

i The position is correctly stated in the report.

ii The property is not adversely affected by any other decision made, or conditions prescribed by public authorities.

iii There are no outstanding statutory notices.

iv. D&B-India's reports are prepared on the basis that the Owners comply with all relevant statutory regulations, including enactment relating to fire regulations, safety and environmental considerations and stipulation of respective statutory provisions.

PHYSICAL SURVEYS:

D&B-India has not carried out Physical Survey and leveling exercise of the Structures and advice Owners to carry out actual Physical Survey of the site along with levels if desired. This report is based on documents forwarded to D&B-India by Owners, Government Records made available to D&B-India and on D&B-India's cursory inspection of site.

STRUCTURAL SURVEYS:

D&B-India has not carried out a structural survey, nor has D&B-India tested the services of the Owners and D&B-India therefore does not give any assurance that any Structure or the immoveable assets are free from defects. In D&B-India's general observations, the Structures are erected normally and appear to have been maintained properly. However, no guarantee or opinion can be inferred about the conditions of Structure and Machinery about safe working of the same.

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D&B-India does not normally carry out investigations on site to ascertain whether any Structure was constructed or altered using deleterious materials or techniques (including, by way of example high alumina cement concrete, wood wool as permanent shuttering, calcium chloride or asbestos). Unless D&B-India was otherwise informed, our report is on the basis that no such materials or techniques have been used.

SITE CONDITIONS:

D&B-India has not carried out investigations on site in order to determine the suitability of ground conditions and services for the purposes for which they are, or are intended to be put, to use, nor does D&B-India undertake archaeological, ecological or environmental surveys. Unless D&B-India is otherwise informed, D&B-India's report is on the basis that these aspects are satisfactory and that, where development is contemplated, no extraordinary expenses or delays will be incurred during the construction period due to these or any other matters related to site.

ENVIRONMENTAL CONTAMINATION:

D&B-India has not carried out physical site surveys or environmental assessments, or investigated historical records, to establish whether any land or premises are, or have been, contaminated. Therefore, unless advised to the contrary, D&B-India's report is carried out on the basis that properties are not affected by environmental contamination.

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