March 2025

Initiating Coverage

Waaree Energies

Executing Eclectic Energy Integration

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Nuvama Institutional Equities

WAAREE ENERGIES

INITIATING COVERAGE

BRAVE HEART

nuvama institutional equities

KEY DATA

Rating	BUY
Sector relative	Outperformer
Price (INR)	2,238
12 month price target (INR)	2,805
52 Week High/Low	3,743/2,026
Market cap (INR bn/USD bn)	643/7.4
Free float (%)	35.7
Avg. daily value traded (INR mn)	3,946.7

SHAREHOLDING PATTERN

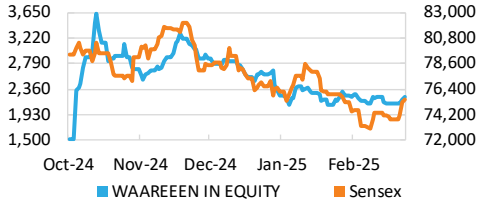
	Dec-24	Oct-24
Promoter	64.3%	64.3%
FII	1.4%	2.2%
DII	2.7%	3.0%
Pledge	0%	0%

FINANCIALS

(INR mn)

Year to March	FY24A	FY25E	FY26E	FY27E
Revenue	1,13,976	1,39,002	1,94,190	2,52,299
EBITDA	15,744	25,837	41,231	57,627
Adjusted profit	8,958	17,706	26,948	37,321
Diluted EPS (INR)	31.2	61.6	93.8	129.9
EPS growth (%)	78.0	97.7	52.2	38.5
RoAE (%)	21.9	30.1	31.4	30.3
P/E (x)	71.8	36.3	23.9	17.2
EV/EBITDA (x)	37.8	23.7	15.2	10.9
Dividend yield (%)	0	0	0	0

PRICE PERFORMANCE



Executing eclectic energy integration

Waaree is not just solar; it is strategically pivoting for exponential growth across the nascent, but multi-decadal renewable energy/green hydrogen opportunity. The company's ballooning capacity and burnishing DCR-linked realisation underpin our FY24–27E revenue/EBITDA CAGR of 30%/54%. The cell plant start-up would fast-charge EBITDA by INR20bn in FY26E (we model in only INR8bn).

Margins would moderate over medium term, but comprehensive integration—G H2, electrolysers, inverters, battery, BESS, RE—shall help sustain growth and de-risk. Meanwhile, early-stage high-growth industry life cycle calls for even higher valuation. Initiating with a *BRAVEHEART* 'BUY' (TP: INR2,805); *caveat emptor*: imponderable risks.

Backward integration to fuel 54% CAGR in EBITDA over FY24–27E

We expect Waaree's FY24–27E revenue/EBITDA to gallop at a 30%/54% CAGR driven by a 25%/8x/6GW surge in module/cells/new wafer capacity. Moreover, given premium realisation pump-primed by government support—ALMM, DCR mandates for module/cells—we reckon Waaree's EBITDA margin shall surge to 23% by FY27E (closest peer Premier Energies clocked 30% in Q3FY25). That said, we expect margins to peak at 24% by FY28E as competition rises for modules and import tariffs fall.

All-round strategy to de-risk and sustain growth at modest margins

Waaree is prudently executing a long-term strategy of becoming a horizontally and vertically integrated New Energy play. It is foraying into production of green hydrogen (G H2), electrolysers, advanced li-ion cells, inverters and BESS. The strategy of scaling up operations by entering new-age areas shall tie up multi-decadal growth and enable it to achieve the targeted 20% sustainable EBITDA margin.

Y2K-like early-stage, multi-decadal opportunity

We liken Indian New Energy's currently early life-cycle stage of potentially exponential and multi-decadal growth opportunity to the Y2K-like technology (IT) opportunity of the 1990s. We feel India's solar sector is on the cusp of a mammoth J-curve breakout, which shall usher in an even larger G H2 prospect, and eventually pave the way for India to emerge a global behemoth in green ammonia (G NH3).

Valuation: High potential returns, strong balance sheet, high RoE

Much like the IT sector's valuation trend during Y2K, Waaree's high 24x FY25E EV/EBITDA factors in explosive growth with a subsequent earnings catch-up. Based on our projections of a 54% EBITDA CAGR, strong cash flow, a robust balance sheet and an RoE of 30%-plus, we reckon EV/EBITDA will correct to a reasonable 11x FY27E.

Imponderables: We gauge sensitivities and attempt to build them in

Inevitably, new industries raise imponderable risks—eventual import tariffs cut, technological upgrades and potential modules overcapacity. We attempt to factor in those and also provide a valuation sensitivity at different growth rates (exhibit 14) with a base case of a modest nominal free cash flow CAGR of 17% over FY24–45E.

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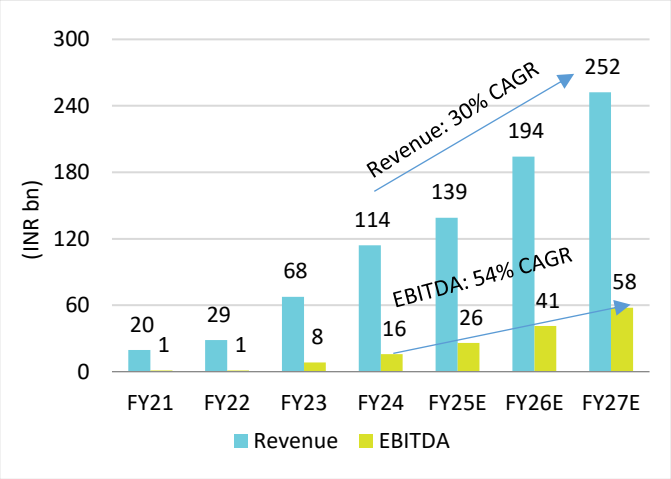
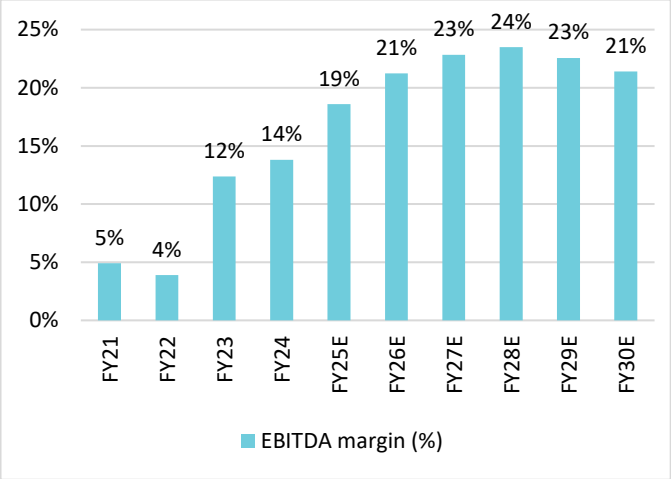
The Story in Charts: Exponential volume and margin-driven growth

Exhibit 1: Revenue/EBITDA CAGR of 30%/54% in FY24–27E…



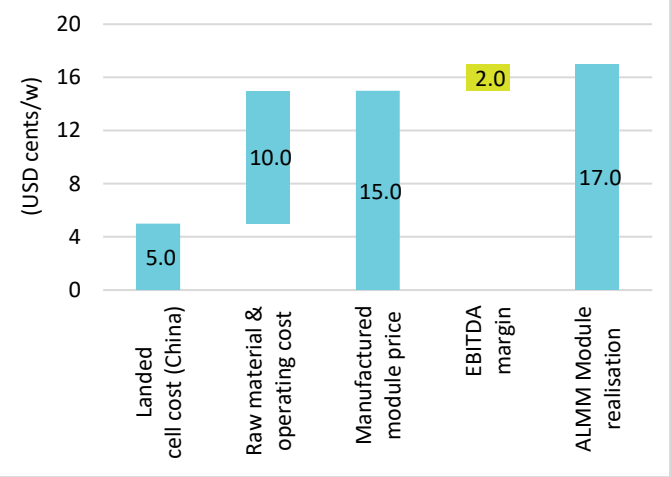
Source: Company, Nuvama Research

Exhibit 2: …with EBITDA margin peaking at 24% by FY28E



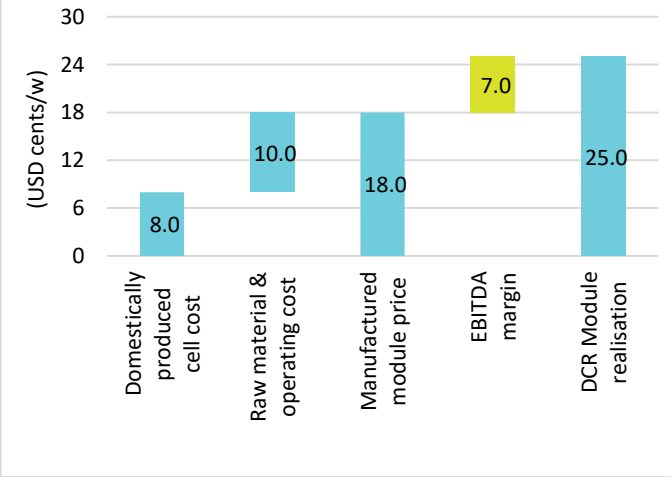
Source: Company, Nuvama Research

Exhibit 3: …pivoting away from modest-margin ALMM modules…



Source: Bloomberg, Industry, Nuvama Research

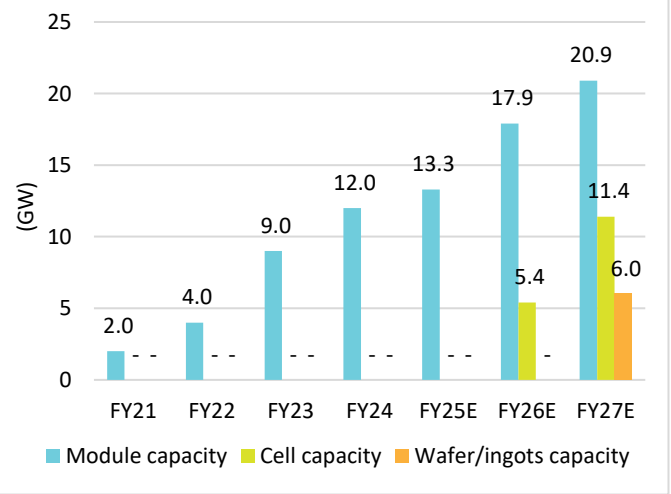
Exhibit 4: …to high-margin DCR modules*…



Source: Bloomberg, Industry, Nuvama Research

**** Conservatively, we bake in USD cent 2/w margin (INR8bn EBITDA) versus USD cent 7/w***

Exhibit 5: …backward-integrating to solar cells, wafers/ ingots



Source: Company, Nuvama Research

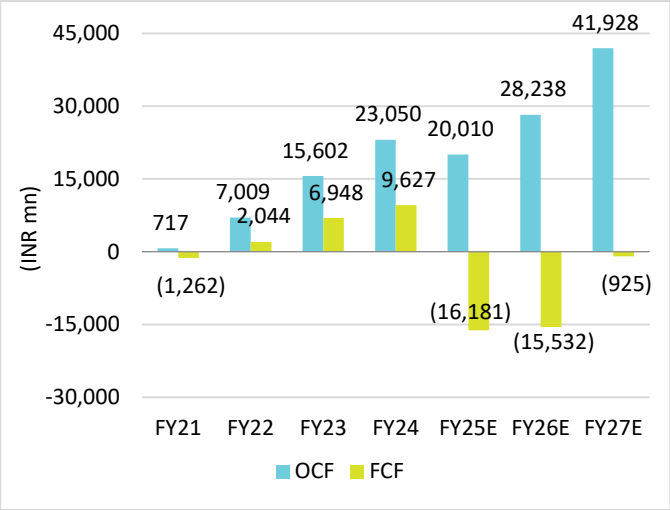
Exhibit 6: Expansion plan: As steady as a sunray

	Capacity (GW)	Update
Currently operational	13.3 (including Indosolar's 1.3GW)	
US (module)	1.6	Module manufacturing capacity in the US (Texas); commenced operations in Jan-25
Chikhli (cell)	5.4	Commenced commercial production of 1.4GW (mono PERC) cell facility in Feb-25 and is ramping up well; 4GW (TOPCon) cell facility to be commissioned by Apr-May'25.
Odisha (integrated)	6	Integrated facility in Odisha likely to be operational by 2027

Source: Company, Nuvama Research

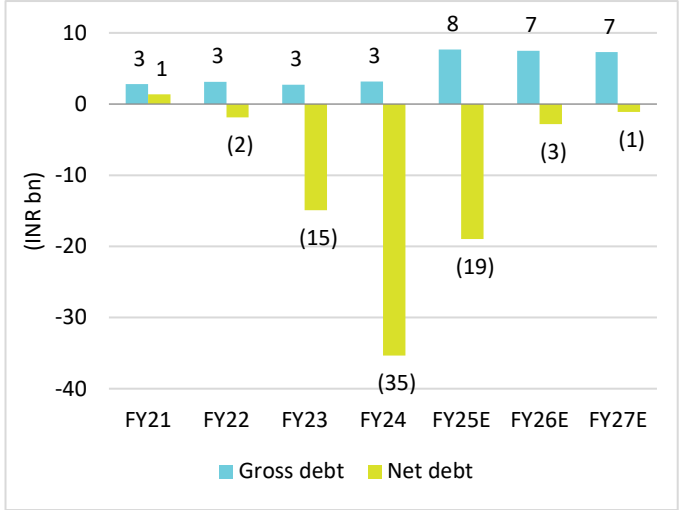
Radiating cash flows and profitability; bright comprehensive plan

Exhibit 7: Strong operating cash flows…



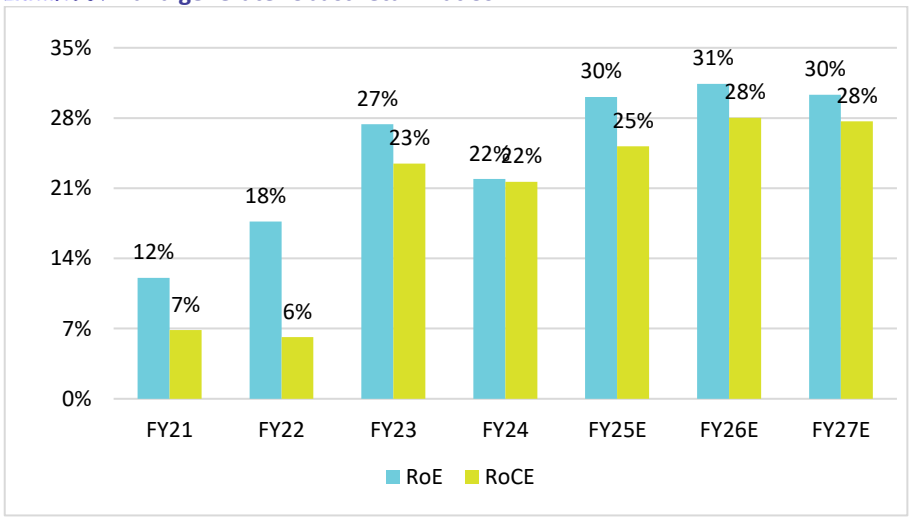
Source: Company, Nuvama Research

Exhibit 8: …shall conserve balance sheet strength…



Source: Company, Nuvama Research

Exhibit 9: …and generate robust return ratios



Source: Company, Nuvama Research

Exhibit 10: Comprehensive long-term strategy for sustaining growth/margin visibility

Source: Company, Nuvama Research

Valuation: DCF TP implies 25% upside potential; new industry life cycle

Exhibit 11: DCF-based SotP: INR2,805, 25% upside potential

Particulars	Value
Risk free rate	6.7%
Market risk premium	6.0%
Beta	1.3
WACC	12.4%
Terminal growth	3.5%
Equity value (INR/sh)	**2,646**
Other investments	160
Waaree Energies total Equity value (INR/sh)	**2,805**
CMP (INR/sh)	2,238
% upside	25%

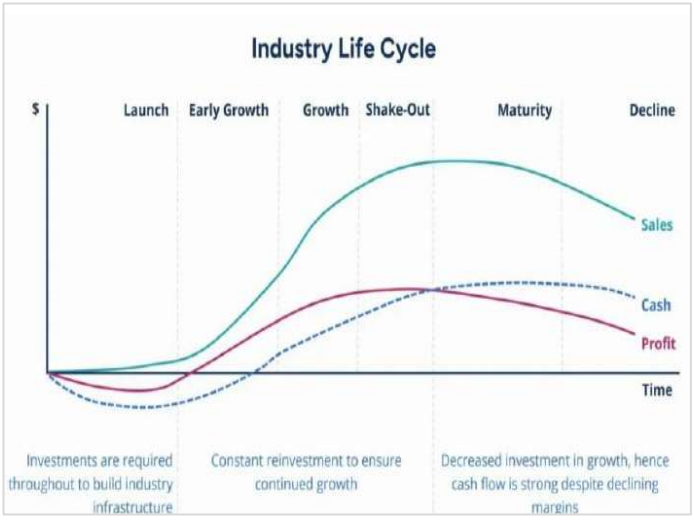
Source: Nuvama Research

Exhibit 12: Peer valuation – At a discount to domestic peer

	EV/EBITDA (x)		PER (x)	RoE (%)
Companies	**FY24**	**FY27E**	**FY27E**	**FY27E**
Premier Energie	102.3	14.4	28.1	31.0
Waaree Energie	37.8	10.9	17.2	30.3
India average	**73.3**	**12.1**	**20.9**	**32.2**
LONGi Green	5.2	8.3	21.0	9.3
Jinko Solar	5.1	5.1	15.4	13.3
Trina Solar	5.0	NM	9.8	11.3
JA Solar	3.5	3.4	8.5	12.6
China average	**4.7**	**5.6**	**13.7**	**11.6**
First Solar (US)	12.5	4.1	4.8	22.6
Global average	**30.1**	**7.3**	**13.1**	**22.1**

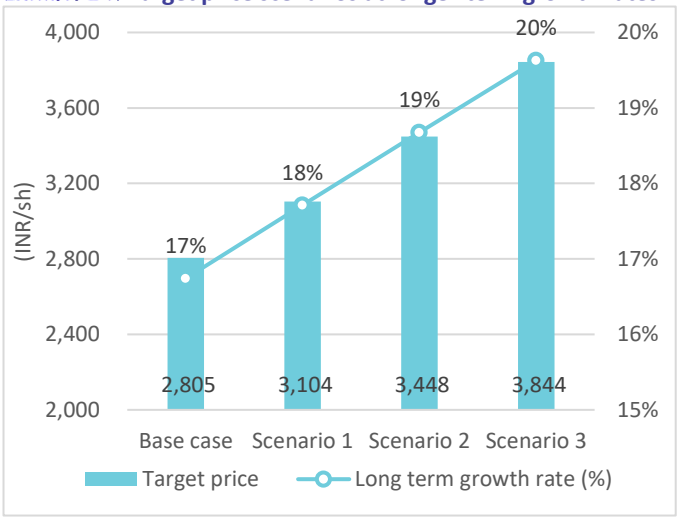
Source: Bloomberg, Company, Nuvama Research

Exhibit 13: Valuation case study: IT sector of early 2000s



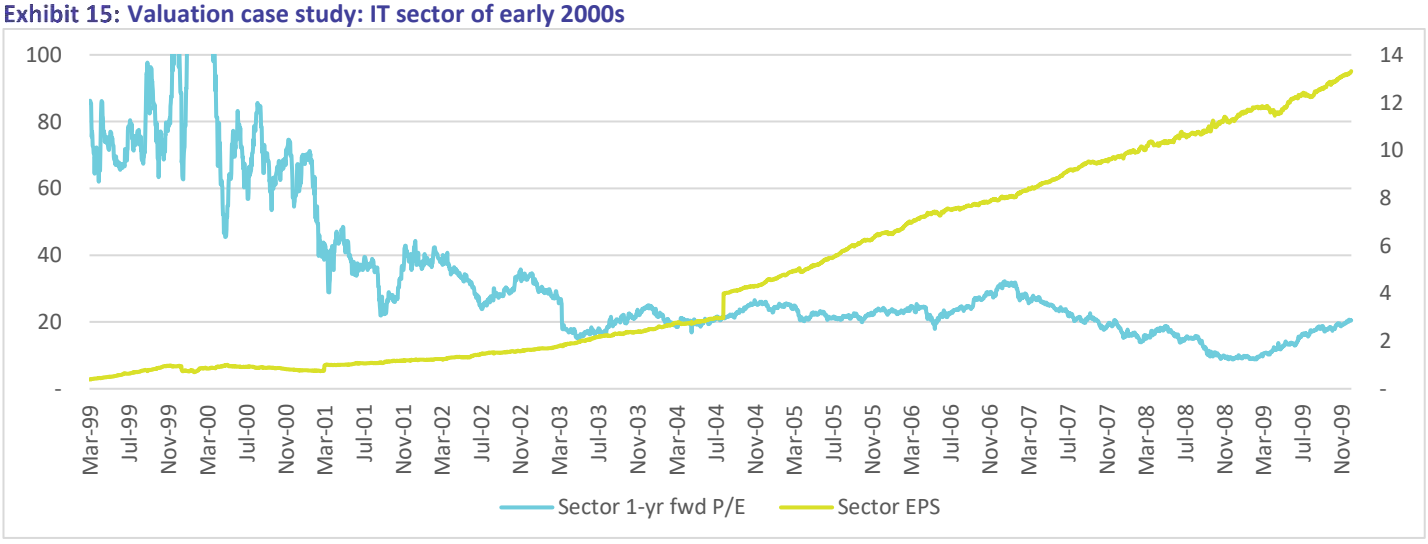
Source: Industry, Company, Nuvama Research

Exhibit 14: Target price scenarios at longer-term growth rates



Source: Nuvama Research

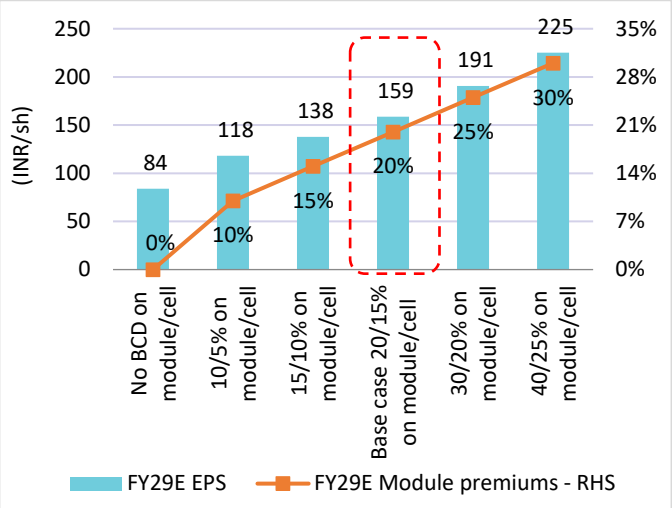
Exhibit 15: Valuation case study: IT sector of early 2000s



Source: Bloomberg, Company, Nuvama Research

Imponderable risks loom: Government support, module oversupply

Exhibit 16: Earnings sensitivity to tweaks in basic customs duty



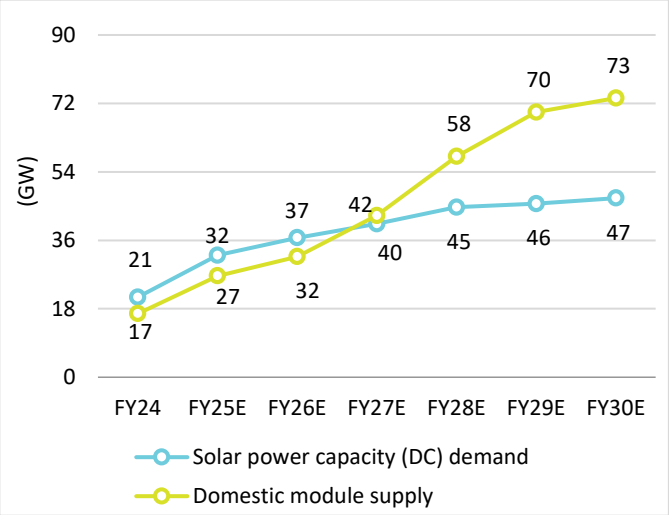
Source: Nuvama Research

Exhibit 17: Every 5% change in CU impacts EBITDA by 12%

Capacity utilisation (CU)	Mapping EBITDA to changes in capacity utilisation	
	FY27E (INR mn)	% change
42%	43,767	-24%
47%	50,697	-12%
52%	**57,627**	**0%**
57%	64,556	12%
62%	71,486	24%

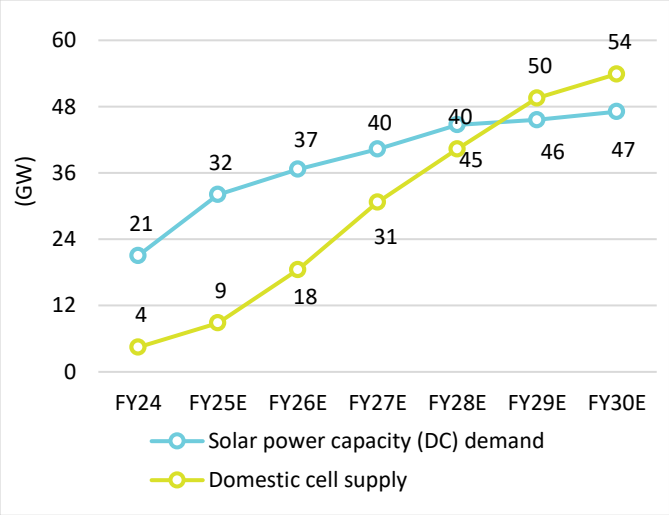
Source: Nuvama Research

Exhibit 18: Solar module overcapacity likely by FY27E…



Source: Company websites, Industry, Nuvama Research

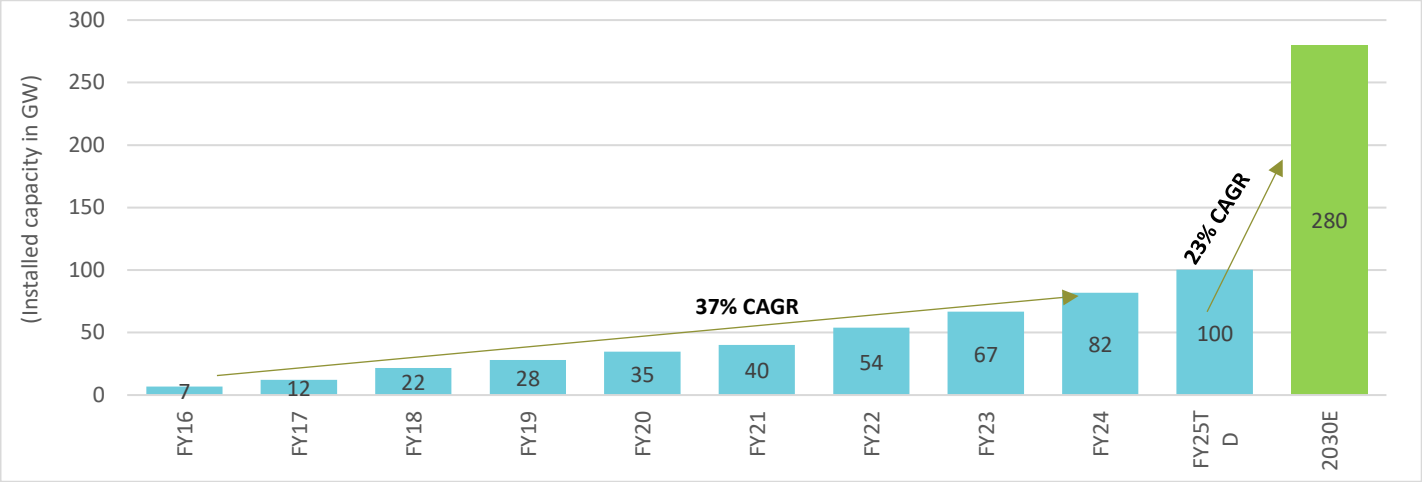
Exhibit 19: …while cell supply to be in deficit until FY29E



Source: Company websites, Industry, Nuvama Research

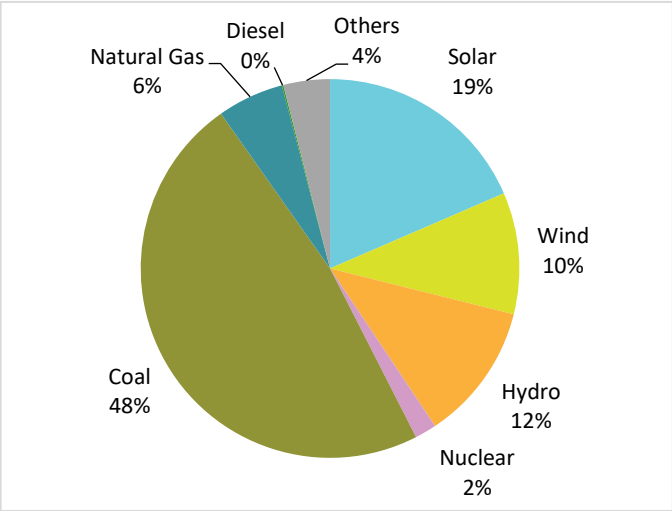
India solar opportunity: FDRE spurring strong solar growth

Exhibit 20: Government targets to achieve solar power capacity of ~280GW from 100GW in FY25TD (23% CAGR over FY25–30E)



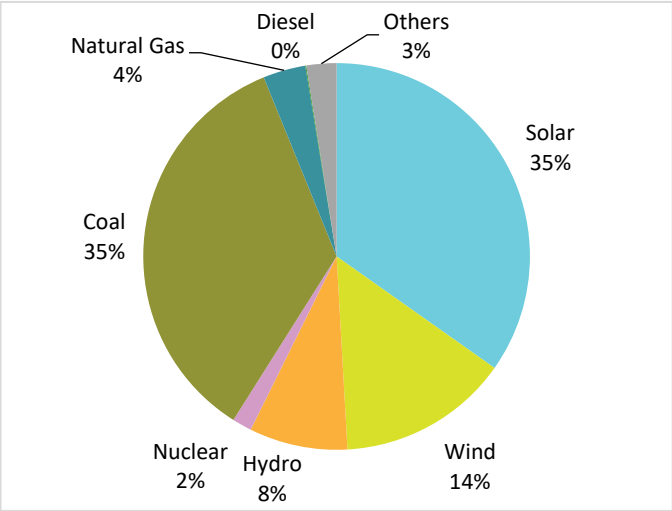
Source: MNRE, Nuvama Research

Exhibit 21: India's power mix: solar share 19% in FY24…



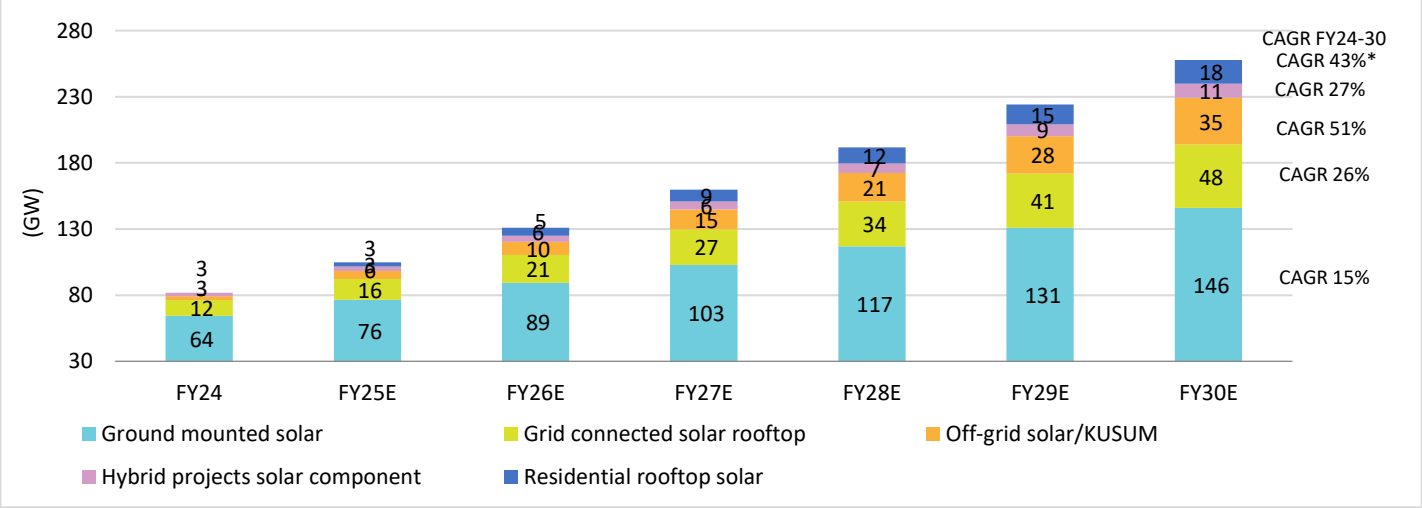
Source: CEA, Nuvama Research

Exhibit 22: …is likely to expand to 35% by FY30E



Source: CEA, Nuvama Research

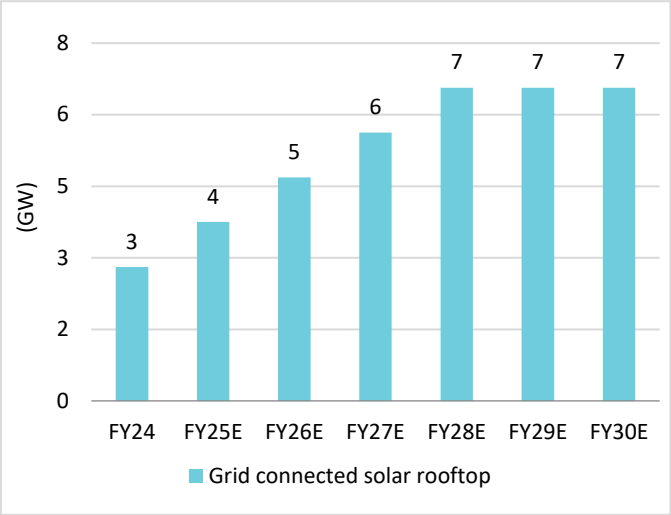
Exhibit 23: We estimate ground-mounted, rooftop and off-grid/KUSUM solar projects to drive solar capacity additions



Source: MNRE, Nuvama Research

**Note: FY25-30 CAGR since FY24 was NIL*

Exhibit 24: Grid connected rooftop to add 35GW capacity…

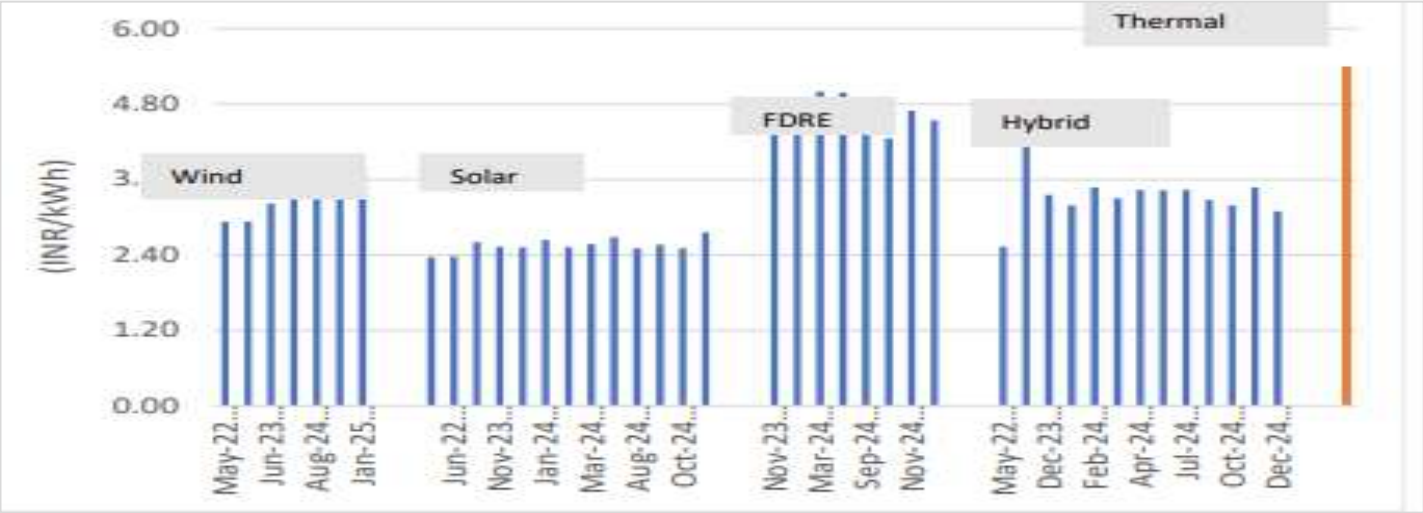


Source: MNRE, Nuvama Research

Exhibit 25: …while off-grid/KUSUM projects to add ~33GW

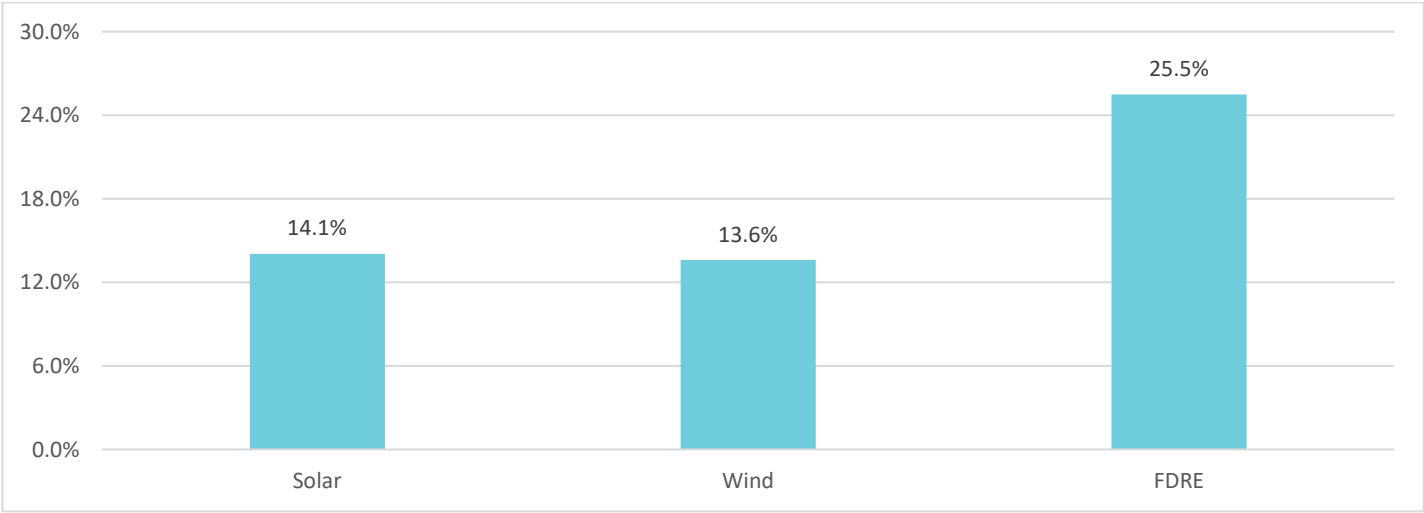
Source: MNRE, Nuvama Research

Exhibit 26: Solar power cheaper than alternatives, but intermittent; FDRE solutions offer huge potential for Waaree's BESS foray



Source: Elekor, Nuvama Research

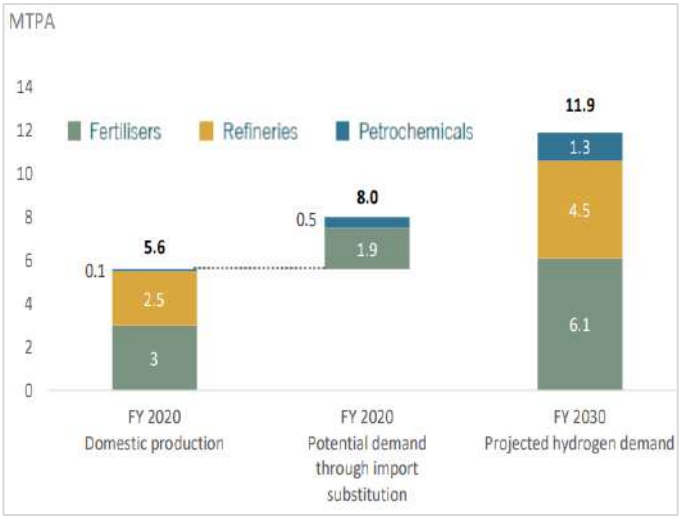
Exhibit 27: Average IRR highest for Firm and Dispatchable Renewable Energy (FDRE)



Source: Nuvama Research

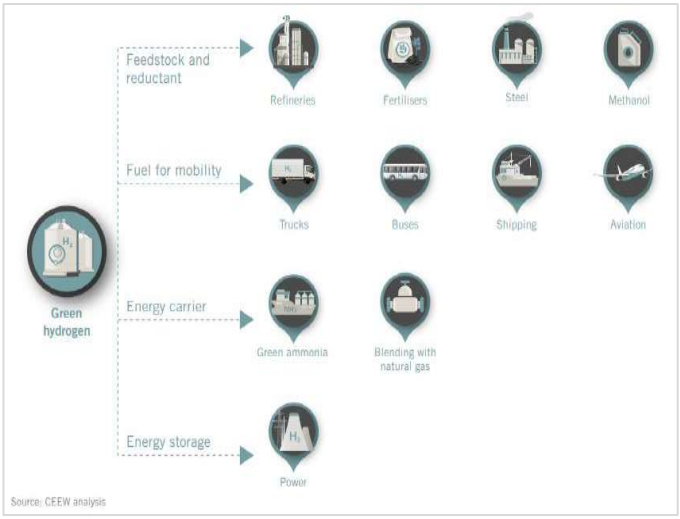
Green Hydrogen: Y2K-like multi-decadal opportunity for India

Exhibit 28: India's H2 demand to double by 2030



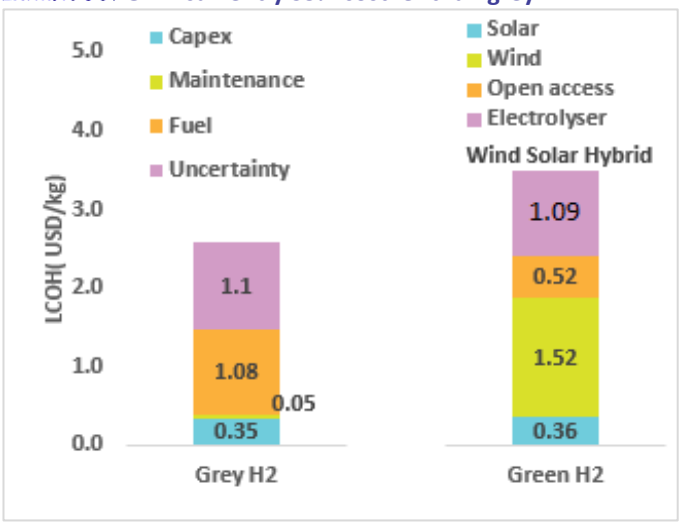
Source: Nuvama Research

Exhibit 29: Uses of G H2 as a decarbonisation tool



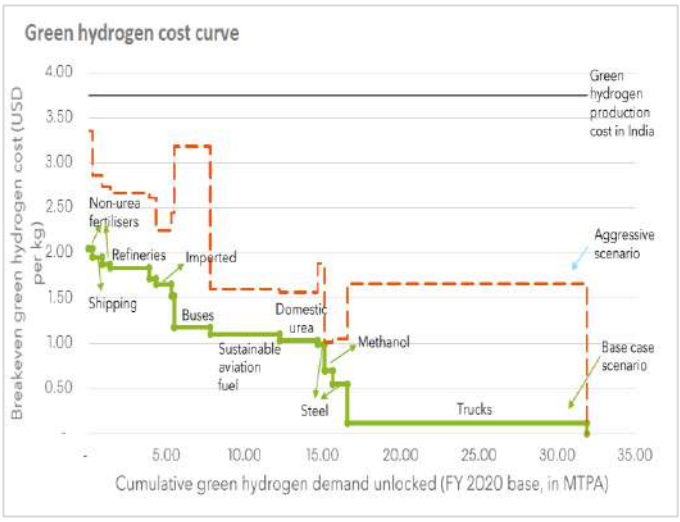
Source: Nuvama Research

Exhibit 30: G H2 currently 35% costlier than grey H2



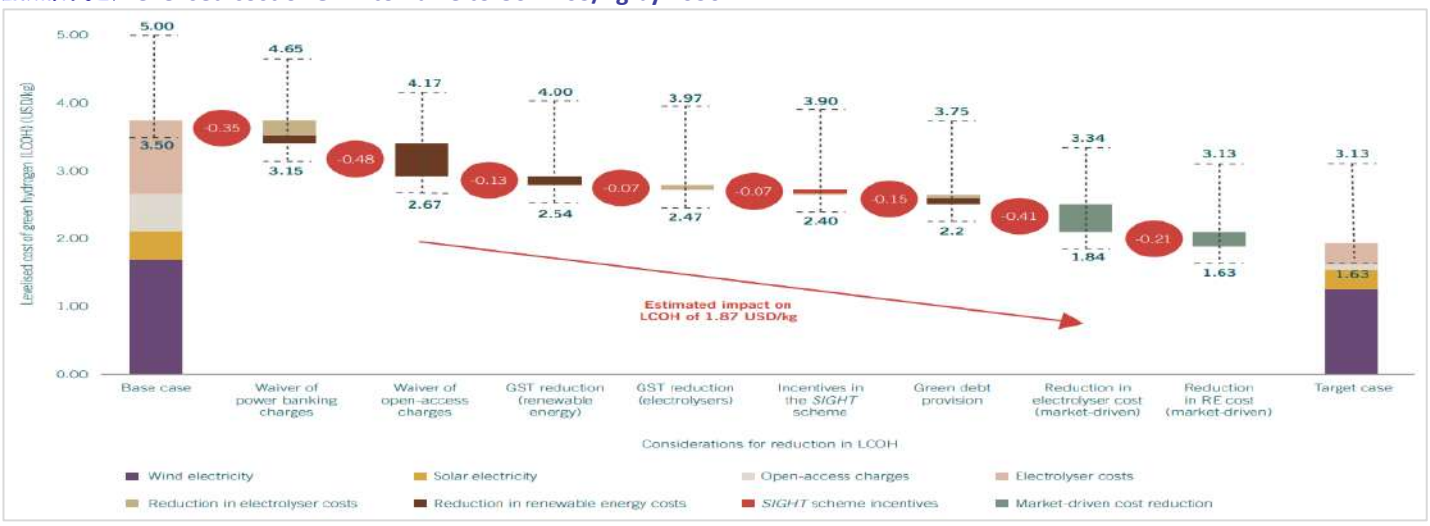
Source: Nuvama Research

Exhibit 31: G H2 sectoral breakeven cost curve



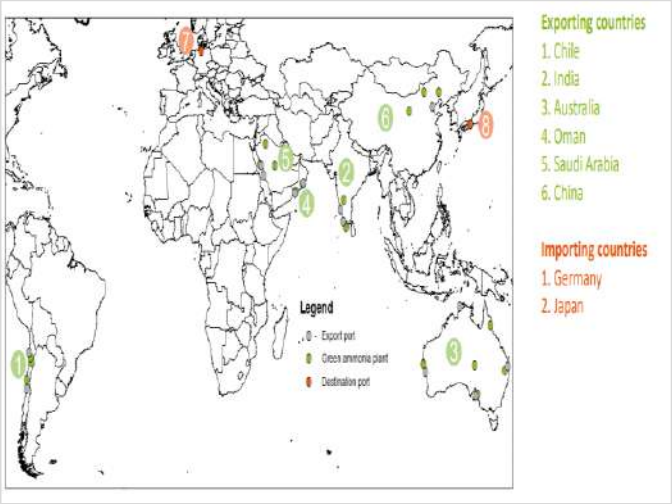
Source: Nuvama Research

Exhibit 32: Levelised cost of G H2 to halve to USD1.63/kg by 2030E



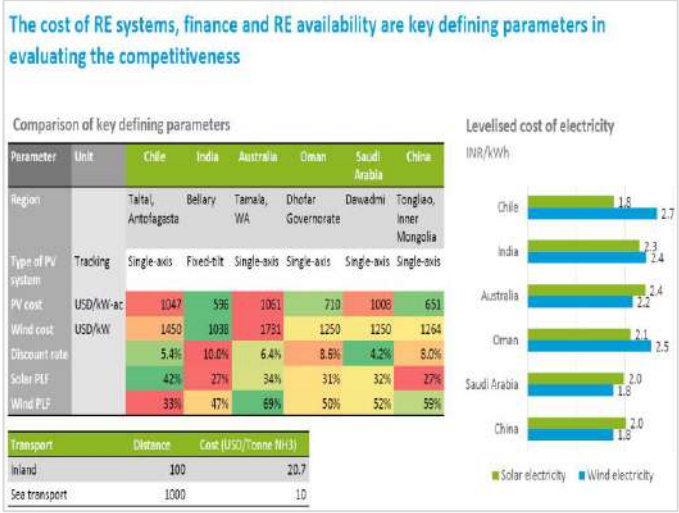
Source: Nuvama Research

Exhibit 33: Key exporter and importer countries of G H2/G-NH3



Source: Nuvama Research

Exhibit 34: India's costs lower: PV by 16–44%, wind by 17–40%

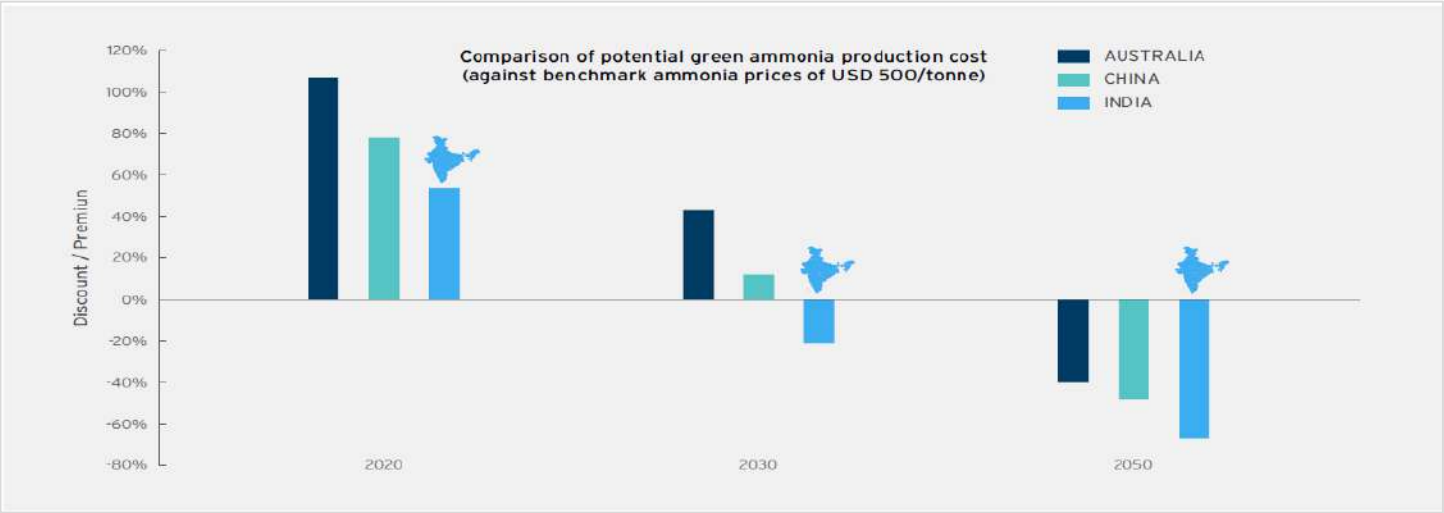


Parameter	Unit	Chile	India	Australia	Oman	Saudi Arabia	China
Region		Taltal, Antofagasta	Bellary	Tamala, WA	Dhofar Governorate	Dawadmi	TonglIao, Inner Mongolia
Type of PV system	Tracking	Single-axis	Fixed-tilt	Single-axis	Single-axis	Single-axis	Single-axis
PV cost	USD/kW-ac	1047	596	1061	710	1008	651
Wind cost	USD/kW	1450	1038	1731	1250	1250	1264
Discount rate		5.4%	10.0%	6.4%	8.6%	4.2%	8.0%
Solar PLF		42%	27%	34%	31%	32%	27%
Wind PLF		33%	47%	69%	50%	52%	59%

Transport	Distance	Cost (USD/Tonne NH3)
Inland	100	20.7
Sea transport	1000	10

Source: Nuvama Research

Exhibit 35: G NH3 production cost likely to be 29%/43% lower than China/Australia by 2030E



Source: Nuvama Research

Financial Statements

Income Statement (INR mn)

Year to March	FY24A	FY25E	FY26E	FY27E
Total operating income	1,13,976	1,39,002	1,94,190	2,52,299
Gross profit	26,378	43,427	63,528	84,479
Employee costs	1,772	2,951	3,953	4,863
Other expenses	8,862	14,638	18,343	21,989
EBITDA	15,744	25,837	41,231	57,627
Depreciation	2,768	3,459	6,315	9,410
Less: Interest expense	1,399	1,627	1,893	1,478
Add: Other income	2,352	3,527	3,880	4,268
Profit before tax	13,929	24,279	36,903	51,007
Prov for tax	4,598	6,111	9,289	12,839
Less: Other adj	3,413	0	0	0
Reported profit	12,372	17,706	26,948	37,321
Less: Excp.item (net)	(3,413)	0	0	0
Adjusted profit	8,958	17,706	26,948	37,321
Diluted shares o/s	287	287	287	287
Adjusted diluted EPS	31.2	61.6	93.8	129.9
DPS (INR)	0	0	0	0
Tax rate (%)	33.0	25.2	25.2	25.2

Balance Sheet (INR mn)

Year to March	FY24A	FY25E	FY26E	FY27E
Share capital	2,630	2,873	2,873	2,873
Reserves	38,249	55,955	82,903	1,20,224
Shareholders funds	40,878	58,828	85,776	1,23,096
Minority interest	607	607	607	607
Borrowings	3,173	7,673	7,474	7,303
Trade payables	20,138	21,972	30,038	38,581
Other liabs & prov	31,946	32,320	32,698	33,082
Total liabilities	1,13,137	1,37,993	1,73,389	2,19,670
Net block	14,364	30,823	48,594	62,767
Intangible assets	68	68	68	68
Capital WIP	13,413	29,686	49,369	68,640
Total fixed assets	27,844	60,577	98,031	1,31,474
Non current inv	3	3	3	3
Cash/cash equivalent	37,792	25,868	9,441	7,461
Sundry debtors	9,714	11,847	16,550	21,503
Loans & advances	1,015	1,035	1,056	1,077
Other assets	31,610	33,371	42,878	52,581
Total assets	1,13,137	1,37,993	1,73,389	2,19,670

Important Ratios (%)

Year to March	FY24A	FY25E	FY26E	FY27E
EBITDA margin (%)	13.8	18.6	21.2	22.8
Net profit margin (%)	7.9	12.7	13.9	14.8
Revenue growth (% YoY)	68.8	22.0	39.7	29.9
EBITDA growth (% YoY)	88.6	64.1	59.6	39.8
Adj. profit growth (%)	78.0	97.7	52.2	38.5

Free Cash Flow (INR mn)

Year to March	FY24A	FY25E	FY26E	FY27E
Reported profit	8,958	17,706	26,948	37,321
Add: Depreciation	2,768	3,459	6,315	9,410
Interest (net of tax)	1,240	0	0	0
Others	(865)	0	0	0
Less: Changes in WC	5,916	(1,617)	(5,692)	(5,651)
Operating cash flow	23,050	20,010	28,238	41,928
Less: Capex	(13,374)	(36,191)	(43,770)	(42,852)
Free cash flow	9,677	(16,181)	(15,532)	(925)

Assumptions (%)

Year to March	FY24A	FY25E	FY26E	FY27E
GDP (YoY %)	6.7	7.2	7.0	6.8
Repo rate (%)	6.5	6.0	5.0	4.5
USD/INR (average)	82.8	84.0	82.0	85.0
Module capacity (GW)	12.0	14.9	17.9	20.9
Cell capacity (GW)	-	-	5.4	11.4

Key Ratios

Year to March	FY24A	FY25E	FY26E	FY27E
RoE (%)	21.9	30.1	31.4	30.3
RoCE (%)	21.6	25.2	28.0	27.7
Inventory days	108	105	103	101
Receivable days	31	31	31	31
Payable days	84	84	84	84
Working cap (% sales)	13.5	12.5	12.0	11.6
Gross debt/equity (x)	0.1	0.1	0.1	0.1
Net debt/equity (x)	(0.8)	(0.3)	0	0
Interest coverage (x)	9.3	13.8	18.4	32.6

Valuation Metrics

Year to March	FY24A	FY25E	FY26E	FY27E
Diluted P/E (x)	71.8	36.3	23.9	17.2
Price/BV (x)	15.7	10.9	7.5	5.2
EV/EBITDA (x)	37.8	23.7	15.2	10.9
Dividend yield (%)	0	0	0	0

Valuation Drivers

Year to March	FY24A	FY25E	FY26E	FY27E
EPS growth (%)	78.0	97.7	52.2	38.5
RoE (%)	21.9	30.1	31.4	30.3
EBITDA growth (%)	88.6	64.1	59.6	39.8
Payout ratio (%)	0	nm	nm	nm

Source: Company and Nuvama estimates

Investment Rationale

Earnings outlook robust; a multi-decadal opportunity

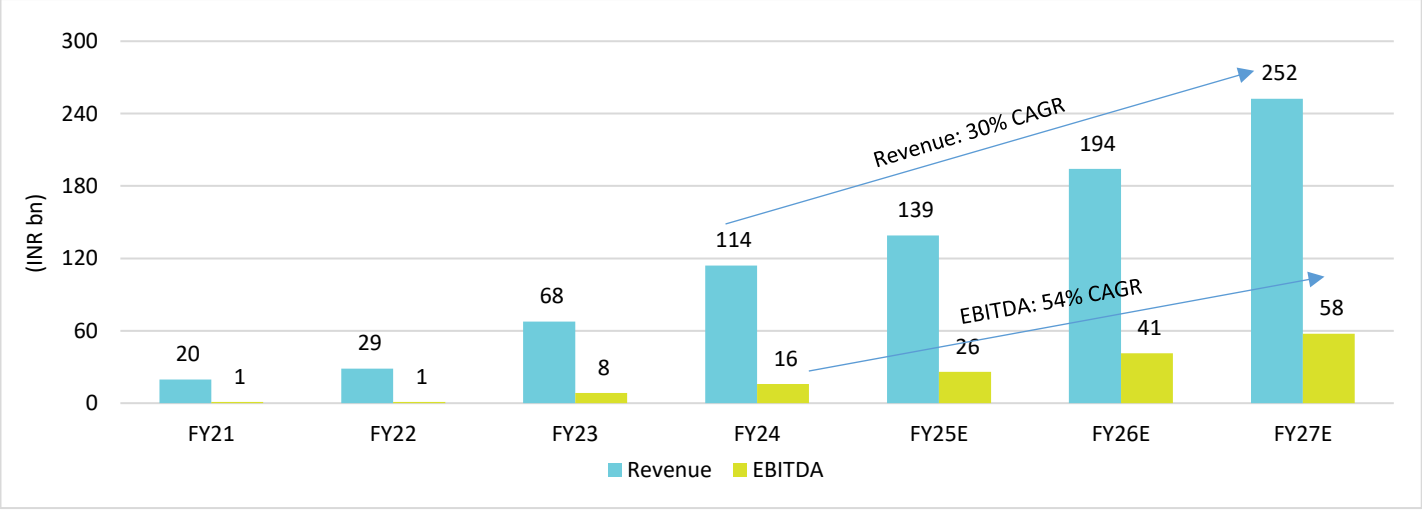
- Waaree's FY24–27E revenue/EBITDA to surge at 30%/54% CAGR driven by a sizable order book of 26.5GW valued at INR500bn
- EBITDA margin to jump from 14% in FY24 to 23% by FY27E driven by backward integration and operating leverage; shift from moderate-margin ALMM modules to high-margin DCR modules shall lift both realisation and margins
- Competitiveness vis-a-vis peers likely to improve due to capacity expansion and backward integration to solar cells and wafers/ingots; solar module/cell/wafer capacity to burgeon post-expansion to 21GW/11GW/6GW
- Enhanced profitability shall power strong cash flows, and beef up balance sheet and return ratios; CF to cover higher capex needs and investments in allied areas
- Horizontal and vertical integration shall differentiate its long-term strategy, de-risk business and sustain growth; Waaree offers a multi-decadal opportunity

Revenue/EBITDA to scorch ahead at 30%/54% CAGR over FY24–27E

We estimate Waaree's EBITDA would surge at a 54% CAGR over FY24–27E, increasing from INR16bn to INR58bn driven by a robust 30% CAGR in revenue. Our growth estimates are based on the company's strong order book of 26.5GW at the end of 9MFY25 valued at INR500bn.

Waaree's EPC arm, Waaree Renewables Technologies (WRTL), is also growing rapidly, and we expect strong 49% CAGR growth in its EPC business over FY24–27E based on its strong order book of 3.4GW at end-9MFY25.

Exhibit 36: Revenue/EBITDA to scorch ahead at 30%/54% CAGR over FY24–27E

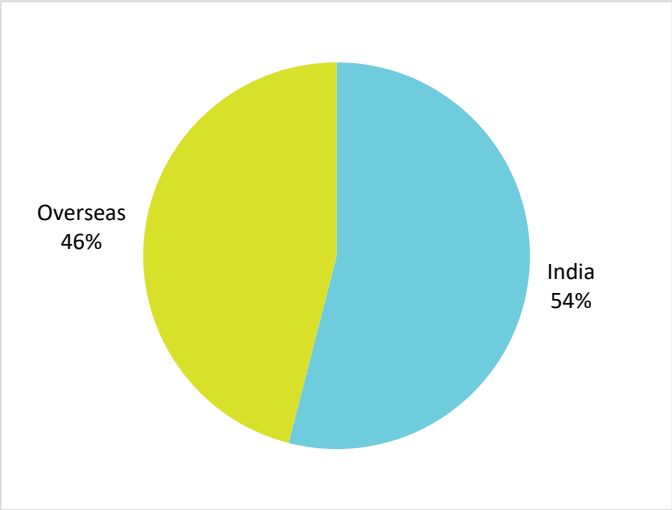


Source: Company, Nuvama Research

Exhibit 37: Order book strong at 26.5GW valued at INR500bn

Source: Company, Nuvama Research

Exhibit 38: 9MFY25 order book split



Source: Company, Nuvama Research

Margins to surge over FY24–27E

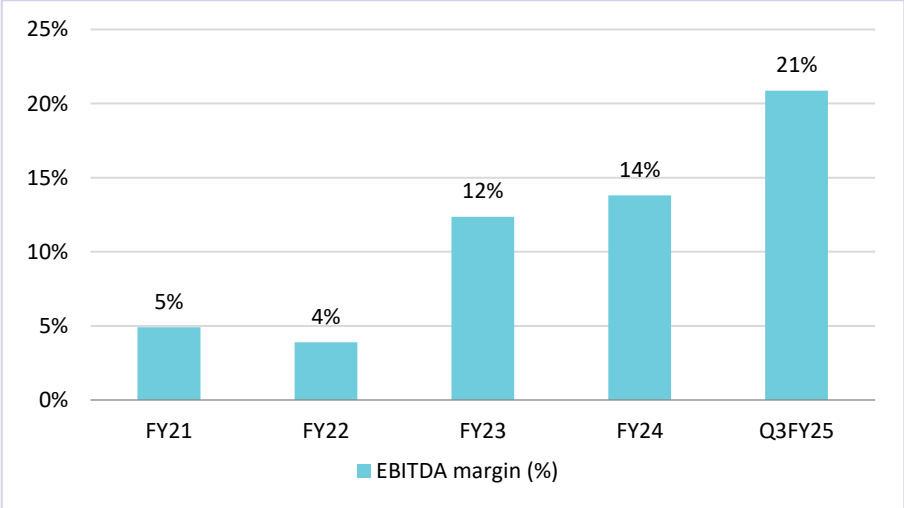
Waaree's EBITDA margin quadrupled from 5% in FY21 to 21% in Q3FY25 driven by:

i) a 7x jump in capacity from 2GW in FY21 to 13.3GW in Q3FY25, as operating leverage improved;

ii) better realisations for ALMM-compliant modules in the domestic market; and

iii) higher realisation for exports.

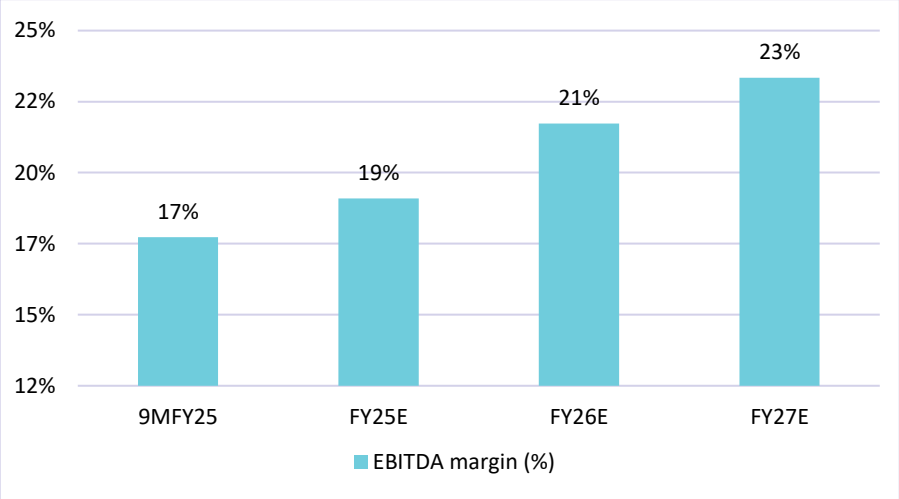
Exhibit 39: EBITDA margin quadruples from 5% in FY21 to 21% in Q3FY25



Source: Company, Nuvama Research

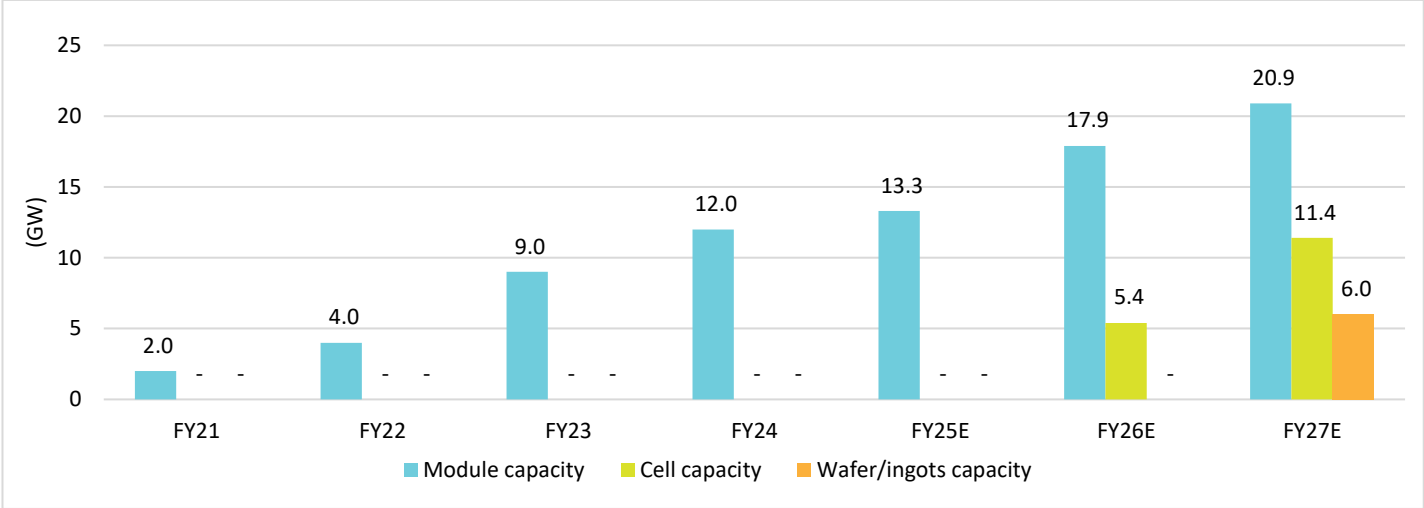
We expect Waaree's EBITDA margin to rise further to 23% by FY27E given its plans to: i) expand solar module capacity to 21GW, and ii) backward integrate into high-margin solar cell manufacturing capacity of 11GW and 6GW wafer capacity by FY27E.

Exhibit 40: We estimate EBITDA margin would rise further to 23% by FY27E



Source: Company, Nuvama Research

Exhibit 41: Waaree to benefit from solar module capacity expansion and backward integration to solar cells and wafers/ingots



Source: Company, Nuvama Research

Exhibit 42: Update on capacity expansion and backward integration

	Capacity (GW)	Update
Currently operational	13.3 (including Indosolar's 1.3GW)	
US (module)	1.6	Module manufacturing capacity in the US (Texas); commenced operations in Jan-25
Chikhli (cell)	5.4	Commenced commercial production of 1.4GW (mono PERC) cell facility in Feb-25 and is ramping up well; 4GW (TOPCon) cell facility to be commissioned by Apr–May'25
Odisha (integrated)	6	Integrated facility in Odisha likely to be operational by 2027

Source: Company, Nuvama Research

Backward integration to enhance competitiveness

Waaree plans to backward-integrate its module capacity by commissioning a 5.4GW solar cell facility in Gujarat by early-Q1FY26E and 6GW of wafer, cell and module integrated facility in Odisha by FY27E. We believe backward integration into solar cells shall be margin-accretive as the share of DCR-compliant modules is set to rise, yielding higher realisation (USD0.25/w versus ALMM-compliant module at USD0.17/w).

Given Waaree manufactures only solar modules, its EBITDA margin (21% in Q3FY25/17% in 9MFY25) has lagged those of integrated peers such as Premier Energies (30% in Q3FY25/26/43% in 9MFY25) and Websol (46% in Q3FY25/43% in 9MFY25). Hence, once backward-integrated, not only would Waaree's competitiveness improve vis-à-vis its integrated peers, but its profitability shall too.

Exhibit 43: Waaree's EBITDA margins lag integrated peers

Company	FY24	H1FY25	Q3FY25	9MFY25
Waaree	14%	15%	21%	17%
Premier	15%	23%	30%	26%
Websol	-29%	42%	46%	43%

Source: Company, Nuvama Research

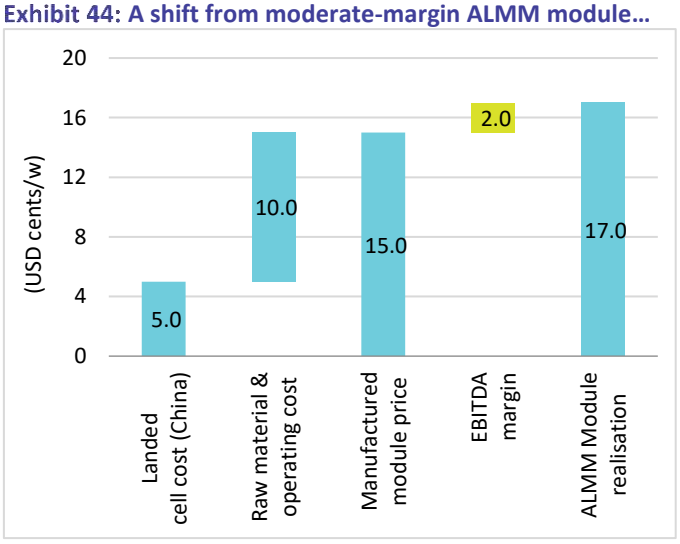
We delineate a few scenarios comparing EBITDA margins for ALMM-compliant solar modules (using solar cells imported from China) and DCR solar modules (using captive solar cells).

With a realisation of USD0.17/w for domestically manufactured ALMM-compliant modules, a domestic manufacturer would generate EBITDA of USD0.02/w, implying a 12% EBITDA margin. Post-backward integration, Waaree's solar modules would be DCR-compliant, which shall attract higher realisation of USD0.25/w, thereby generating EBITDA of USD0.07/w, translating to an EBITDA margin of 28%.

The shift from moderate-margin ALMM modules to manufacturing high-margin DCR modules shall improve Waaree's EBITDA margin by USD0.05/w, but we conservatively assume margin improvement of only USD0.02/w in FY26E, which shall improve its blended EBITDA margin by 268bp in FY26E to 21% from 19% in FY25E.

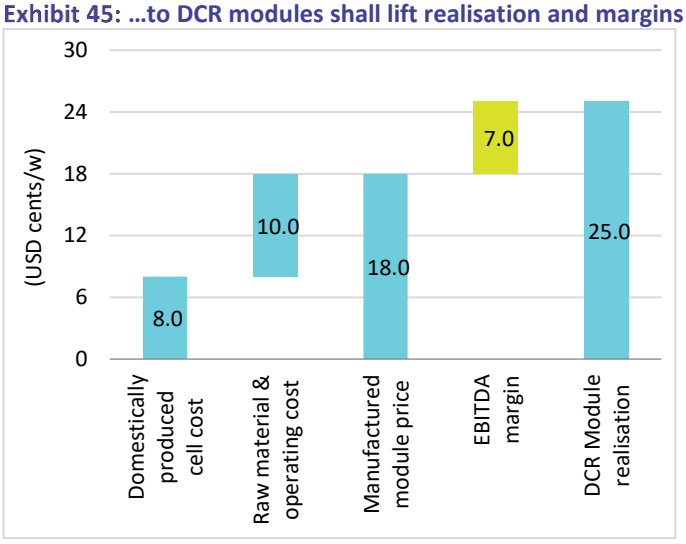
We reckon 85% cell capacity utilisation of its 5.4GW cell facility shall help Waaree generate incremental annual EBITDA of INR20bn. Even so, we factor in conservative incremental EBITDA of INR8bn with total EBITDA estimated at INR41bn in FY26E.

Exhibit 44: A shift from moderate-margin ALMM module…



Source: Bloomberg, Industry, Nuvama Research

Exhibit 45: …to DCR modules shall lift realisation and margins



Source: Bloomberg, Industry, Nuvama Research

High-margin cell start-up to be margin-accretive as well

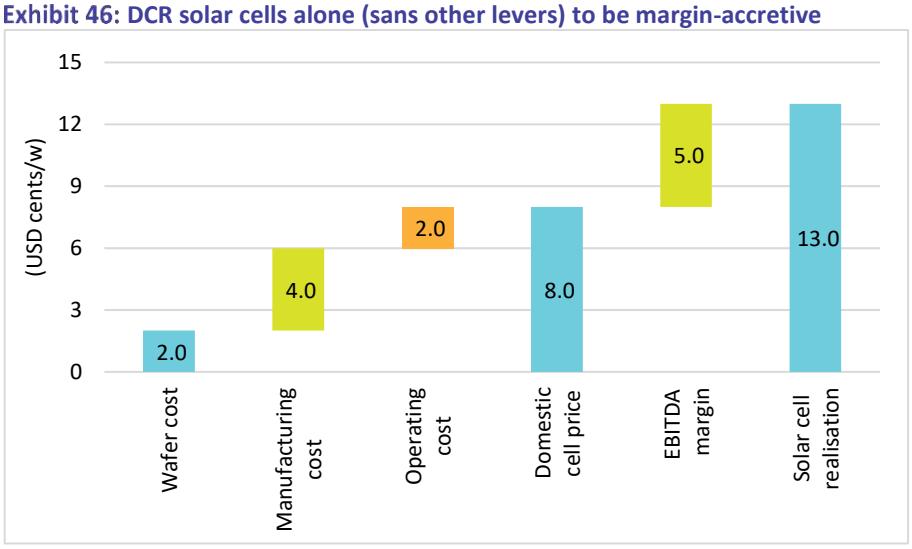
DCR-compliant modules must use domestically manufactured solar cells. That said, given India's current solar cell capacity of ~8GW (end-FY24) eclipsed by demand for solar cells of >35GW annually, a gaping demand-supply gap exists.

This demand-supply gap is likely to keep solar cell prices in the domestic market elevated as we estimate solar cell supply shall not outpace demand at least until FY28E; as new capacities come up, FY29E shall mark a crossover in demand-supply.

Accordingly, we argue the start-up of Waaree's solar cell manufacturing capacity by early Q1FY26E presents an excellent opportunity for the company to exploit: i) superior solar cell realisations of USD0.13/w; and ii) introduction of ALMM-List II for cells, which takes effect from June 1, 2026.

At current DCR solar cell price of USD0.13/w (versus USD0.05/w, >2.5x higher than solar cells imported from China), domestic solar cell manufacturers can generate EBITDA of USD0.05/w, which would ratchet up margins as well.

Exhibit 46: DCR solar cells alone (sans other levers) to be margin-accretive



Source: Bloomberg, Industry, Nuvama Research

Volumes to follow as competition rises and barriers fall

While government policies stoked demand for solar modules, the combination of ALMM and the DCR mandate and lack of domestic capacity has fuelled realisation and profitability of solar modules and cells manufactured domestically.

Eying superior returns of domestically manufactured modules and cells, many entities announced solar module and cell capacities. As per the capacities announced so far, we estimate solar module installed capacity would rise to 123GW while solar cell capacity is likely to burgeon to 55GW by FY27E, from 63GW and 8GW in FY24 respectively.

However, with the rise in installed capacity and increase in availability of supply of solar module and cells, we expect higher competitive intensity to start affecting margins FY28E onwards.

Importantly, as the Indian solar industry achieves production at scale for solar modules and cells, we believe there would be a looming risk of government phasing out the BCD of 40% on solar modules/25% on cells. While phasing out of BCD is anyone's guess, we have factored in a gradual decline in BCD for modules and cells from FY28E, which in turn should further intensify competition.

Exhibit 47: Domestic solar module manufacturing capacity to burgeon from 63GW in FY24 to 123GW by FY27E

	India module manufacturing capacity						
(GW)	**FY24**	**FY25E**	**FY26E**	**FY27E**	**FY28E**	**FY29E**	**FY30E**
Reliance New Energy	-	5.0	10.0	15.0	20.0	20.0	20.0
Waaree Energies	12.0	13.3	17.9	20.9	23.9	25.9	27.9
Premier Energies	4.1	4.1	5.1	7.1	9.1	9.1	9.1
Adani Mundra PV	4.0	6.0	8.0	8.0	10.0	10.0	10.0
ReNew Power	6.4	6.4	6.4	7.4	8.4	9.4	10.4
Goldi Solar	3.3	6.3	6.3	6.3	6.3	6.3	6.3
Jupiter Solar	-	-	3.6	3.6	3.6	4.6	5.6
Websol	0.6	0.6	0.6	0.6	0.6	0.6	0.6
RenewSys	2.5	3.5	3.5	3.5	4.5	5.5	5.5
Solex Energy	0.7	1.5	1.5	2.5	4.0	4.0	4.0
Tata Power Solar	4.7	4.7	4.7	4.7	4.7	4.7	4.7
First Solar	3.3	3.3	3.5	3.5	3.5	3.5	3.5
Rayzon Solar	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Saatvik Green Energy	1.2	3.8	3.8	3.8	4.8	5.8	6.8
Grew Solar	1.2	2.8	2.8	4.0	4.0	5.0	6.0
Gautam Solar	1.0	2.0	2.0	3.0	3.0	4.0	5.0
Others	14.1	19.1	22.1	25.1	29.1	32.1	35.1
Total	**63.0**	**86.4**	**105.8**	**123.0**	**143.5**	**154.5**	**164.5**

Source: Company websites, Industry, Nuvama Research

Exhibit 48: Solar cell capacity additions to touch 55GW by FY27E

	India cell manufacturing capacity						
(GW)	**FY24**	**FY25E**	**FY26E**	**FY27E**	**FY28E**	**FY29E**	**FY30E**
Reliance New Energy	-	-	5.0	10.0	15.0	20.0	20.0
Waaree Energies	-	-	5.4	11.4	14.4	17.4	19.4
Premier Energies	2.0	2.0	3.0	7.0	7.0	7.0	7.0
Adani Mundra PV	4.0	6.0	8.0	10.0	10.0	10.0	10.0
ReNew Power	-	2.5	2.5	3.5	4.5	5.5	6.5
Goldi Solar	-	-	-	-	2.0	3.0	4.0
Jupiter Solar	1.0	1.0	1.0	1.0	2.0	4.0	7.0
Websol	0.6	0.6	1.2	1.2	1.2	1.2	1.2
RenewSys	-	-	-	-	1.8	1.8	1.8
Solex Energy	-	-	-	1.0	1.0	2.0	2.0
Tata Power Solar	0.5	4.0	4.0	4.0	4.0	4.0	4.0
Saatvik Green Energy	-	-	-	1.0	2.0	4.0	4.0
Grew Solar	-	-	-	-	2.8	2.8	2.8
Gautam Solar	-	-	-	1.0	1.0	2.0	2.0
Others	-	-	3.2	4.2	5.2	5.2	6.2
Total	**8.1**	**16.1**	**33.3**	**55.3**	**73.9**	**89.9**	**97.9**

Source: Company websites, Industry, Nuvama Research

Feasibility of Waaree's US facility uncertain after IRA halt

The erstwhile Biden administration had enacted the Inflation Reduction Act (IRA), which offers funding, programmes and incentives to accelerate the transition to a clean energy economy and drive significant deployment of new clean electricity resources.

It also allows taxpayers to deduct a portion of their costs from their federal taxes via investment and production tax credits until the end of 2032. Solar module and cell manufacturers are thus eligible to avail credits of USD7cents/w and USD4cents/w on production of solar modules and cells, respectively.

Exhibit 49: Eligible production credits for manufacturers across solar PV chain

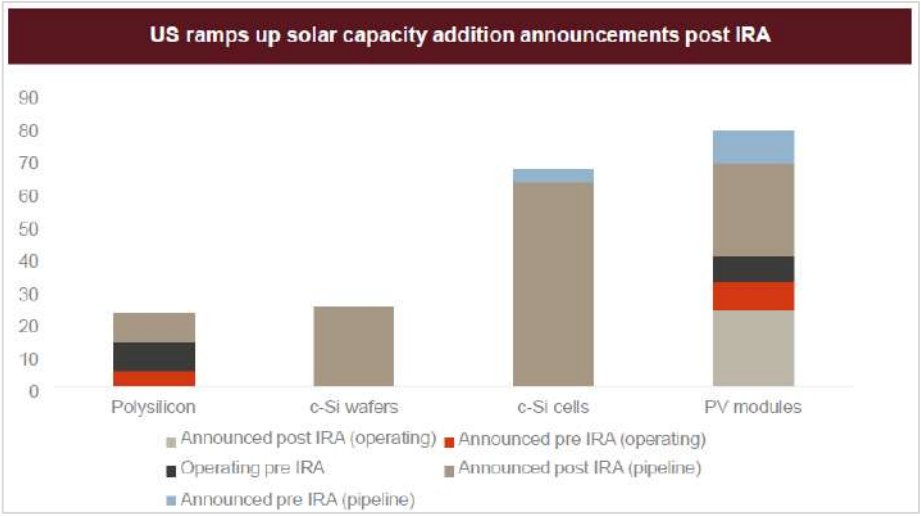
Component	UoM	Amount
Module	US cents/w	7
Cell	US cents/w	4
Wafer	USD/m^2	12
Polysilicon	USD/kg	3

Source: Nuvama Research

The new Trump administration has paused all disbursements under the IRA and directed all government agencies to review their processes and policies. Waaree had recently commissioned a 1.6GW module manufacturing facility in the US, which now faces imponderable uncertainty regarding its profitability as IRA benefit of USD7cents/w is unlikely to offset the incremental cost of operating a facility in the US over India, leading to margin dilution at the consolidated level.

Capacity to the tune of 150–155GW across the module supply chain was announced post-IRA to give local manufacturing segment push, however only 16% of the capacity was operational by Aug-24 (largely modules capacity of 23–25GW). Waaree's export volumes are also likely to be affected as solar IPPs in the US may delay or outright abandon their plans to commission solar power plants if there is a full withdrawal of IRA benefits.

Exhibit 50: 150–155GW of capacity announced post-IRA; only 16% operational

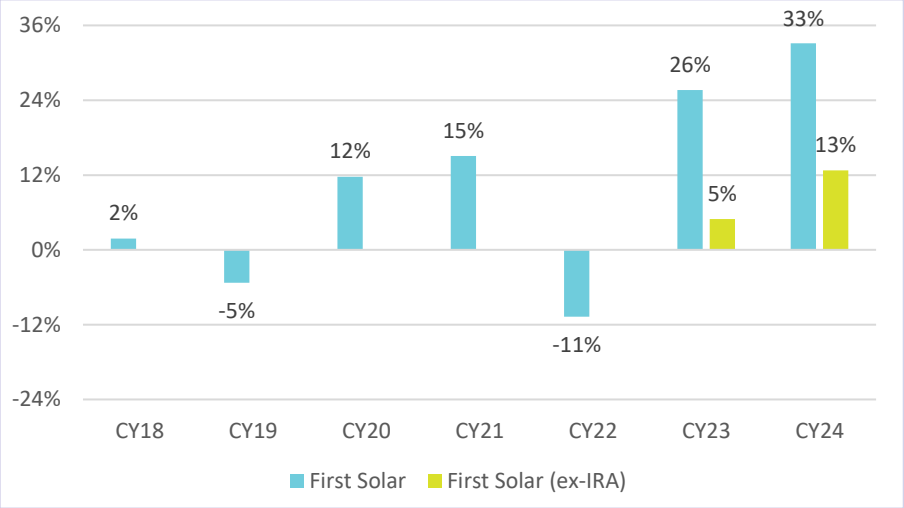


Source: CRISIL MI&A Research, Nuvama Research

On the flip side, First Solar, a module manufacturer in the US, has reported volatile EBITDA margins over the past few years. Pre-covid margins were a measly single digit while post-covid averages higher due to commodity inflation. CY23/24 margins at 26%/33% were primarily on account of IRA incentive while ex-IRA EBITDA margin stood at 5%/13%, lower than domestic margins.

As a silver lining, in case the US raises the import tariffs, Waaree is likely to preserve its US export volumes from India by servicing its customers from the US facility.

Exhibit 51: Ex-IRA margins for US facility likely to be lower than domestic



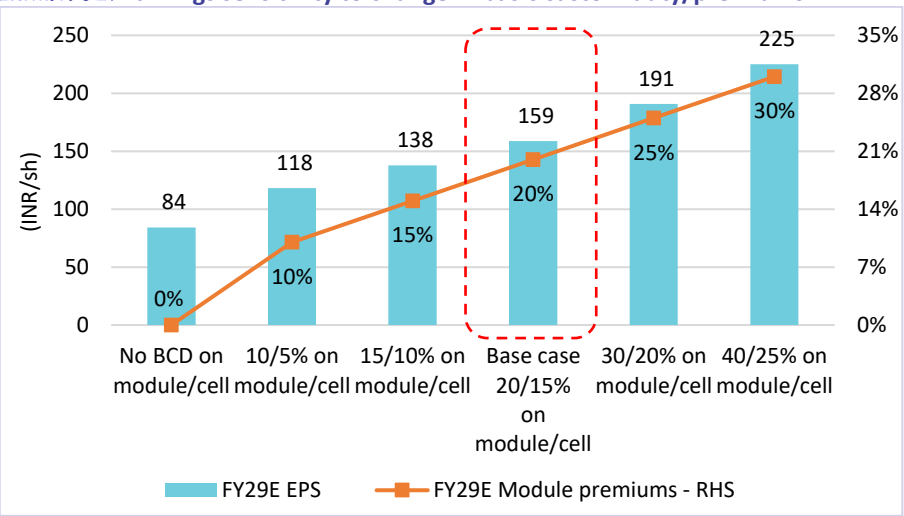
Source: Company, Nuvama Research

Key earnings sensitivity/scenarios

Impact on earnings with change in BCD

Based on our FY29E base-case BCD of 20%/15% on imports of solar modules/cells and a 20% premium pricing for modules, we reckon Waaree's EPS works out to INR159. If the current BCD of 40%/25% on modules/cells continues, our FY29E EPS shall rise by 42% to INR225, unleashing the upside risk to our estimates.

Exhibit 52: Earnings sensitivity to change in basic custom duty/premiums



Source: Nuvama Research

EBITDA sensitivity to capacity utilisation

Exhibit 53: 12% EBITDA impact for every 5% change in capacity utilisation

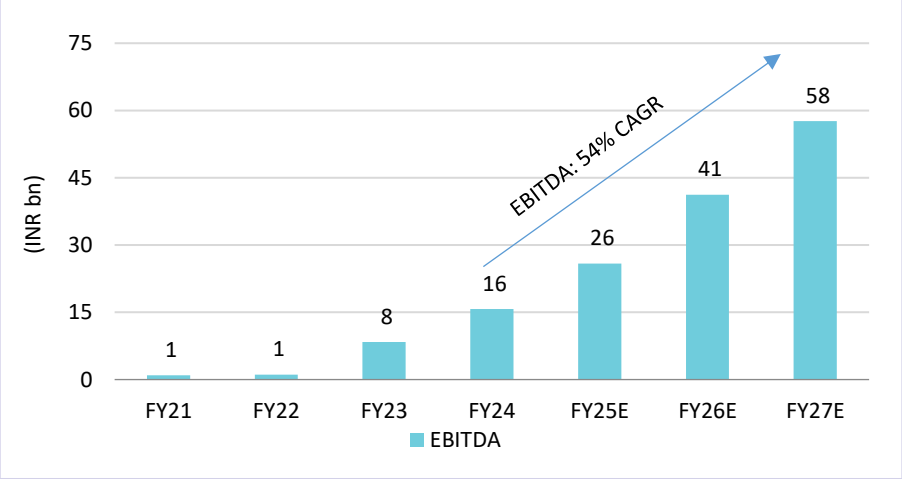
Impact of change in capacity utilisation	EBITDA impact	
	FY27E (INR mn)	% change
42%	43,767	-24%
47%	50,697	-12%
52%	**57,627**	**0%**
57%	64,556	12%
62%	71,486	24%

Source: Nuvama Research

Enhanced profitability to ensure balance sheet strength

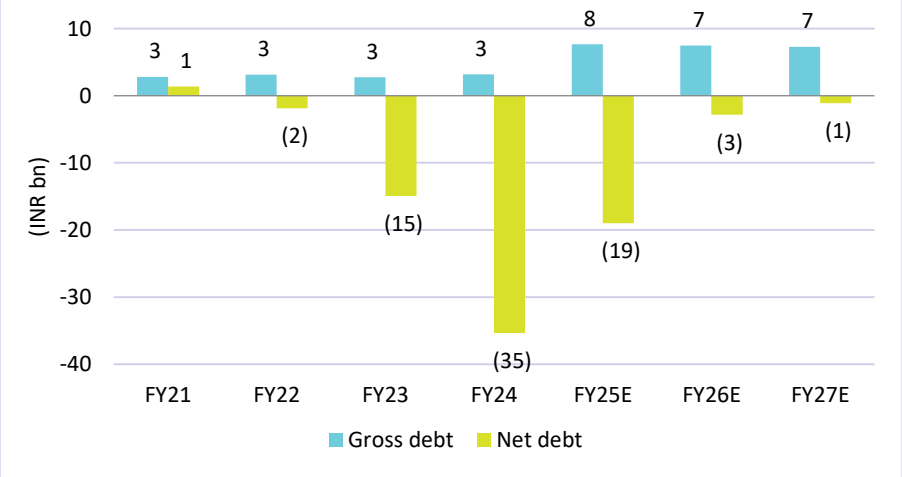
We estimate EBITDA shall compound annually at 54% over FY24–27E driven by: i) Waaree's module/cell/wafer capacity expansion to 21GW/11GW/6GW by FY27E; ii) backward integration for superior realisations; and iii) solar module capacity utilisation ramp-up from 44% in FY24 to 52% utilisation on expanded module capacity by FY27E.

Exhibit 54: EBITDA to surge at 54% CAGR over FY24–27E



Source: Company, Nuvama Research

Exhibit 55: Net debt comfortable, ensures balance sheet firepower for growth



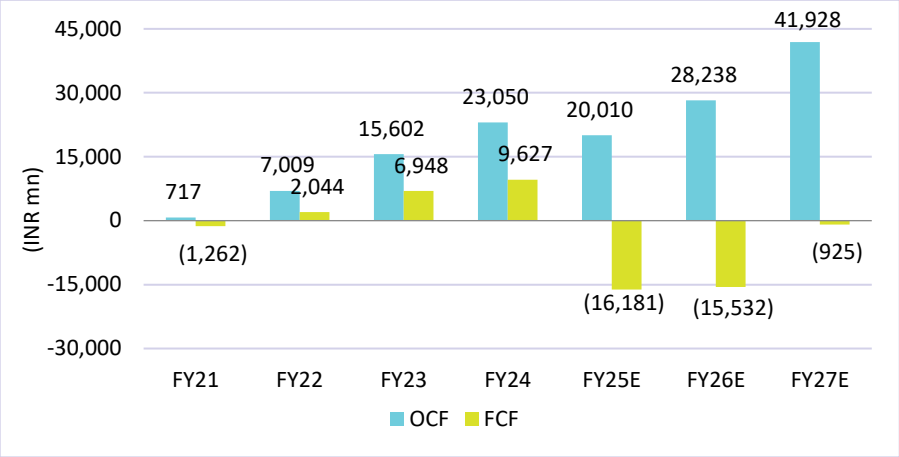
Source: Company, Nuvama Research

Robust cash flows to cover higher capex requirements

IPO proceeds, cash flow to meet high capex needs, funds for related green forays

Despite higher capex of ~INR123bn over FY25–27E, Waaree's operating cash flows remain strong, which shall largely take care of its higher capex spends for capacity expansion and backward integration into cells and wafers over FY25–27E. Free cash flow turns positive from FY28E given stronger operating cash flow generation.

Exhibit 56: Cash flows remain strong, provide cushion for higher capex



Source: Company, Nuvama Research

Waaree is on track to backward-integrate its solar module manufacturing capacity by setting up a 5.4GW solar cell capacity in Chikhli, Gujarat, and 6GW integrated facility for manufacturing wafers, cells and modules, which was awarded under the PLI Tranche II. Waaree has guided for capex of ~INR120bn over FY25–27E.

In addition to solar module/cell capacities, the company has announced strategic investments to create a diversified green energy portfolio.

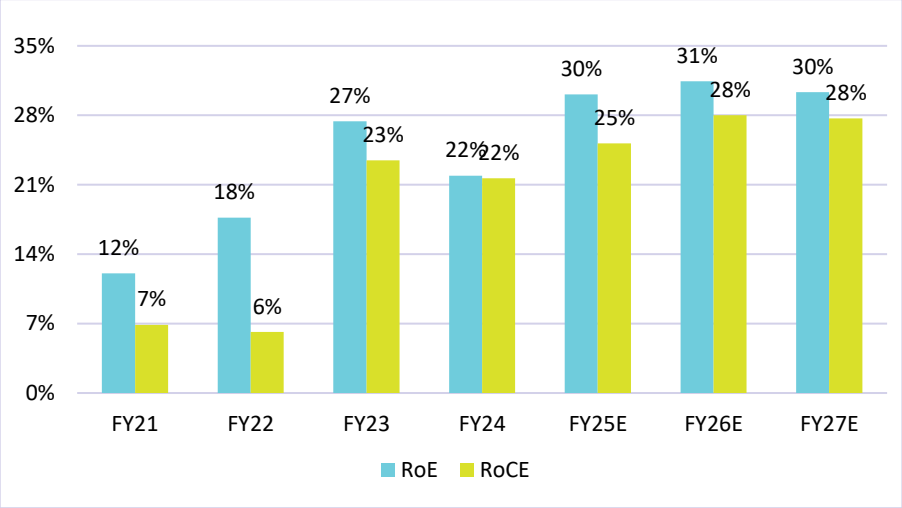
Exhibit 57: Proposed strategic investments to build a green portfolio

Adjacent businesses	Amount (INR mn)	Comments/key updates
Renewable power generation	7,920	Acquired Enel Green Power India for a consideration of INR7920mn; subject to approval; won RUMSL's 170MW project
Renewable power infrastructure	6,500	
Lithium-ion storage cell, and energy storage system	20,730	Potential plant capacity: 3.5GWh; to be operational by Q2FY27
Green hydrogen electrolyser manufacturing	5,510	Awarded PLI for a 300MW electrolyser manufacturing facility; potential plant capacity: 300MW; to be operational by Q2FY27
Inverters	1,300	Investment in renewable power projects and bidding pipeline; potential plant capacity: 3L invertors/3GW per annum; to be operational by Q4FY26
Total proposed investments	**41,960**	

Source: Company, Nuvama Research

Based on our expectation of a rise in Waaree's profitability, we estimate its return ratios shall remain robust with an FY27E RoE/RoCE at 30%/28%. Higher returns also ensure a shorter payback of 1.5–2 years, which can also cater to any further capex needs.

Exhibit 58: Returns ratios strong, enabling quicker payback



Source: Company, Nuvama Research

Valuation – similar to Indian IT in 2000s?

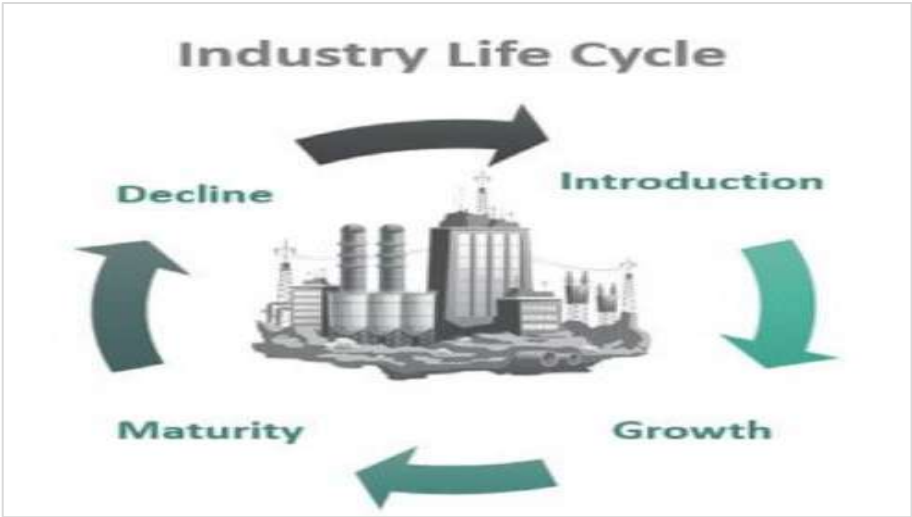
- Indian solar PV industry is in the early growth stage of industry life cycle—characterised by exponential increase in market size and also rising competition
- Much like the Indian IT sector in early 2000s, we observe a trend in the PV industry's valuations and earnings in its ongoing early-growth stage; if history is any guide, high valuation multiples, which factor in high growth with subsequent earnings catch-up, shall correct to more reasonable levels in due course
- Waaree's 24x FY25E EV/EBITDA factors in high-growth with earnings catching up; we reckon valuation shall correct to a more reasonable FY27E PE of 17x and EV/EBITDA of 11x—a corollary of our FY24–27E EBITDA/EPS CAGR of 54%/60%
- **Valuation sensitivity:** Given the structural story, FCF shall gallop at a 17% CAGR over FY24–45E, yielding a TP of INR2,805/share. If we factor in a higher 20% CAGR, the TP can shoot up to INR3,844/share

Industry in early growth stage, akin to Indian IT sector in early 2000s

We believe the Indian solar PV industry is in the early growth stage of the industry life cycle, characterised by a sustained increase in market size and rising competition as many new entrants jump in vying for a slice of the growing pie.

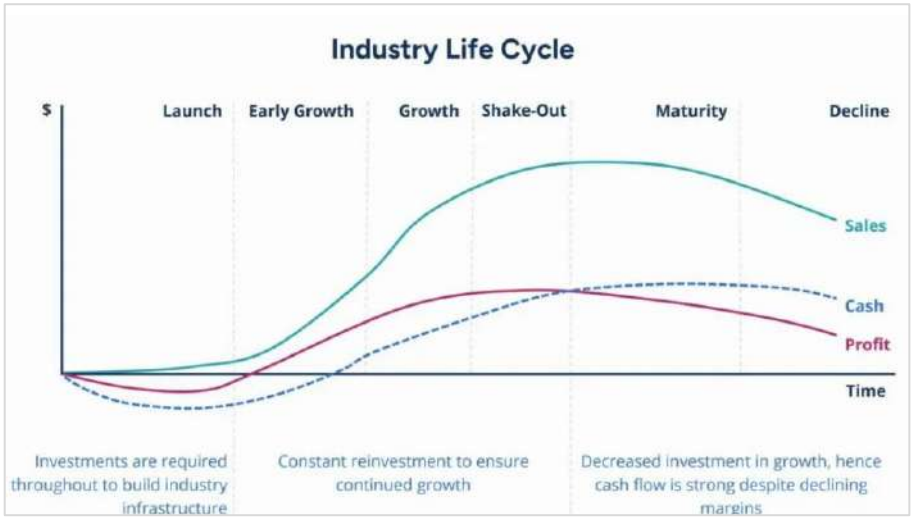
Companies in the growth stage are likely to experience significant growth in revenue and profits as new capacities are announced and utilisation levels of current facilities increase.

Exhibit 59: Industry stages



Source: Nuvama Research

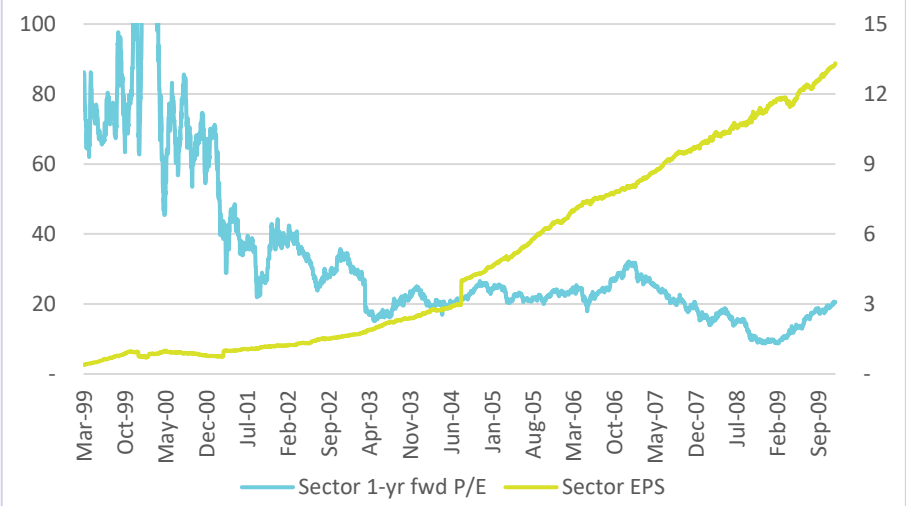
Exhibit 60: Growth-stage companies post significant rise in revenues and profits



Source: Nuvama Research

Using the example of the Indian IT industry in the early 2000s, we demonstrate the movement of valuations and earnings of an industry in its early growth stage. We observe a correction in high multiples, which factored in high growth with earnings catching up, brought the valuation to more reasonable levels. We include TCS, Infosys, Wipro, HCL Technologies and Tech Mahindra in our analysis and calculate sector EPS and valuations on a market-cap weighted basis.

Exhibit 61: Lofty valuations of high-growth industry correct as earnings catch up



Source: Bloomberg, Nuvama Research

Drawing comparisons with the Indian solar PV industry, at the current price, valuations are extremely high at 36x FY25E P/E and 24x FY25E EV/EBITDA for Waaree. Based on our earnings, we reckon the P/E shall correct to a more reasonable 17x FY27E EPS and 11x EV/EBITDA as we factor in EBITDA/EPS growth at a 54%/60% CAGR for Waaree over FY24–27E.

Exhibit 62: SotP valuation yields TP of INR2,805

Particulars	Value
Risk free rate	6.7%
Market risk premium	6.0%
Beta	1.3
WACC	12.4%
Terminal growth	3.5%
Equity value (INR/sh)	**2,646**
Other investments	160
Waaree Energies equity value (INR/sh)	**2,805**
CMP (INR/sh)	2,238
% upside	25%

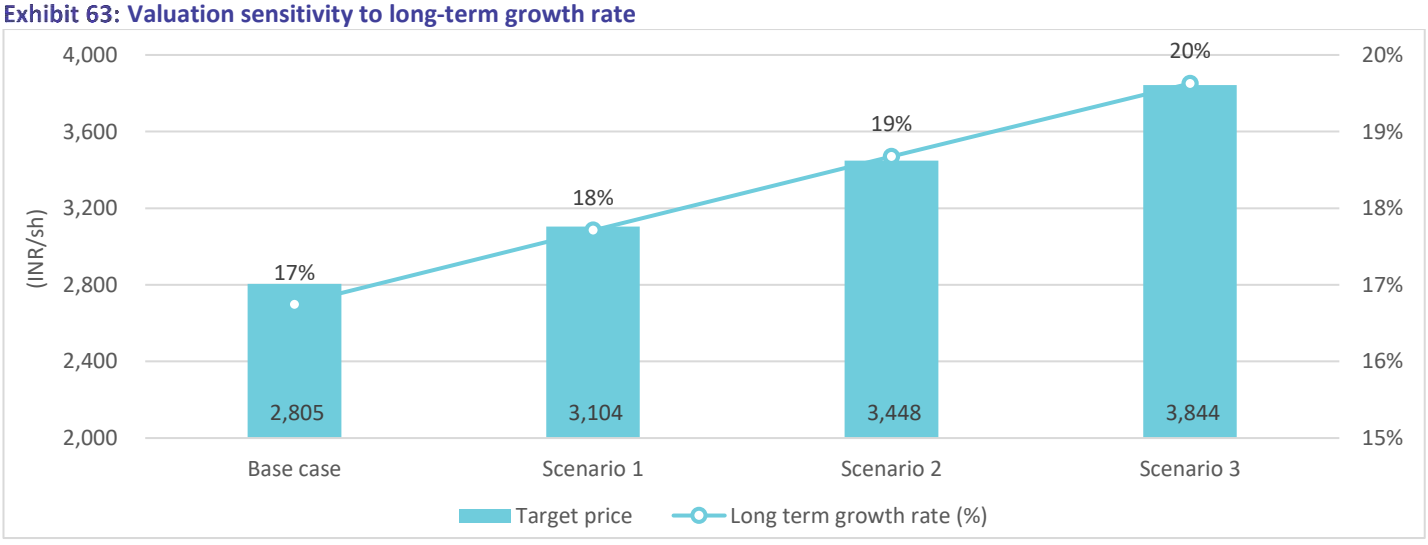
Source: Nuvama Research

Valuation sensitivity

We believe the Indian solar industry is in the early growth stage of the industry life cycle, characterised by a sustained increase in market size and rising competition. Companies in the early growth stage are likely to experience significant growth in revenue and profits, which is likely to normalise as competition rises and utilisation levels of the current facilities rise. While we estimate free cash flows shall remain strong for Waaree, galloping at a 17% CAGR over FY24–45E, we provide different scenarios for long-term growth rate and its sensitivity to valuations.

Our base case long-term CAGR of 17% over FY24–45E yields a TP of INR2,805/share. However, if we factor in a much higher 20% CAGR, the TP inflates to INR3,844/share.

Exhibit 63: Valuation sensitivity to long-term growth rate



Source: Nuvama Research

Peer group valuation

Exhibit 64: Global peer valuations for solar module/cell producers

	Mkt Cap	P/E (x)				P/B (x)				EV/EBITDA (x)				EV/Sales (x)				ROE (%)			
Companies	(USD bn)	FY24	FY25E	FY26E	FY27E	FY24	FY25E	FY26E	FY27E	FY24	FY25E	FY26E	FY27E	FY24	FY25E	FY26E	FY27E	FY24	FY25E	FY26E	FY27E
Premier Energies	4.9	200.9	44.6	34.8	28.1	71.9	14.6	10.3	7.5	102.3	23.7	19.0	14.4	15.5	6.1	4.8	3.3	43.7	54.0	34.5	31.0
Waaree Energies	7.5	71.8	36.3	23.9	17.2	15.7	10.9	7.5	5.2	37.8	23.7	15.2	10.9	5.2	4.4	3.2	2.5	21.9	30.1	31.4	30.3
India average		**127.3**	**38.8**	**27.3**	**20.9**	**44.0**	**10.6**	**7.8**	**5.6**	**73.3**	**23.6**	**16.5**	**12.1**	**10.8**	**5.2**	**3.9**	**2.8**	**42.7**	**39.6**	**30.6**	**32.2**
LONGi Green	18.5	8.9	NM	40.0	21.0	1.8	2.2	2.1	1.9	5.2	NM	15.5	8.3	1.0	1.5	1.3	1.1	20.7	-11.1	3.6	9.3
Jinko Solar	9.7	8.8	41.4	21.9	15.4	2.1	2.1	2.0	1.8	5.1	9.0	7.0	5.1	0.8	0.9	0.8	0.7	24.2	3.5	8.6	13.3
Trina Solar	5.3	6.0	NM	14.2	9.8	1.2	1.4	1.3	1.2	5.0	NM	NM	NM	0.7	0.9	0.8	0.6	20.0	-8.0	6.9	11.3
JA Solar	5.9	4.9	NM	23.2	8.5	1.2	1.3	1.3	1.1	3.5	10.2	4.2	3.4	0.8	0.9	0.7	0.7	25.2	-6.9	5.1	12.6
China average		**7.1**	**41.4**	**24.8**	**13.7**	**1.6**	**1.7**	**1.6**	**1.5**	**4.7**	**9.6**	**8.9**	**5.6**	**0.8**	**1.1**	**0.9**	**0.8**	**22.5**	**-5.6**	**6.1**	**11.6**
First Solar (US)	13.6	16.6	9.7	6.8	4.8	2.1	1.7	1.4	1.1	12.5	7.5	5.5	4.1	3.6	3.0	2.3	1.9	12.5	17.5	21.0	22.6
Global average		**50.3**	**29.9**	**19.7**	**13.1**	**15.9**	**4.7**	**3.6**	**2.7**	**30.1**	**13.6**	**10.3**	**7.3**	**5.1**	**3.1**	**2.3**	**1.8**	**25.9**	**17.2**	**19.2**	**22.1**

Source: Company, Bloomberg, Nuvama Research

Note: FY24/25E/26E/27E is CY23/24E/25E/26E for global peers

Key Risks and Mitigants

- The Government of India (GoI) has imposed a basic customs duty of 40%/25% on imports of solar modules/cells; phasing out the BCD shall intensify competition, affecting realisations and margins
- Solar cell plant stabilisation remains critical; Waaree commissioned its 1.4GW mono PERC facility within a short period of time; 4GW TOPCon facility to commence operations in early Q1FY26
- Given evolving technologies, the risk of solar module/cell manufacturing advancing towards more efficient and cheaper modules remains, not to mention a shift in demand towards newer products
- Solar module overcapacity—a risk in the near term; over medium term, exports and backward integration shall mitigate and cushion the impact on margins
- Valuation challenge: high near-term margins vis-a-vis long-term potential

Continuance of basic custom duty levy uncertain

The government imposed a basic customs duty of 40% on imports of solar modules and 25% on solar cells on April 1, 2022. This was done in an effort to boost domestic manufacturing of solar components and reduce India's reliance on imports. The BCD applies to all imports of solar modules and cells, regardless of the country of origin.

As the Indian solar industry achieves production at scale for solar modules and cells, we believe there remains a risk of the government phasing out the basic custom duties of 40%/25% levied on solar modules/cells. While it is uncertain by when the phasing out of the BCD would start, we have factored in a gradual decline in BCD for modules and cells from FY28, which should further intensify competition.

We reckon with our FY29E base case BCD of 20%/15% on imports of solar modules/cells and 20% premium pricing for modules, Waaree's EPS stands at INR159. If the current BCD of 40%/25% on modules/cells continues, our FY29E EPS shall rise by 42% to INR225, creating an upside risk to our estimates.

Solar cell plant stabilisation remains critical

Waaree plans to backward-integrate its module capacity by commissioning a 5.4GW solar cell facility in Gujarat by early Q1FY26E and another 6GW integrated module/cell/wafer manufacturing facility in Odisha by FY27E.

While emphasis is on backward integration, key risk lies in stabilisation of the solar cell facility. Developing a solar cell manufacturing plant involves high capex for infrastructure, machinery and technology. The complexity of setting up production lines requires precision and a stabilisation period of six–12 months for achieving high cell efficiency and yield. We have seen integrated players such as Premier Energies and Websol facing issues in stabilisation post-commissioning of its solar cell facility.

However, Waaree has commenced commercial production of 1.4GW of mono PERC solar cell facility that is ramping up well, aims to commission 1.5GW of its total 4GW TOPCon facility soon and the entire 4GW TOPCon solar cell facility by early Q1FY26. The utility control room remains a critical facility for managing the solar cell facility. Waaree has already commissioned its utility facility for its 5.4GW solar cell facility. The successful commissioning of its 1.4GW PERC solar cell facility within a short time remains a positive development and creates optimism on the remaining capacity being commissioned and stabilised within a short period as well.

Short technology life-cycles

Solar module manufacturing technology has been continuously evolving as manufacturing processes transition from PERC to TOPCon with HJT emerging as the newest viable technology. While there is high fungibility between PERC and TOPCon, the HJT process flow is very different. Given the risk of evolving technology, the risk of solar module/cell manufacturing advancing towards more efficient and cheaper modules remains along with a shift in demand towards newer products.

However, Waaree's focus remains on upgrading and modernising its existing facilities. The company has a proven track record of investing in advanced technology as it phased out production of multi-crystalline modules and shifted to manufacturing higher efficiency PERC and TOPCon modules.

We believe Waaree's focus on upgradation, automation, modernisation and preventive maintenance of plants and equipment increases their useful life and improves their efficiency and operating performance. Furthermore, the company continues to evaluate front-line technologies and resultant benefits with a view to be ahead of the competition.

Currently, the company is in the process of phasing out the mono PERC technology and adopting TOPCon technology. This transition requires integrating additional processes, for which capital expenditure remains minimal. However, given HJT technology is gaining momentum, the transition from TOPCon to HJT shall require dismantling the existing lines and setting up a different line altogether, thereby increasing capital expenditure for the company.

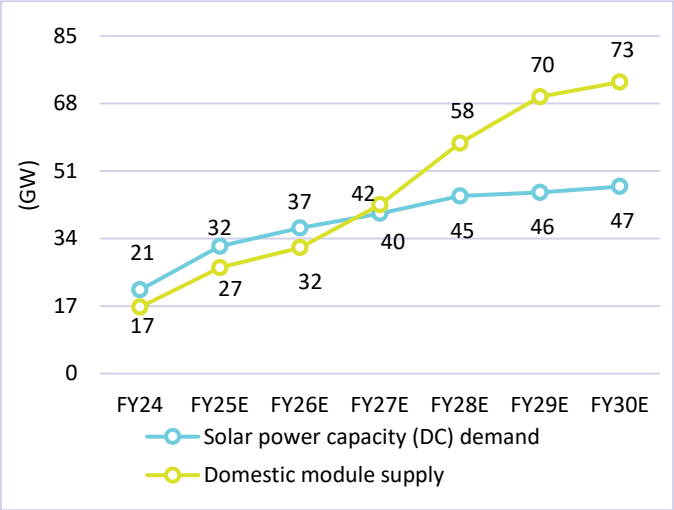
Exports and shift to cells/wafers to offset likely module overcapacity

Given superior profitability for domestically produced solar modules and cells driven by implementation of supportive measures by the government such as the basic custom duty, ALMM, DCR and PLI incentives, many entities have announced solar module and cell capacities. Based on the announcements, we estimate ~88GW incremental solar module manufacturing capacity likely to be added over the next five years. This is likely to create a supply glut, which could affect industry margins and make it unviable for standalone module manufacturers to operate.

However, given solar module capacity staring at a potential oversupply, we believe the profit pool shall shift to solar cells as demand for domestically manufactured solar cells increases once ALMM List-II for solar cells is implemented from Jun-26.

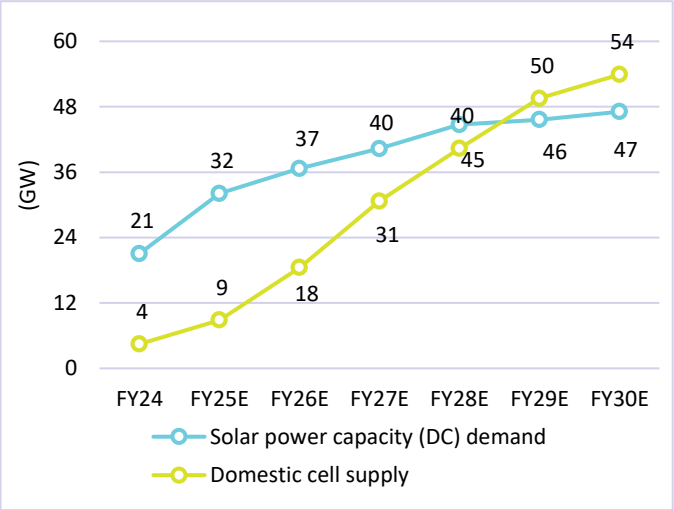
Similarly, once solar cell supply outpaces demand (most likely by FY29), we forecast a similar trend shall follow for further backward integration into wafers and subsequently polysilicon.

Exhibit 65: Solar module overcapacity likely by FY27E…



Source: Company websites, Industry, Nuvama Research

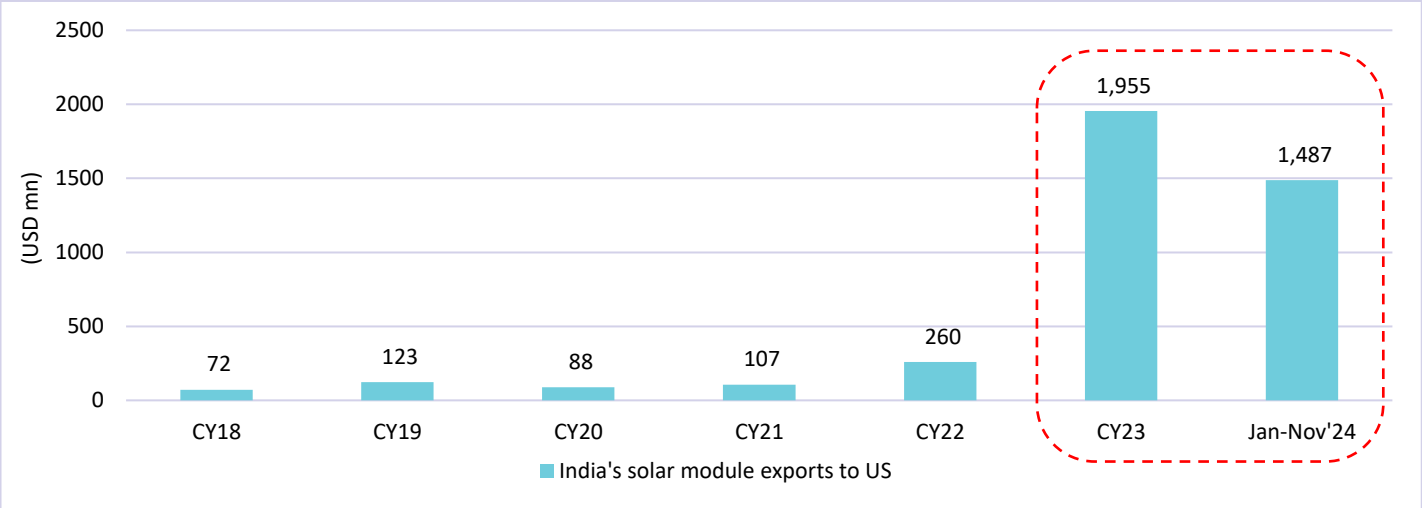
Exhibit 66: …while cells supply to be in deficit till at least FY29E



Source: Company websites, Industry, Nuvama Research

While we estimate overcapacity shall remain a risk for the Indian solar manufacturers in the domestic market, the tariffs levied by the US on imports of solar modules/cells from China, and lower installed manufacturing capacity in the US provides a significant growth opportunity in the near to medium term for export-oriented players such as Waaree. We believe this shall mitigate some of the downside risk in margins and profitability due to overcapacity in the domestic market for solar modules and later for solar cells.

Exhibit 67: India's exports shot up over last two years; provides exponential growth opportunity going forward



Source: Company, Nuvama Research

Gaining new expertise—Execution of backward-forward integration

Notably, for green hydrogen and electrolyser manufacturing, we believe operational and technological risks and challenges exist, which remain the key variables.

Waaree plans to set up an electrolyser manufacturing facility for sustainable hydrogen solutions. The company is in the planning stage to set up an electrolyser manufacturing facility based on Alkaline technology to facilitate green energy transition. Currently, Waaree is in discussions with several foreign electrolyser manufacturers for a technology tie-up for local manufacturing and they are likely to firm up the arrangement soon. The company expects to roll out locally manufactured electrolysers by end-FY26E.

The electrolysers may be used in a variety of industrial sectors ranging from refineries, fertilisers, chemicals (including green ammonia producers), steel, and electronics among others. We reckon the adoption of green hydrogen shall lead to a cost-efficient electrolyser and make green hydrogen more economical.

While the company has provided a strategy and framework to integrate its existing business with new adjacent businesses, the company's capability and pace of acquiring new expertise for its strategic investments in new businesses shall remain an imponderable risk.

Valuation challenge: High near-term margin versus long-term potential

Given the Indian solar PV industry is in the early growth stage of the industry life cycle, characterized by sustained increase in market size and rising competition as many new entrants jump in vying for a small slice of the growing pie. Companies in the growth stage are likely to experience significant growth in revenue and profits, as new capacities are announced, and utilization levels of current facilities rise.

While the Indian solar module and cell manufacturers are enjoying higher near-term margins owing to demand-supply gap in domestically produced modules and cells for ALMM and DCR mandated projects. However, with new capacities coming up and capacity utilisation of existing facilities rising, we believe the margins and earnings are likely to normalise. This creates a valuation challenge for such companies with near-term high growth factoring in premium valuations.

Drawing similarities to the IT sector in the 2000s, we observe a correction in high valuation multiples to more reasonable levels as earnings catch up. Waaree's current valuations are extremely high at 36x FY25E PE and 24x FY25E EV/EBITDA. Based on our estimated earnings, we expect the stock's valuation to correct to more reasonable levels of 17x FY27E EPS and 11x EV/EBITDA, as we factor in EBITDA/EPS CAGR of 54%/60% over FY24–27E.

Differentiated long-term strategy

Horizontal, vertical integration to de-risk and capture long-run growth

Waaree has established itself as the largest domestic solar module manufacturer and nearing to becoming the largest domestic solar cell manufacturer. The company has also won a PLI for setting up 6GW of integrated facility to manufacture wafers, ingots, cells and modules, providing further backward integration advantage for sustainable long-term business viability.

Aligning with its long-term strategy of becoming an integrated energy transition company and de-risking themselves, Waaree has announced its foray into new adjacent businesses such as, i) renewable power generation through acquisition of Enel Green Power India (subject to approval); ii) green hydrogen and electrolyser manufacturing; iii) lithium-ion advanced chemistry storage cell; and iv) inverters.

The company's strategy of scaling up operations via forays into new fast-growing industries is likely to be the key driver of growth going forward. By leveraging expertise, diversifying revenue streams, mitigating risks, capturing synergies and leveraging brand reputation, Waaree expects to be well-positioned to maximize its financial performance and create long-term sustainable growth.

By horizontal and vertical integration in the solar value chain, the company has created a strategy and framework to de-risk its business operations. With the announcement of foray in adjacent businesses, the company remains ahead of the curve for sustaining long-term margins and capturing a multi-decadal opportunity within the new energy sector.

The company has acknowledged the near and mid-term high margins to be unsustainable, and hence integration of its business operation in to the whole solar energy value chain is likely to provide the earnings growth visibility, de-risk from fluctuation in commodity prices, which shall enable it to achieve its targeted sustainable long-term EBITDA margin of ~20%.

Exhibit 68: Strategic investments to diversify its green portfolio

Source: Company, Nuvama Research

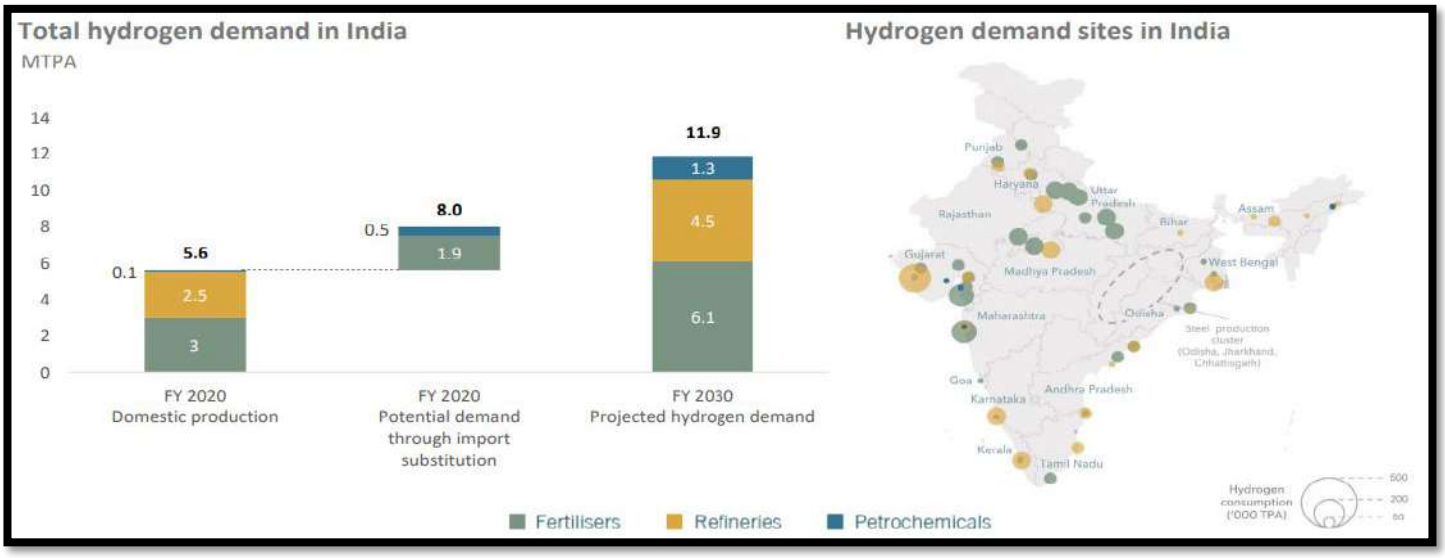
H2 demand in India poised to double by 2030E

H2 demand in the refining and fertiliser industries is likely to double by 2030E, provided sectoral production targets are met. The refining sector is likely to account for 4.5MTPA of H2 demand by 2030E with a smoother transition to G H2 on account of the sector's lower-price sensitivity to production costs. G H2 demand in refining is estimated to be ~1.1MTPA (~24% of aggregate sectoral H2 demand).

H2 demand for the Indian fertiliser industry is forecast to be 6.1MTPA by 2030E. Due to the high price sensitivity to input H2 costs, the already existing large subsidy expenditure by GoI and the ageing domestic plants, only ~10% of the 6.1MTPA is likely to be met by G H2.

The petrochemical industry may require 1.3MTPA of H2 by 2030E on new refinery additions in India (current demand ~0.6MTPA). Green H2 uptake in steel, mobility and shipping shall be explored through FY26–30 by implementation of pilot projects.

Exhibit 69: H2 demand to increase 2x to 11.9MTPA by 2030E

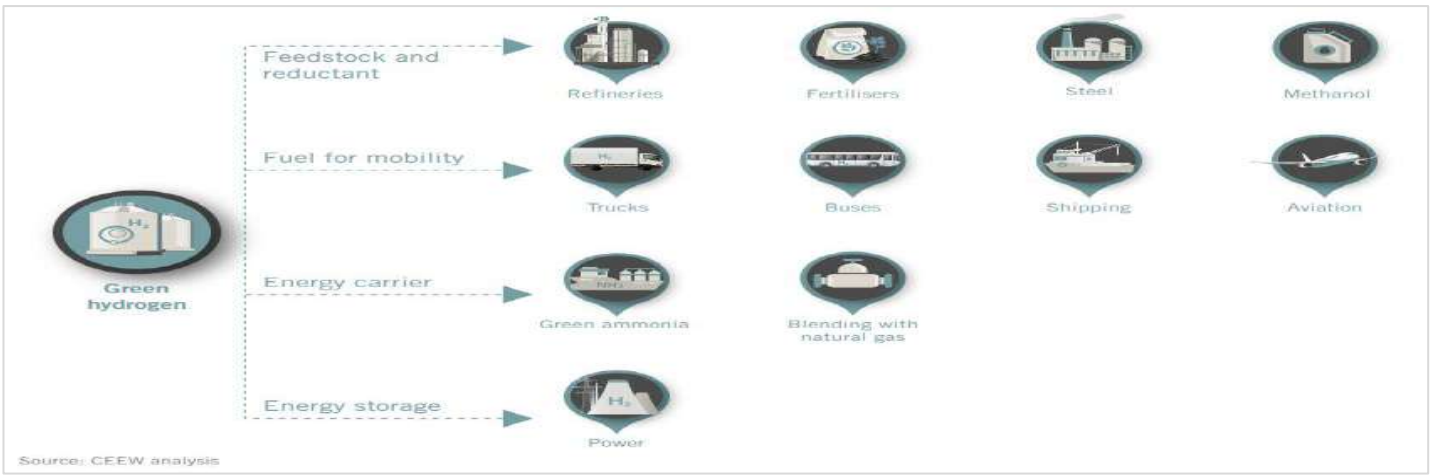


Source: CEEW, Nuvama Research

G H2 has applications in multiple sectors

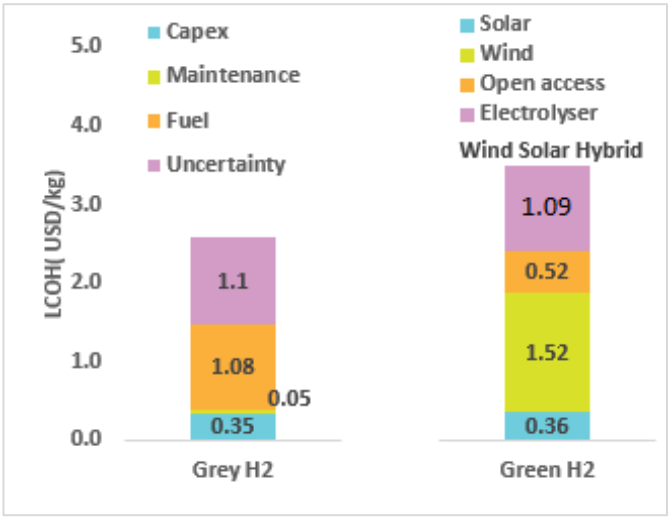
G H2 has wide applications ranging from feedstock in chemicals to reductants in the refining and steel segment. It may also be a fuel for heavy mobility in the long term. Moreover, G H2 may act as a carrier of energy in the form of ammonia and as a cooking fuel. Furthermore, G H2 may support grid stability in the power sector.

Exhibit 70: Use cases of G H2 as a decarbonisation tool



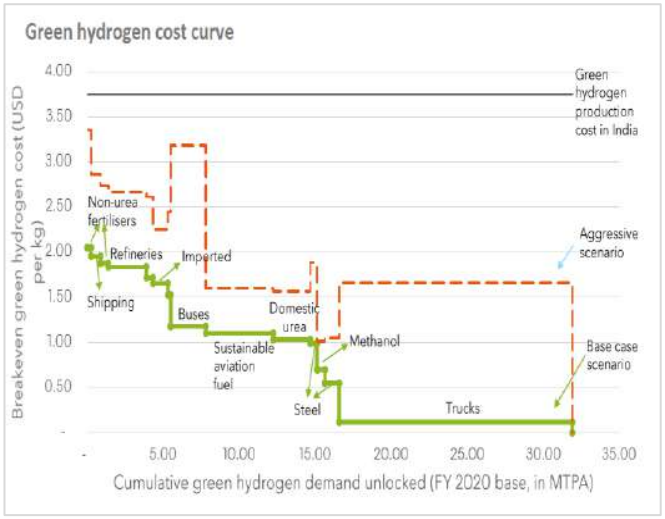
Source: CEEW, Nuvama Research

Exhibit 71: Green H2 currently 35% costlier than grey H2



Source: CEEW, Nuvama Research

Exhibit 72: G H2 sectoral breakeven cost curve



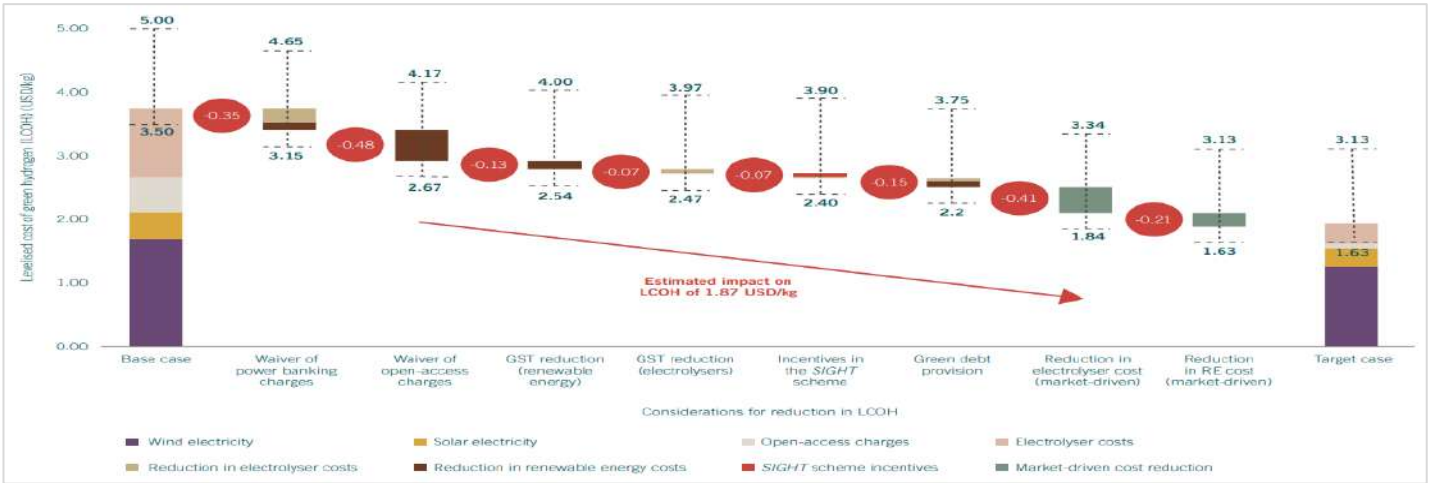
Source: CEEW, Nuvama Research

Low G H2 costs primary driver for accelerated adoption

As per industry estimates, the levelised cost of G H2 (LCOH) in India in 2024 is estimated to be USD3.5–5/kg. Some interventions by the Government of India, in addition to the outlay granted under NGHM to provide viability gap funding, may bring down the LCOH to USD1.63–3.13/kg by 2030E.

Incentives reducing the cost of RE, including waiving power banking, open-access charges and GST reduction would lead to an aggregate reduction of USD0.96/kg. Incentives reducing the cost of electrolyser production, including GST waiver, SIGHT incentives and green-debt provision would lead to a total reduction of USD0.29/kg. A market-driven reduction in RE and electrolyser costs is estimated to be USD0.62/kg.

Exhibit 73: LCOH could reduce to USD1.63–3.13/kg driven by additional incentives and market forces



Source: CEEW, Nuvama Research

BESS – RTC power demand creates huge potential

Battery Energy Storage Systems have gained traction in the last few years. It has a very high energy density, making it appropriate to offer ancillary services. More importantly, BESS can be installed easily, requires less time for setup, and can be used for a wide range of grid support activities, such as energy time shift, distribution deferral and energy arbitrage. The technology is yet to achieve its full potential to provide grid support services, and comes with high investment cost and changing technology, and therefore has associated risks. Furthermore, batteries would require replacement or disposal after seven–ten years, depending upon usage.

Recently, the Ministry of Power has mandated all Renewable Energy implementing agencies and state utilities must incorporate a minimum of two hours co-located energy storage systems (ESS), equivalent to 10% of the installed solar capacity in all future solar tenders. This shall increase demand for battery storage technologies over the next few years.

Technologies such as pumped hydro storage (PHS), lithium, and sodium batteries are available commercially and are being used for different applications. Other technologies such as compressed air, flywheel, thermal and hydrogen storage, have yet to demonstrate their commercial viability at scale.

Waaree plans to set up a 3.5GWh BESS manufacturing facility, which will enable it to leverage its integration in the solar value chain.

Waaree plans to set up a 3.5GWh BESS manufacturing facility, which will enable it to leverage its integration in the solar value chain

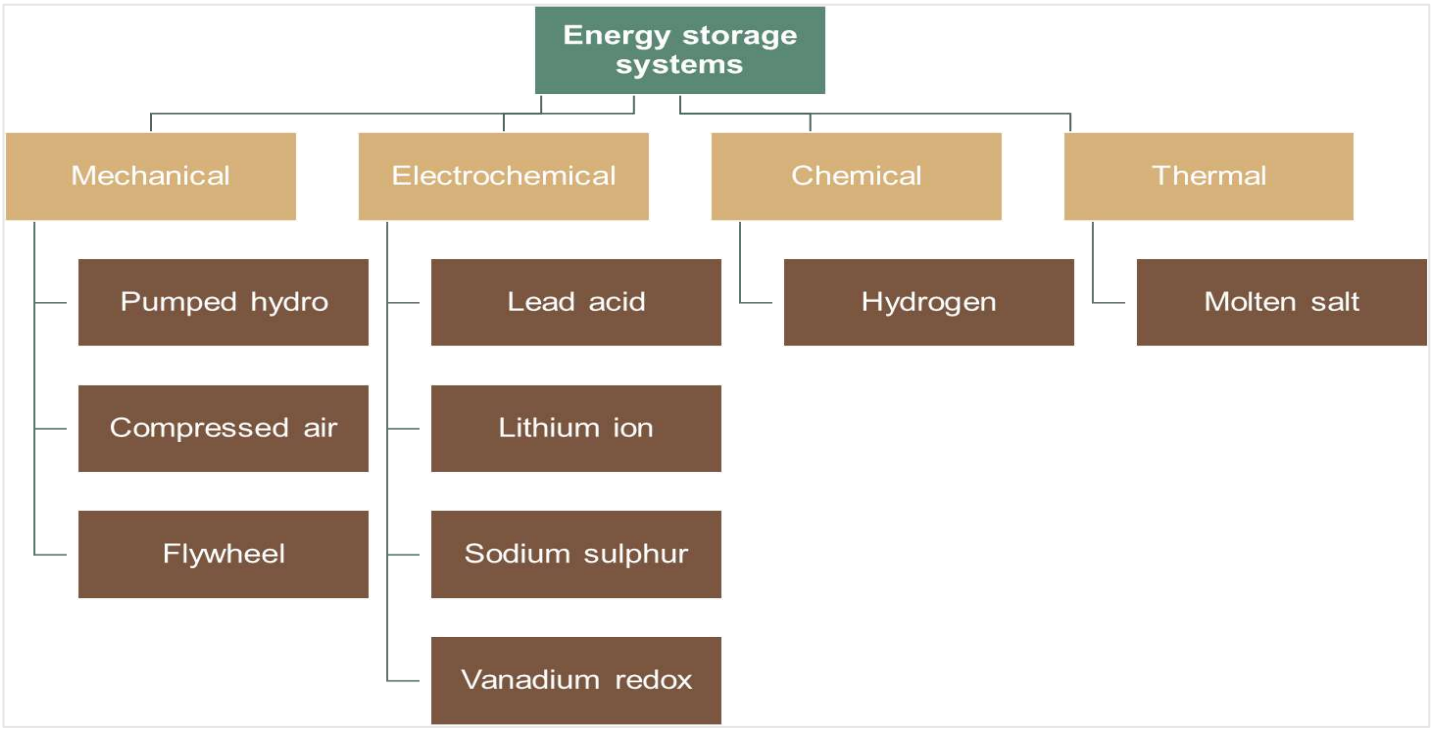
As per National Electricity Plan (NEP) 2023 of Central Electricity Authority (CEA), the energy storage capacity requirement is projected to be 82.4GWh (47.7GWh from PSP and 34.7GWh from BESS) by FY27. This requirement is further expected to increase to 411.4GWh (175.2GWh from PSP and 236.2GWh from BESS) by FY32.

Furthermore, the CEA has projected that, by 2047, energy storage requirement is likely to increase to 2380GWh (540GWh from PSP and 1840GWh from BESS), due to the addition of a larger amount of renewable energy in light of the net zero emissions targets set for 2070.

The INR37.6bn (USD452mn) viability gap funding (VGF) programme aims to install 4GWh of BESS by FY26.

To meet the demand for efficient energy utilisation from renewable sources, various government agencies have issued tenders totalling 57GW and auctioned 11.5GW of energy storage projects, with or without renewable energy capacities, as of FY24.

Exhibit 74: Major types of storage technologies



Source: Industry, Nuvama Research

Exhibit 75: Comparison of pumped hydro storage (PHS) and Battery Energy Services (BESS)

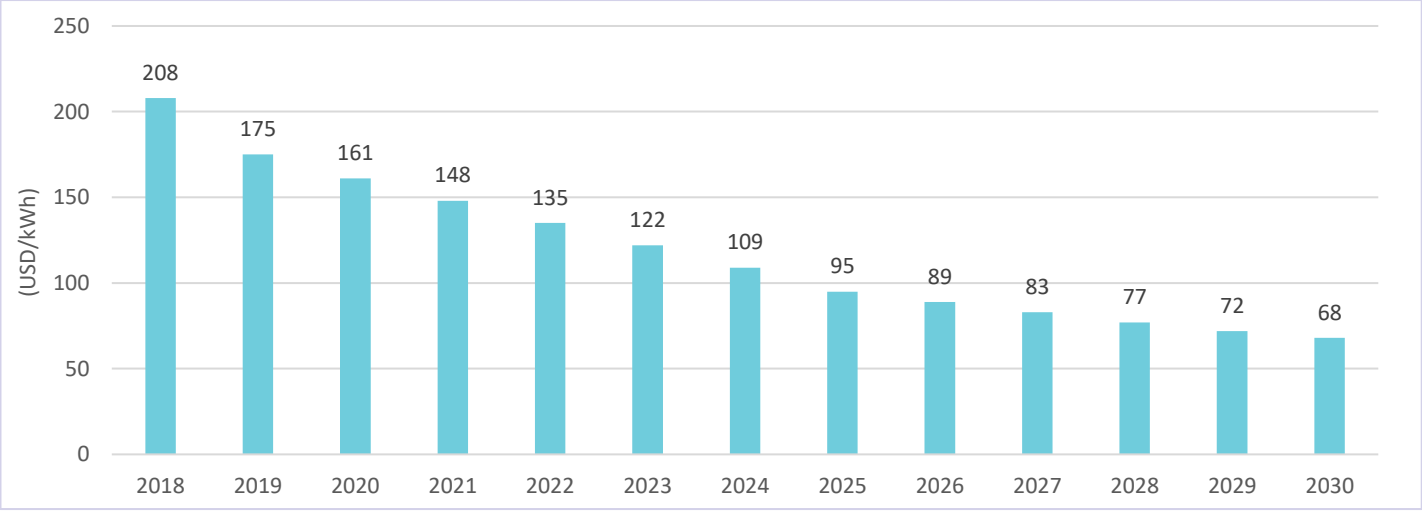
Parameters	PHS	BESS
Capital cost	Total capital cost for a closed-loop PHS ranges from INR50–60mn/MW*	Lithium-ion battery storage can range from USD550-700/kW (for a four-hour storage solution)
Efficiency	75–80%	80–85%
Land requirement	~2,000 m^2/MW	~100 m^2/MW
Ideal storage duration	6–12 hours	Up to 4 hours
Response time	30–90 seconds	In milliseconds
Project life	40–50 years (life of dam/reservoir is over 80 years)	Up to eight years
Construction period	4–5 years, it also depends upon other external and socio-political factors	1 year
Operating cost	Lower	Higher since batteries need to be replaced after certain period
Estimated levelised tariff	INR4–6 per kWh	INR5–7 per kWh
Environmental impact	Need substantial reservoirs, which may cause environmental consequences, such as habitat destruction and changes in water flow downstream	Disposal of batteries is a major concern. If not taken care properly, may end up in landfills, posing risks of corrosion, flammability, and environmental contamination
Execution and operational risk	Long approval process for land, environmental and forest clearances Rehabilitation and resettlement issues Limited naturally suitable sites Long gestation period with high construction risk Managing water requirement, especially in case of any adverse events	Shortage of rare minerals and metals Limited manufacturing capacity Cost volatility Performance deterioration and fire risk in extreme ambient conditions Constant degradation and self-discharge

Source: Industry, Company, Nuvama Research

**Capex may vary based on number of reservoirs to be built, topography/ region, etc*

Due to technological innovations and improved manufacturing capacity, lithium-ion chemistries have experienced a steep price decline since inception. Bloomberg NEF projects the cost trajectory of BESS to decline in the future.

Exhibit 76: Lithium-ion battery cost estimated to decline



Source: BNEF, Nuvama Research

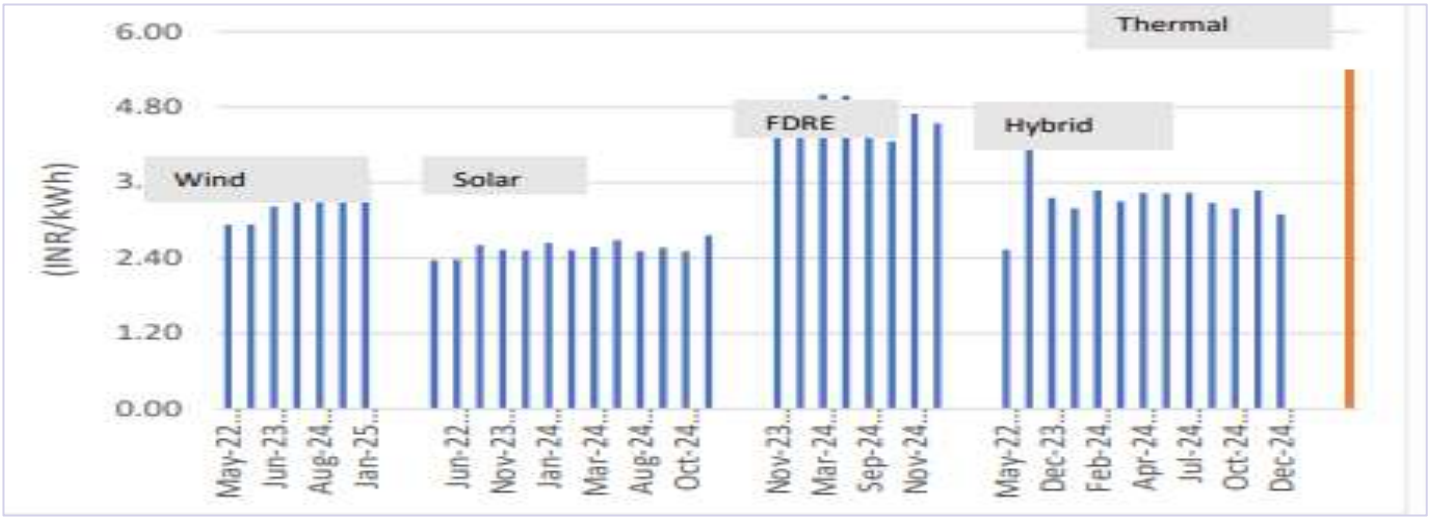
FDRE key to counter renewable energy intermittency

Renewable energy sources such as wind and solar are "intermittent" as they cannot be sourced when needed at some time during of the day. Furthermore, significant use of variable and intermittent renewable energy presents issues such as grid balancing and underutilisation of the transmission system.

Firm and Dispatchable Renewable Energy (FDRE) is an ingenious solution, which integrates solar generation (for daytime) with wind (for nights) and fills in the gaps in energy storage systems (ESSs). Hence, the business models of RE projects have also evolved from: i) vanilla wind and solar projects to; ii) hybrid co-located solar and wind to; iii) round-the-clock (RTC) RE supply with CUF commitment on monthly and annual basis to; iv) peak power RE constructs and FDRE with load-following characteristics that is anticipated to provide assured RTC power from renewables.

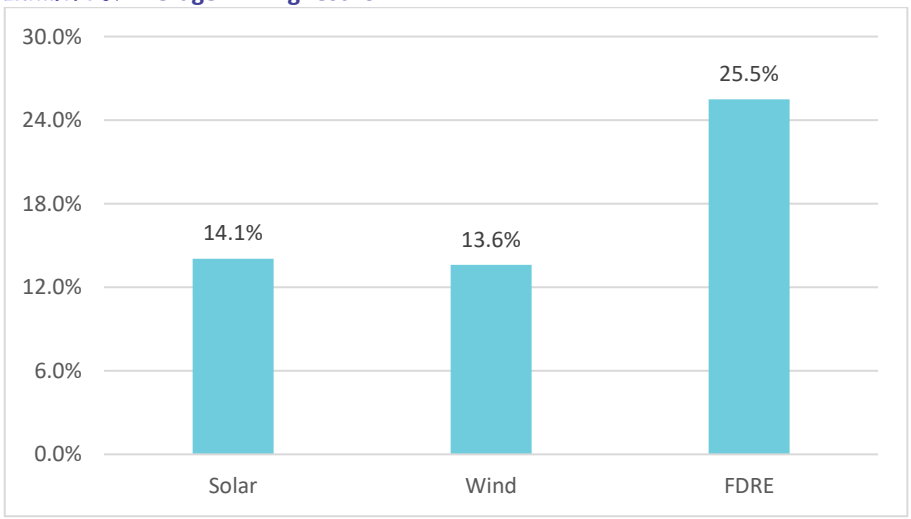
Our *Power team's* analysis indicates plain-vanilla solar/wind projects generate mid-teen IRRs while complex solutions (such as FDRE) command an IRR of 20%-plus.

Exhibit 77: Solar power cheaper than alternatives, but intermittent; FDRE solutions offer huge potential for Waaree's BESS foray



Source: Industry, Nuvama Research

Exhibit 78: Average IRR highest for FDRE



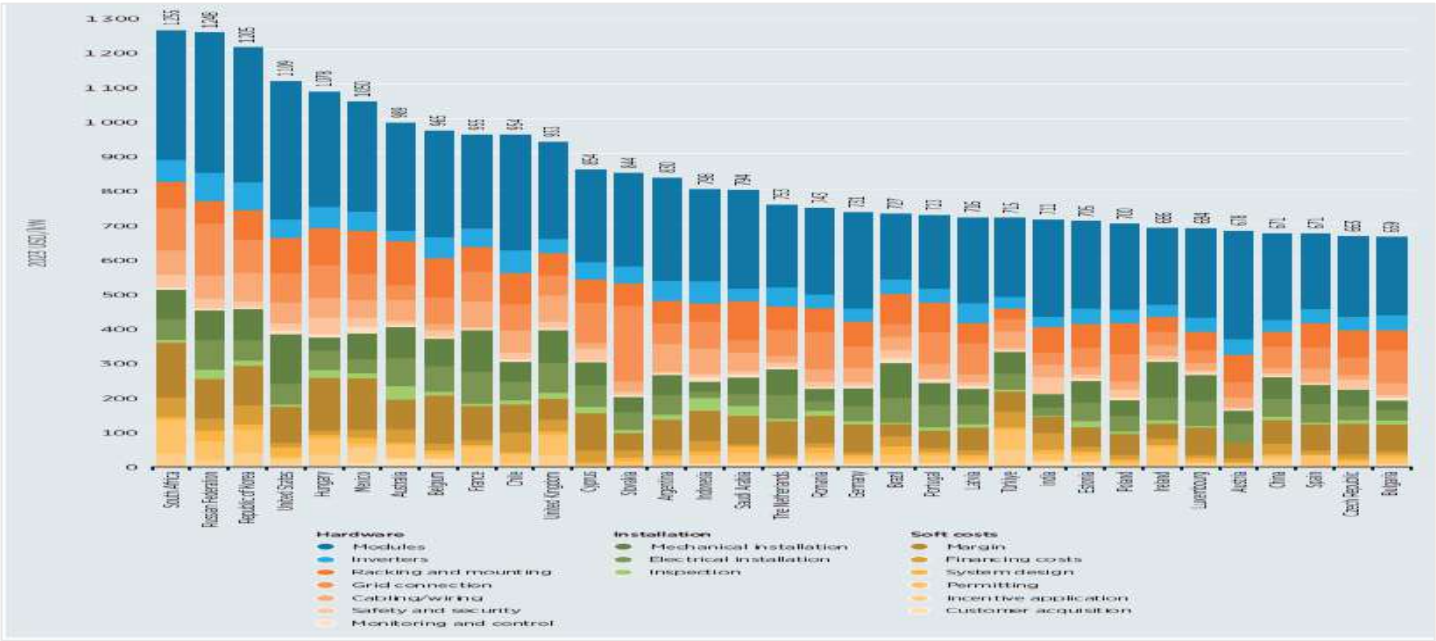
Source: Industry, Nuvama Research

Multi-decadal industry growth

India highly competitive in New Energy

India's PV installation cost in 2022 was USD664/kW (down 89% since 2010) despite being heavily reliant on imports of solar modules from China and Taiwan. In 2023, while major markets saw a decline in its PV installation cost, the PV installation cost in India rose to USD711/kW (+7% YoY) on the back of a 15% YoY growth in installed capacity. Despite an increase in installation cost, India remains one of the most competitive in the new energy space.

Exhibit 79: Utility-scale solar PV installed costs by country (2023)



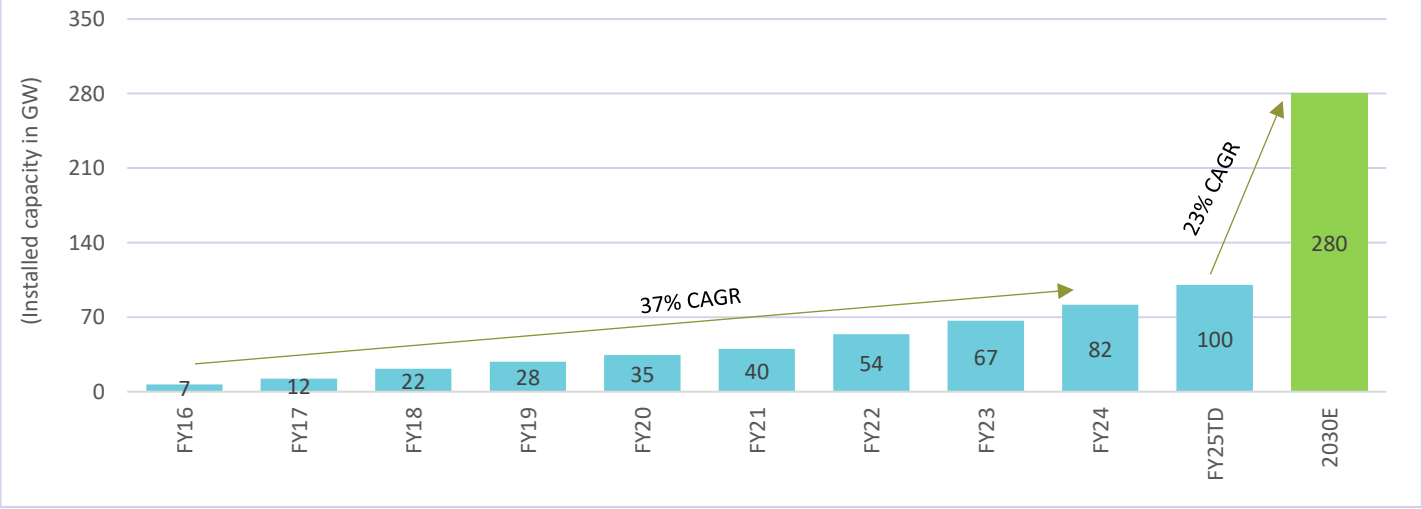
Source: IRENA, Nuvama Research

India's 3–4x solar growth

Robust solar capacity-adds in FY24; momentum sustains—100GW capacity in Jan-25

Given current solar capacity at 100.3GW, 84.1GW capacity under implementation and an additional 47.5GW capacity under tendering, clear visibility is there of solar capacity rising to 232GW over the next few years.

Exhibit 80: Solar power capacity shall rise to ~280GW from 100GW FY25TD (CAGR 23% over FY25–30E)



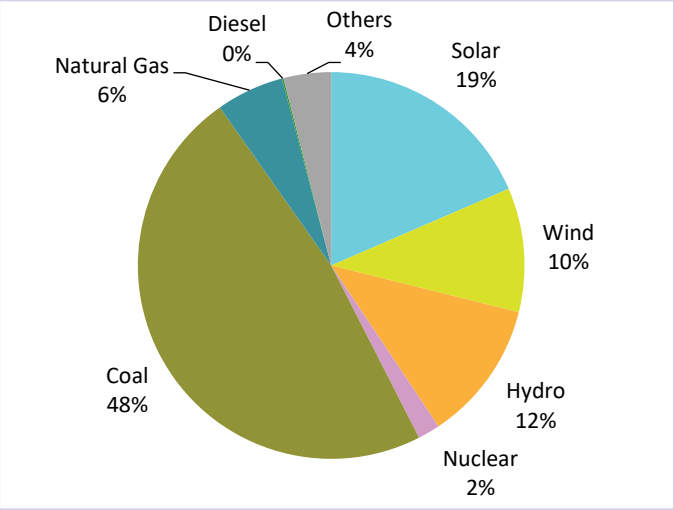
Source: MNRE, Nuvama Research

We estimate incremental solar capacity additions of ~176GW during FY24–30E, significantly surpassing ~53GW added during FY20–24. This growth is primarily driven by government thrust on reduction of carbon emission and shift to cleaner fuels, demonstrated by an aggressive tendering strategy. Key catalysts include technological advancements (e.g. floating solar and module efficiency), affordable financing, and supportive policies.

India's solar capacity to surge at a 21% CAGR over FY24–30E

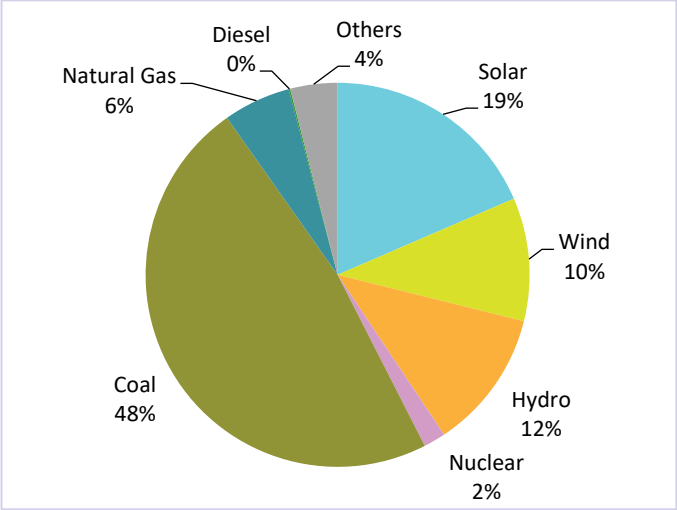
We estimate India's total power capacity shall grow at a 9% CAGR from 442GW in FY24 to 741GW by FY30. The large part of this incremental capacity addition shall come from solar capacity, which we expect to grow from 82GW in FY24 to 258GW by FY30, implying a 21% CAGR. This growth is followed by a strong 47% CAGR in solar capacity additions over FY15–24. With solar capacity expansion, the share of solar shall rise from 19% in FY24 to 35% by FY30. Our expectation for solar capacity growth is backed by strong tailwinds for the solar sector driven by a decline in module prices and tariffs, favourable government policies and geographical advantage.

Exhibit 81: Installed solar capacity at 82GW in FY24…



Source: CEA, Nuvama Research

Exhibit 82: …estimated to rise to 258GW by FY30E



Source: CEA, Nuvama Research

The global average solar module price, which constitutes 55–60% of the total system cost, crashed 73% to USD0.47/w in CY16 from USD1.78/w in 2010. Prices continued to decline to USD0.22/w by end-August 2019, owing to technology improvement, scale benefits and a demand-supply gap in the global solar module manufacturing industry. Further, declining inverter prices (6-7% of the capital cost), which fell to USD0.2/w by March 2020 (which has now been reduced to USD0.016-0.018/w), reduced system costs. Module prices reached USD0.22/w level in FY21.

Module prices started to fall in 2023 owing to the ramp-up in production of upstream components. Prices of modules fell to USD0.15–0.20/w in Apr–Nov'23 from USD0.23/w in Jan-23. This has eased some pressure on capital costs in FY24. Prices of mono facial module had touched USD0.20/w by Q4FY24. Solar module prices further declined to USD0.09/w as global markets remain oversupplied.

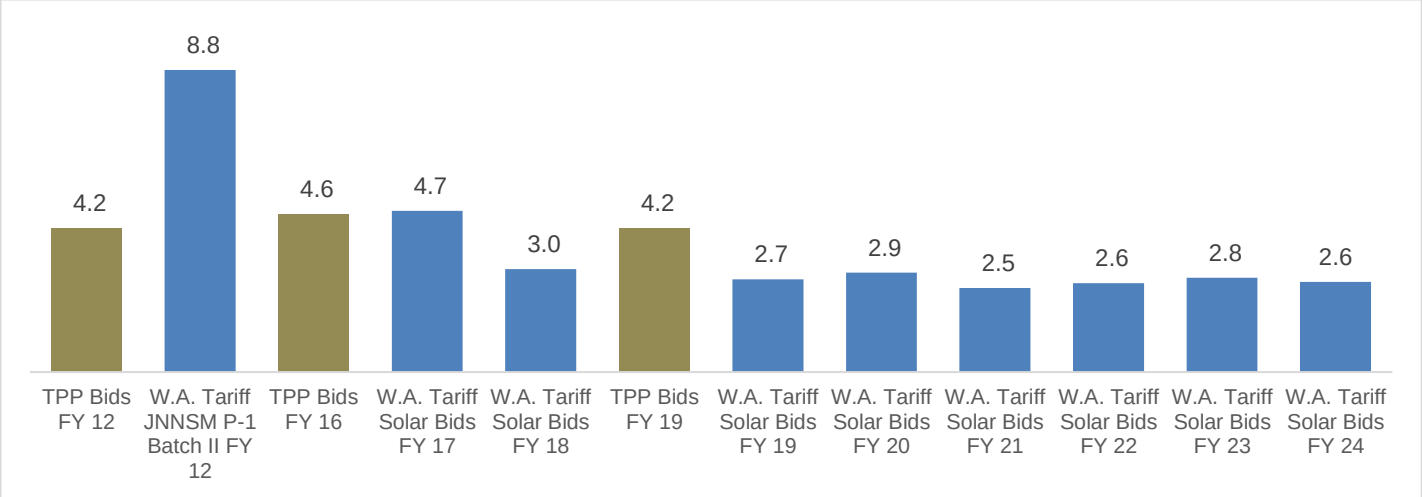
Exhibit 83: Module prices decline >85% from FY15 to FY24; current module prices trending at USD0.09/w

Source: Bloomberg, Nuvama Research

Solar power tariffs have been lower than coal-based power tariffs

In recent years, no major development has taken place in the case of thermal power bidding. However, considering the previously bid prices of thermal power, solar power tariffs have been on the lower side.

Exhibit 84: Competitively bid solar power tariffs much lower than coal-based power tariffs



Source: CRISIL MI&A Consulting

Note: TPP – Thermal power plant; JNNSM – Jawaharlal Nehru National Solar Mission; W.A. – Weighted average levelised tariffs

Green hydrogen to unleash another 2x growth

The National Green Hydrogen Mission (NGHM) was approved by the government on January 4, 2022. The mission aims to make India a leading producer and supplier of green hydrogen globally. The mission would result in development of green hydrogen production capacity of at least 5MMTPA with an associated renewable energy capacity addition of about 125GW in the country.

The initial outlay for the mission will be INR197bn, including an outlay of INR175bn for the Strategic Interventions for Green Hydrogen Transition Programme (SIGHT) programme, INR15bn for pilot projects, INR4bn for R&D, and INR3.9bn towards other mission components. Overall, the Green Hydrogen Policy is a major step forward for the clean energy transition in India. The policy is likely to have a significant impact on the future renewable capacity addition in India and would help to make India a prominent player in the green hydrogen sector.

Incentives to ignite economies of scale

The Government of India has taken several policy initiatives to promote solar module manufacturing in India. Some of the key government initiatives to support a domestic PV manufacturing industry are as follows:

1. **Approved list of models and manufacturers**: The ALMM was introduced in 2019 to ensure the quality and performance of solar modules used in India. It is a list of solar cell and module types and manufacturers in India that have been certified by the Bureau of Indian Standards. Only modules that are listed on the ALMM are eligible for use in government-sponsored solar projects.

2. **Domestic content requirement (DCR)**: The DCR mandates the use of solar cells and modules manufactured domestically as per specifications and testing requirements fixed by MNRE. Various schemes have been announced by the government to promote the use of domestically manufactured modules such as CPSU scheme, PM-KUSUM scheme and grid connected rooftop solar programmes. All these schemes have a Central Financial Assistance (CFA)/VGF component to cover the cost difference between imported and domestic solar cells and modules. It is mandatory to use DCR cells and modules to avail the financial aid provided by the central/state government. Phase–II of the Grid Connected Rooftop Solar Programme was launched to encourage grid connected rooftop solar systems in various consumer segments. A target has been set of adding 38GW of rooftop solar capacity by Mar-26, comprising 4GW in residential segment with CFA and 34GW in commercial and industrial sector through suitable incentives by DISCOMs.

3. **Basic customs duty**: The government imposed a basic customs duty of 40% on solar modules and 25% on solar cells on April 1, 2022. This was done in an effort to boost domestic manufacturing of solar components and reduce India's reliance on imports. The BCD applies to all imports of solar modules and cells, regardless of the country of origin.

4. **Solar manufacturing linked tender**: SECI had floated an EoI with the proposition of linking solar project tendering to setting up of module manufacturing capacities. The initial proposal had been floated for 5GW of manufacturing-linked capacities linked to 10GW of solar projects, which was then reduced to 3GW of manufacturing capacities but linked to 10GW of projects. Under this initiative, developers would have to comply with a 1:3 ratio between manufacturing capacities and projects and adhere to the timelines, otherwise strict penalties were stipulated.

   Furthermore, developers could only import polysilicon while the remaining manufacturing chain from silicon wafers to modules would have to be set up. However, the above tenders failed to attract bidder response, except for a single bid from Azure Power for 600MW of manufacturing capacity and 2,000MW of solar projects. This bid was, however, cancelled due to disagreement over the final bid price (no auction conducted as only one bidder).

   After few extensions and revised tenders, in October 2019, the tender was scaled up to 7GW of power generation capacity linked to 2GW of photovoltaic manufacturing capacity. This also included a green shoe option if the developers wished to avail of it. The tender finally got allocated in January 2020, with even a 1GW over subscription (several clauses were amended and tariff ceiling raised). The bid was won by Adani Green Energy (6GW of power generation) and Azure Power (2 GW). They also availed 2GW each under green shoe option.

Both recently signed PPAs with SECI for ~4.67GW and 2.3GW, respectively. The capacities for manufacturing-linked tenders are likely to be commissioned FY25 onwards in phases. Moreover, in Sep-21, SECI revised the tariff to INR2.54/unit from INR2.92/unit. This led to pick-up in PSA signing activity for manufacturing-linked tender with 1GW of PSA signed by TANGEDCO, 0.5GW by GRIDCO and 5.5GW by AP discom.

5. **Pradhan Mantri Kisan Urja Suraksha evam Utthan Mahabhiyan (PM-KUSUM) Scheme**: Launched in Mar-19, the PM-KUSUM Scheme supports farmers by offering financial assistance for installing solar-powered irrigation systems, including solar pumps and grid-connected solar power plants. It aims to reduce diesel use in agriculture and boost farmers' income.

   By shifting to solar energy, the scheme also helps to reduce carbon emissions and improve energy access in rural agricultural areas. Under the scheme, central government subsidy up to 30% or 50% of the total cost is given for the installation of standalone solar pumps and for the solarisation of existing grid-connected agricultural pumps.

   Furthermore, farmers can install grid-connected solar power plants up to 2MW on barren land and sell electricity to DISCOMs. The scheme, implemented by state departments, targets adding 34,800MW of solar capacity by Mar-26 with a total central financial support of INR344billion.

Exhibit 85: Key targets of PM-KUSUM scheme

Component	Target	Creation of RE capacity target (GW)
Component A	10,000 MW of Decentralised Ground Mounted Grid Connected Solar Plants	10
Component B	Installation of 1.4mn Standalone Solar Powered Agriculture Pumps	7
Component C	Solarisation of 3.5mn existing individual Grid-connected Agriculture Pumps including Feeder Level Solarisation	17.8
	Total	**34.8**

Source: MNRE, Nuvama Research

6. **PLI scheme for domestic module manufacturing:** On November 11, 2020, the government introduced the PLI scheme for ten key sectors to enhance India's manufacturing capabilities and exports under its Aatmanirbhar Bharat initiative. One of the ten sectors for which PLI was approved is high-efficiency solar PV modules, for which, the MNRE was designated as the implementing ministry.

   The financial outlay for the PLI scheme is INR45bn over a five-year period. This was later increased to INR240bn. In Sep-21, IREDA, the implementing agency, released the list of PLI scheme participants, and the scheme received 54.8GW worth of bids for a 10GW scheme. Bids of ~19GW were submitted for the manufacture of polysilicon, 32GW for wafers, and 54.8GW for cells and modules.

   In Mar-23, the government, through SECI, allocated 39.6GW of domestic solar PV module manufacturing capacity under the PLI scheme (Tranche-II) to 11 companies, with a total outlay of ~INR140bn. Total manufacturing capacity of 7,400MW was likely to become operational by Oct-24, 16,800MW by Apr-25, and the remaining 15,400MW by Apr-26.

Exhibit 86: Capacity awarded (MW) under PLI scheme (tranches I and II)

Player	Polysilicon	Wafer	Cells	Modules
Shirdi Sai Electricals Limited	4,000	4,000	4,000	4,000
Reliance New Energy Solar Limited	4,000	4,000	4,000	4,000
Adani Infrastructure Private Limited	737	737	737	737
Total PLI Tranche I	**8,737**	**8,737**	**8,737**	**8,737**
Indosol Solar Private Limited	6,000	6,000	6,000	6,000
Reliance New Solar Energy Limited	6,000	6,000	6,000	6,000
FS India Solar Ventures Private Limited	3,400	3,400	3,400	3,400
Waaree Energies Limited		6,000	6,000	6,000
Avaada Electro Private Limited		3,000	3,000	3,000
ReNew Photovoltaics Private Limited		4,800	4,800	4,800
JSW Renewable Technologies Limited		1,000	1,000	1,000
Grew Energy Private Limited		2,000	2,000	2,000
VSL Green Power Private Limited			2,400	2,400
AMPIN Solar One Private Limited			1,000	1,000
TP Solar Limited			4,000	4,000
Total PLI Tranche II	**15,400**	**32,200**	**39,600**	**39,600**
Total PLI Tranche I+II	**24,137**	**40,937**	**48,337**	**48,337**

Source: Company, MNRE, SECI, IREDA, CRISIL MI&A Consulting

Module and cell industry demand–supply

Demand drivers in place; solar equipment manufacturers to benefit

The Government of India has chalked out ambitious plans to achieve 500GW of renewable energy by 2030, of which 280GW will come from solar. For this purpose, the government has undertaken various steps to achieve this target.

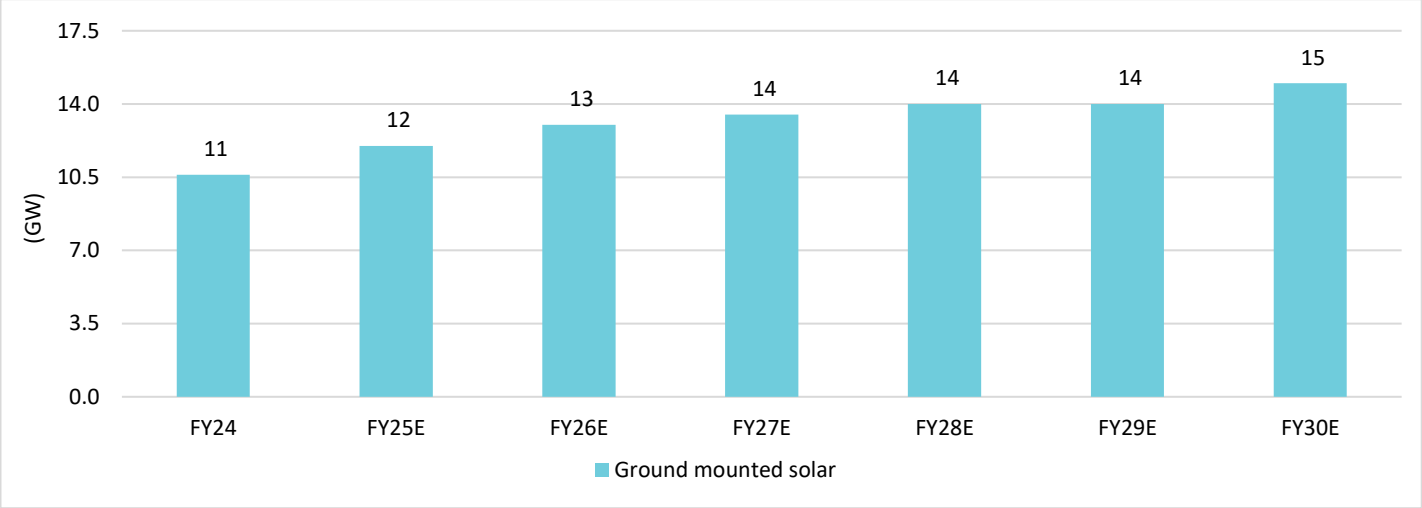
The government decided to invite bids for 50GW of renewable energy capacity annually for the next five years i.e. over FY24–28E. These annual bids of Inter-State Transmission (ISTS) connected renewable energy capacity shall also include setting up of wind power capacity of at least 10GW per annum, implying ~80% of this capacity for solar projects. In FY24, bids amounting to 52GW had been issued.

We believe the governments thrust on increasing solar power capacity shall benefit large-scale backward integrated solar equipment manufacturers.

Ground-mounted solar projects to drive demand

We forecast the incremental annual solar power capacity addition shall be contributed by ground-mounted solar projects. Our estimates suggest incremental solar power capacity addition from the ground-mounted solar projects to contribute ~82GW over FY25–30E.

Exhibit 87: Ground-mounted solar projects to add ~82GW over FY24–30E; annual addition of 12–15GW



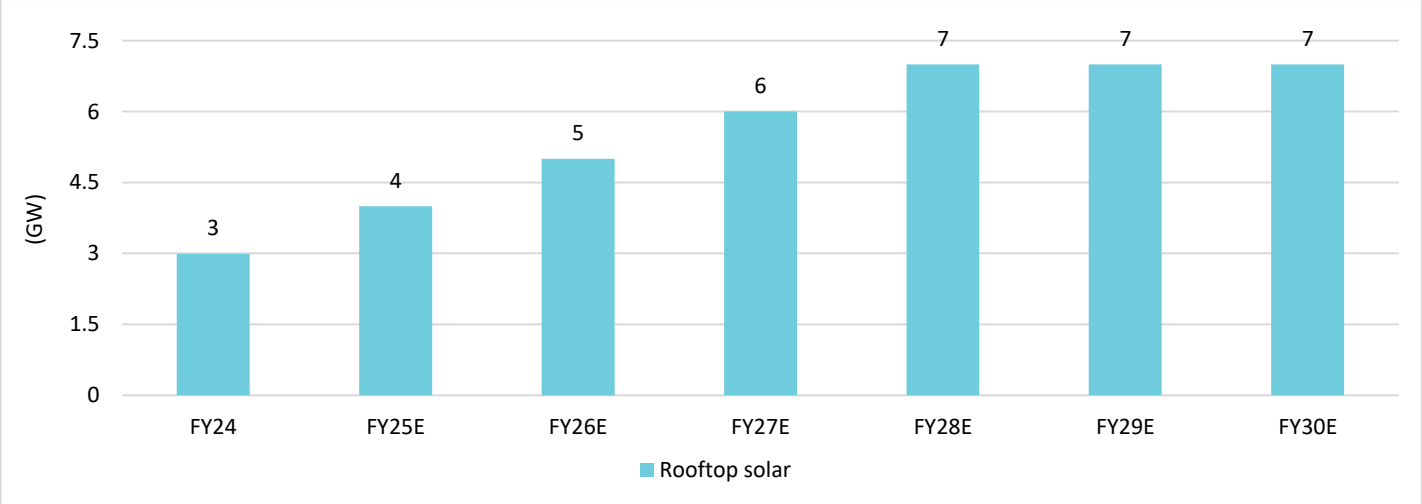
Source: Nuvama Research

Rooftop solar capacity addition to be ~35GW over FY25–30E

Our estimates suggest ~35GW of projects would be commissioned driven by commissioning of capacities by SECI and government institutions, capacities allocated by state governments and capacities to be added by industrial and commercial consumers under net/gross metering schemes of various states.

Residential rooftop consumers will also contribute to the growth. The Prime Minister's household scheme if effectively implemented can boost the residential segment offtake substantially.

Exhibit 88: Incremental rooftop capacity additions over FY25–30E



Source: Nuvama Research

Overall, we estimate the grid connected solar power additions shall touch 258GW by FY30E (conservative estimate of government targeting 280GW of solar addition).

Module capacity to exceed demand by FY27E...

The government's push for increasing solar capacity to achieve its Net Zero targets by 2070, coupled with favourable policies and schemes has led to local manufacturers of solar modules and cells to become the ultimate beneficiaries. India's solar module manufacturing capacity has increased from 5.8GW in FY16 to 63GW in FY24, growing at a 35% CAGR over FY16–24. This growth in capacity is a result of multiple demand and supply-side government policies.

In order to transform India into a manufacturing hub and reduce its dependence on imports, the GoI implemented supply-side measures such as Production Linked Incentives (PLI), Approved List of Models and Manufacturers (ALMM), Domestic Content Requirement (DCR) and Basic Customs Duty (BCD) of 40% on imports of solar modules and 25% BCD on imports of solar cells.

In addition to these, the government set in place demand-side measures such as setting up solar parks, implementation of the PM-KUSUM scheme and PM Surya Ghar Muft Bijli Yojana. Moreover, the government floated tenders through SECI and other large utility scale tenders to spur demand as well.

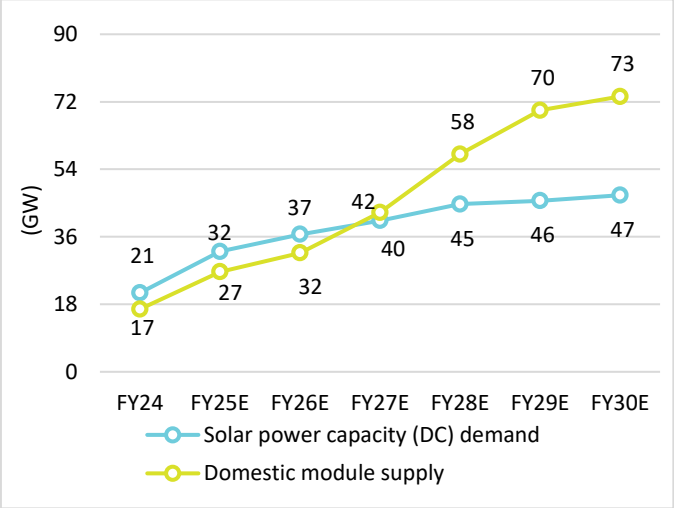
However, our calculation suggests solar module capacity is likely to increase from 63GW in FY24 to 123GW by FY27E and 165GW by FY30E. We believe the announced capacities will likely cause a supply glut and make module manufacturing alone unviable for smaller entities.

…however, solar cells supply deficit to persist until at least FY29E

The recent announcement of List-II for solar PV cells under the ALMM framework will take effect from June 1, 2026. With the introduction of List-II for cells, the government intends to make solar a 100% DCR market. This has encouraged entities to backward integrate their solar module manufacturing capacities.

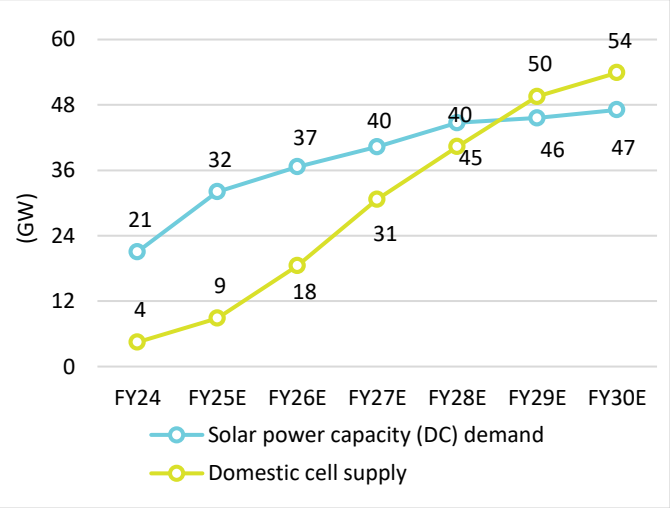
Based on our calculations, cell-manufacturing capacity is also likely to rise from 8GW seen in FY24 to 55GW by FY27E. While current cell manufacturing capacity remains under-supplied, with the announced capacities, we believe the cell manufacturing capacity shall also likely enter an oversupplied phase from FY29E.

Exhibit 89: Solar module supply to top demand by FY27E…



Source: Company websites, Industry, Nuvama Research

Exhibit 90: …with cell supply to be in deficit till at least FY29E



Source: Company websites, Industry, Nuvama Research

Exhibit 91: Domestic solar module manufacturing capacity to shoot up from 63GW in FY24 to 165GW by FY30E

	India module manufacturing capacity						
(GW)	**FY24**	**FY25E**	**FY26E**	**FY27E**	**FY28E**	**FY29E**	**FY30E**
Reliance New Energy	-	5.0	10.0	15.0	20.0	20.0	20.0
Waaree Energies	12.0	13.3	17.9	20.9	23.9	25.9	27.9
Premier Energies	4.1	4.1	5.1	7.1	9.1	9.1	9.1
Adani Mundra PV	4.0	6.0	8.0	8.0	10.0	10.0	10.0
ReNew Power	6.4	6.4	6.4	7.4	8.4	9.4	10.4
Goldi Solar	3.3	6.3	6.3	6.3	6.3	6.3	6.3
Jupiter Solar	-	-	3.6	3.6	3.6	4.6	5.6
Websol	0.6	0.6	0.6	0.6	0.6	0.6	0.6
RenewSys	2.5	3.5	3.5	3.5	4.5	5.5	5.5
Solex Energy	0.7	1.5	1.5	2.5	4.0	4.0	4.0
Tata Power Solar	4.7	4.7	4.7	4.7	4.7	4.7	4.7
First Solar	3.3	3.3	3.5	3.5	3.5	3.5	3.5
Rayzon Solar	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Saatvik Green Energy	1.2	3.8	3.8	3.8	4.8	5.8	6.8
Grew Solar	1.2	2.8	2.8	4.0	4.0	5.0	6.0
Gautam Solar	1.0	2.0	2.0	3.0	3.0	4.0	5.0
Others	14.1	19.1	22.1	25.1	29.1	32.1	35.1
Total	**63.0**	**86.4**	**105.8**	**123.0**	**143.5**	**154.5**	**164.5**

Source: Company websites, Industry, Nuvama Research

Exhibit 92: Solar cell capacity additions to pick up over next couple of years

	India cell manufacturing capacity						
(GW)	**FY24**	**FY25E**	**FY26E**	**FY27E**	**FY28E**	**FY29E**	**FY30E**
Reliance New Energy	-	-	5.0	10.0	15.0	20.0	20.0
Waaree Energies	-	-	5.4	11.4	14.4	17.4	19.4
Premier Energies	2.0	2.0	3.0	7.0	7.0	7.0	7.0
Adani Mundra PV	4.0	6.0	8.0	10.0	10.0	10.0	10.0
ReNew Power	-	2.5	2.5	3.5	4.5	5.5	6.5
Goldi Solar	-	-	-	-	2.0	3.0	4.0
Jupiter Solar	1.0	1.0	1.0	1.0	2.0	4.0	7.0
Websol	0.6	0.6	1.2	1.2	1.2	1.2	1.2
RenewSys	-	-	-	-	1.8	1.8	1.8
Solex Energy	-	-	-	1.0	1.0	2.0	2.0
Tata Power Solar	0.5	4.0	4.0	4.0	4.0	4.0	4.0
Saatvik Green Energy	-	-	-	1.0	2.0	4.0	4.0
Grew Solar	-	-	-	-	2.8	2.8	2.8
Gautam Solar	-	-	-	1.0	1.0	2.0	2.0
Others	-	-	3.2	4.2	5.2	5.2	6.2
Total	**8.1**	**16.1**	**33.3**	**55.3**	**73.9**	**89.9**	**97.9**

Source: Company websites, Industry, Nuvama Research

Comparative dashboard

Exhibit 93: Landscape of key players

Particulars	UoM	Premier	Adani	Waaree	Renew	Goldi	Jupiter	Websol	Solex Energy	Tata Power Solar Systems	RIL
Operational metrics (31st Mar'24)											
Module manufacturing tech		PERC+Topcon	PERC+Topcon	PERC	PERC	PERC	PERC	PERC+Topcon	PERC	PERC+Topcon	HJT
Solar module manufacturing capacity	GW	4.1	4.0	13.3	4.0	3.3	-	0.6	1.5	2.7	-
Share in India's module manufacturing	%	5.7%	5.6%	18.5%	5.6%	4.6%	0.0%	0.8%	2.1%	3.7%	0.0%
Proposed solar module manufacturing capacity	GW	5.0	6.0	6.0	2.0	2.7	1.8	1.3	2.5	2.0	20.0
Solar cell manufacturing capacity	GW	2.0	6.0	-	2.4	-	0.8	0.6	-	2.5	-
Share in India's cell manufacturing	%	16.2%	32.4%	0.0%	20.3%	0.0%	6.5%	4.9%	0.0%		0
Proposed solar cell manufacturing capacity	GW	5.0	6.0	11	3.6	5.0	2.4	1.2	2.0	2.0	20.0
Integrated capacity of module + cell	GW	2.0	4.0	11	0.1	-	-	0.6	-	2.5	20.0
Non-integrated module capacity	GW	2.1	-	12.5	2.4	3.3	-	-	-	0.15	-
Enlisted Capacity as ALMM List (Sep-24)	MW	2,561	4,067	11,919	1,636			NA			
Market share as a % of total enlisted capacity as per ALMM List (Sep-24)	%	5%	7%	21%	3%			NA			
Proposed wafer capacity	GW	2.0		6.0							
Financial metrics		**FY24**	**FY23**	**FY24**	**FY23**	**FY23**	**FY23**	**FY24**	**FY24**	**FY24**	
Revenue	INR mn	31,438	15,925	1,13,976	17,914	14,872	4,304	259	3,659	1,17,256	
YoY growth	%	120%	-38%	69%	50%	172%	43%	50%	126%	71%	
EBITDA	INR mn	5,053	863	18,096	1,221	912	220	(66)	284	7,198	
EBITDA margin	%	16%	5%	16%	7%	6%	5%	-25%	151%	6%	
PAT	INR mn	2,314	(3,514)	12,744	461	484	(358)	(1,210)	87	3,914	
PAT margin	%	7%	-22%	11%	3%	3%	-8%	-468%	2%	3%	
Net Debt	INR mn	9,895						1,826			
RoE	%	44%	-52%	30%	7%	60%	-34%	-81%	21%	27%	
RoCE	%	26%	-1%	26%	9%	30%	2%	-16%	18%	35%	
D/E	x	2.2	2.6	0.2	0.5	3.0	4.2	1.7	2.1	-	

Source: Company websites, Industry, Nuvama Research

Exhibit 94: Other comparable metrics

Particulars	UoM	Premier	Adani	Waaree	Renew	Websol	Solex Energy	Insolation	Tata Power Solar Systems
Operational capacity (Mar-24)	GW	4.1GW module and 2GW cell	4GW module and cell	13.3GW module in India and 1.6GW module in US	4GW module and 2.4GW cell	0.55GW module and 0.6GW cell	1.5GW module	1GW module	2.7GW module and 2.5GW cell
Order book	INR mn	59,266	NA	NA	NA	NA	NA	NA	NA
Order book quantity	GW	54		20					
Revenue mix	%			Domestic (Utilities & Enterprises) - 31.42% Domestic (Retail) - 10.15% Exports - 57.64% Others - 0.79%					
Major country export revenue %	%	US - 8.8% HK - 4.7%		US - 99.6% Others - 0.4%					
Number of manufacturing factories		2 in Telangana	1 in Gujarat	4 in Gujarat	1 each in Karnataka, Telangana and Maharashtra	One in West Bengal		Two in Jaipur	
Top customers		NTPC, Tata Power Solar Systems, Panasonic Life Solutions, Continuum, Shakti Pumps.					Amul, NDDB, Taj Skyline, ONGC, IOCL, Torrent Power, Banco Aluminium, UGVCL, India Post		

Source: Company websites, Industry, Nuvama Research

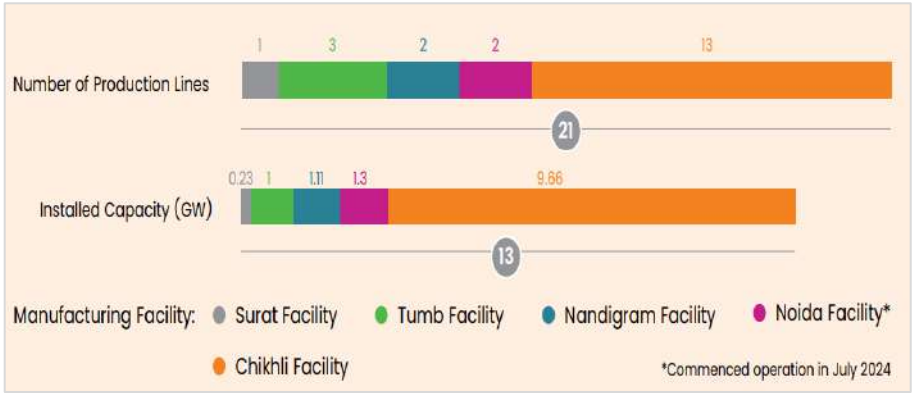
Company Description

Waaree Energies (Waaree), founded in 1990, is India's largest manufacturer of solar PV modules with the largest aggregate installed capacity of 13.3GW (including Indosolar capacity of 1.3GW). Waaree commenced operations in 2007 focusing on solar PV module manufacturing with the aim to provide quality, cost-effective sustainable energy solutions across markets, and aid in reducing carbon footprint paving the way for sustainable energy, thereby improving quality of life.

Its solar PV modules are currently manufactured using multi-crystalline cell technology, monocrystalline cell technology and emerging technologies such as Tunnel Oxide Passivated Contact (TopCon) that aids reduce energy loss, enhances overall efficiency. The portfolio of solar energy products consists of following PV modules: i) multi-crystalline modules; ii) monocrystalline modules; and iii) TopCon modules, comprising flexible modules that include bifacial modules (Mono PERC, framed and unframed), and building integrated photo voltaic (BIPV) modules.

The company operates five manufacturing facilities in India spread over an area of 143 acres—Surat, Tumb, Nandigram and Chikhli in Gujarat, and the Indosolar facility in Noida, Uttar Pradesh.

Exhibit 95: A snapshot of Waaree's current domestic manufacturing capacity



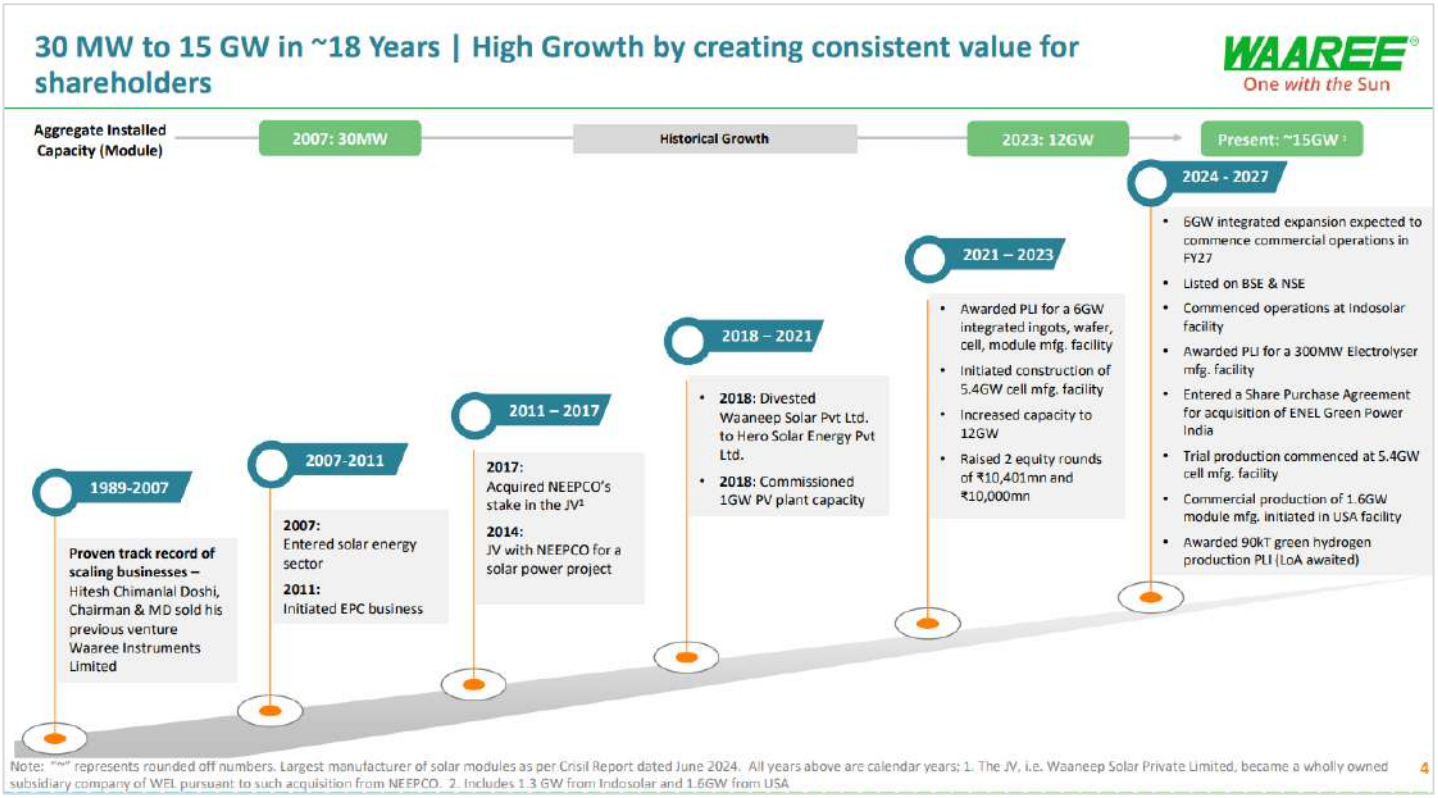
Source: Company, Nuvama Research

Installed capacity to rise to 21GW for modules, 11GW for cells and 6GW wafers

In line with the company's strategy, the company continues to ramp up its installed capacity further. Waaree commenced its 1.6GW module manufacturing capacity in the US (Texas) in Jan-25. Furthermore, the company has started commercial production of 1.4GW mono PERC facility and is ramping up well. The remaining 4GW (TOPCon) facility is likely to be commissioned by Apr–May'25.

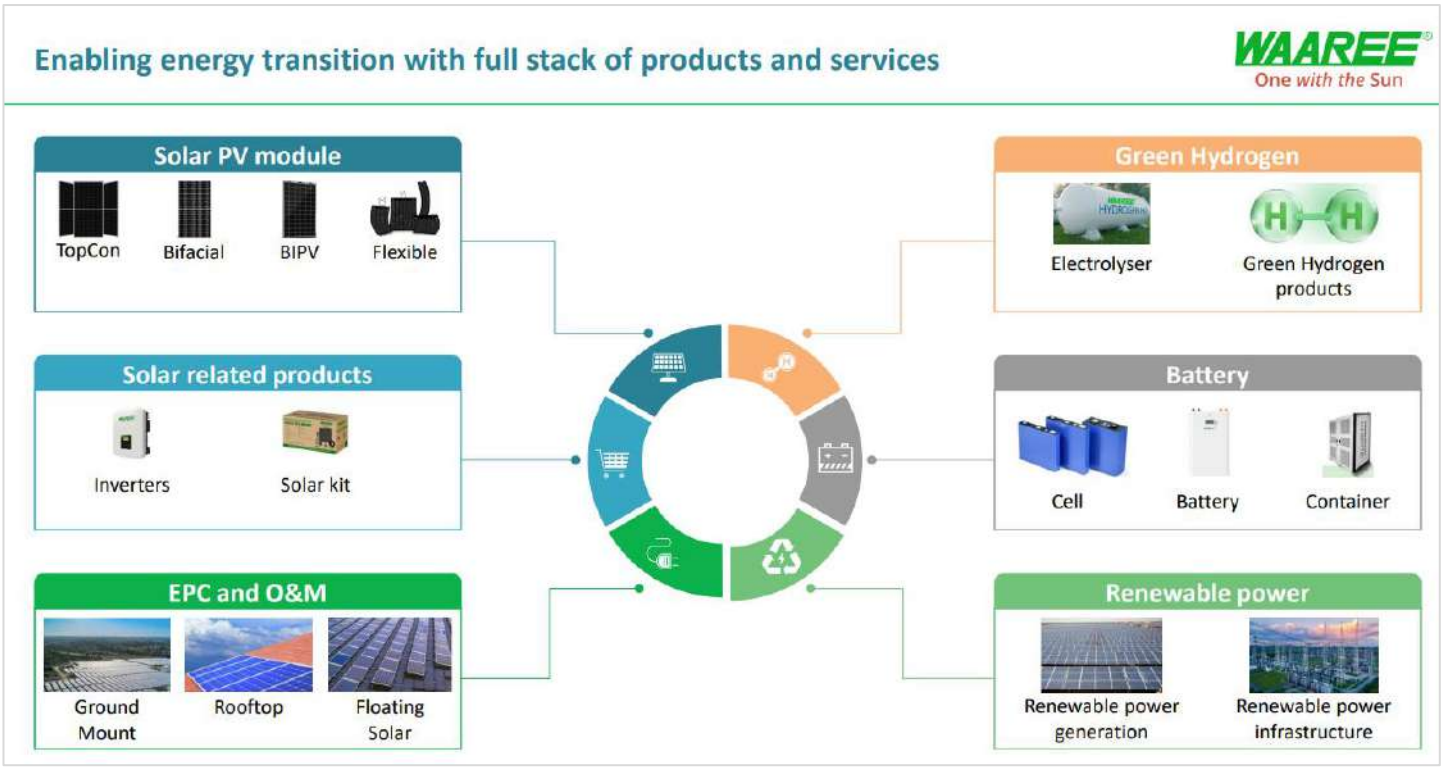
Waaree plans to add 6GW integrated facility in Odisha and is in advanced stages of planning; it aims to complete by FY27. Post-commissioning, Waaree's installed solar module capacity shall rise to 21GW, solar cell capacity to 11GW and wafer capacity to 6GW by FY27E.

Exhibit 96: Waaree Energies – Mapping the journey



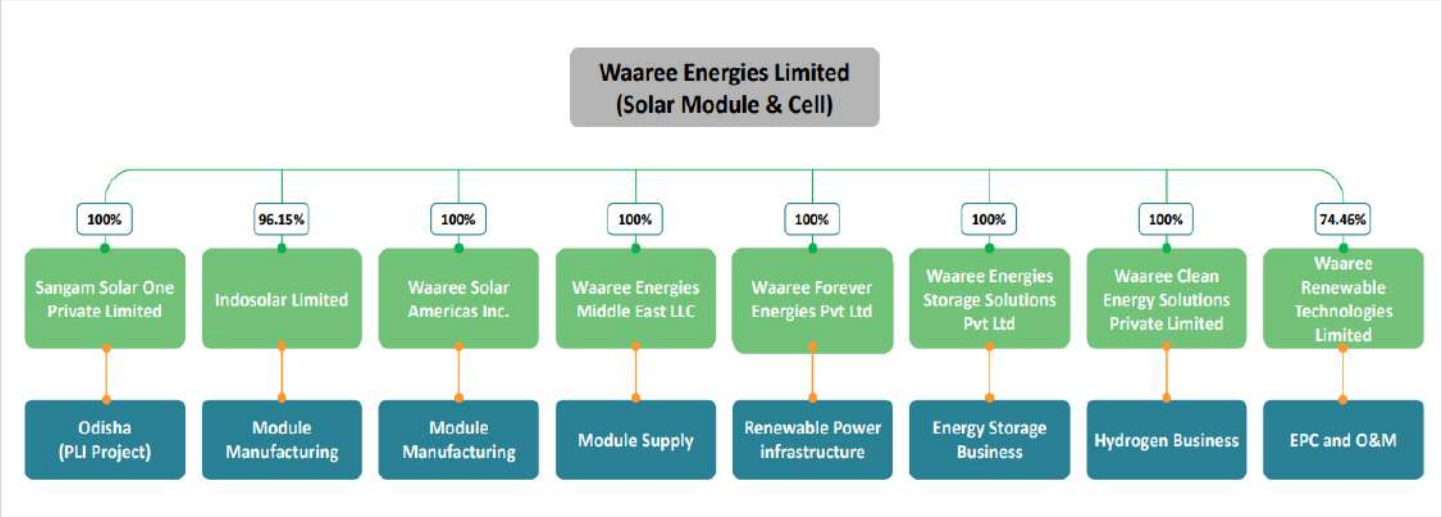
Source: Company, Nuvama Research

Exhibit 97: Mission: Venture into pivotal areas in energy transition journey…



Source: Company, Nuvama Research

Exhibit 98: …with a simple group structure, which ensures ring-fencing



Source: Company, Nuvama Research

Management Overview

Mr Hitesh Chimanlal Doshi – Chairperson and Managing Director

Mr Doshi is the promoter, chairperson of the Board and MD. He is a Bachelor of Commerce from the University of Mumbai. He is also a Doctorate of Professional Entrepreneurship (business project management) from the European Continental University. Mr Doshi has over 22 years of experience in the engineering industry.

Dr Amit Ashok Paithankar – Whole-Time Director and CEO

Dr Paithankar is a PhD in (Technology), an Electrical Engineer from the University of Mumbai and an MBA from the London School of Business and Finance. With over 25 years of experience in Engineering, R&D, Manufacturing, IT and General Management under his belt, Dr Paithankar has operated across diverse geographical locations over the course of his distinguished career—including India, Asia Pacific, the EU and the US.

Mr Viren Chimanlal Doshi – Whole-Time Director

Mr Doshi passed the higher secondary exams from the Maharashtra State Board of Secondary and Higher Secondary Education. He has over 15 years of experience in the engineering industry.

Mr Hitesh Pranjivan Mehta – Whole-Time Director

Mr Mehta is a Bachelor of Commerce from the University of Mumbai and has been admitted to the Institute of Chartered Accountants of India as a member. Mr Mehta has over 23 years of experience in the field of engineering, solar and oil industries.

Ms Sonal Shrivastava – CFO

Ms Shrivastava is a Bachelor of Science Engineering (Chemical) from Vinoba Bhave University and is an MMS from the Jamnalal Bajaj Institute of Management Studies, University of Mumbai. She was previously associated with Sugati Holdings Private Limited, Duet Capital SA, Vedanta Limited, Lafarge India Limited, Suzlon Energy Limited and Holcim Services (South Asia) Limited in various capacities.

Additional Data

Management

MD & Chairman	Hitesh C Doshi
CEO	Amit Paithankar
CFO	Sonal Srivastava
Executive Director	Viren C Doshi
Auditor	SRBC & Co LLP Chartered Accountants

Holdings – Top 10*

	% Holding		% Holding
Waaree Sustaina	18.37	Doshi Nipa Vire	5.64
Doshi Pankaj Ch	11.13	Doshi Binita Hi	5.56
Doshi Bindiya K	6.90	Doshi Kirit Chi	4.46
Doshi Viren Chi	6.10	Dharamshi H Kal	2.32
Doshi Hitesh Ch	5.89	VT ENERGY SRI	2.17

**Latest public data*

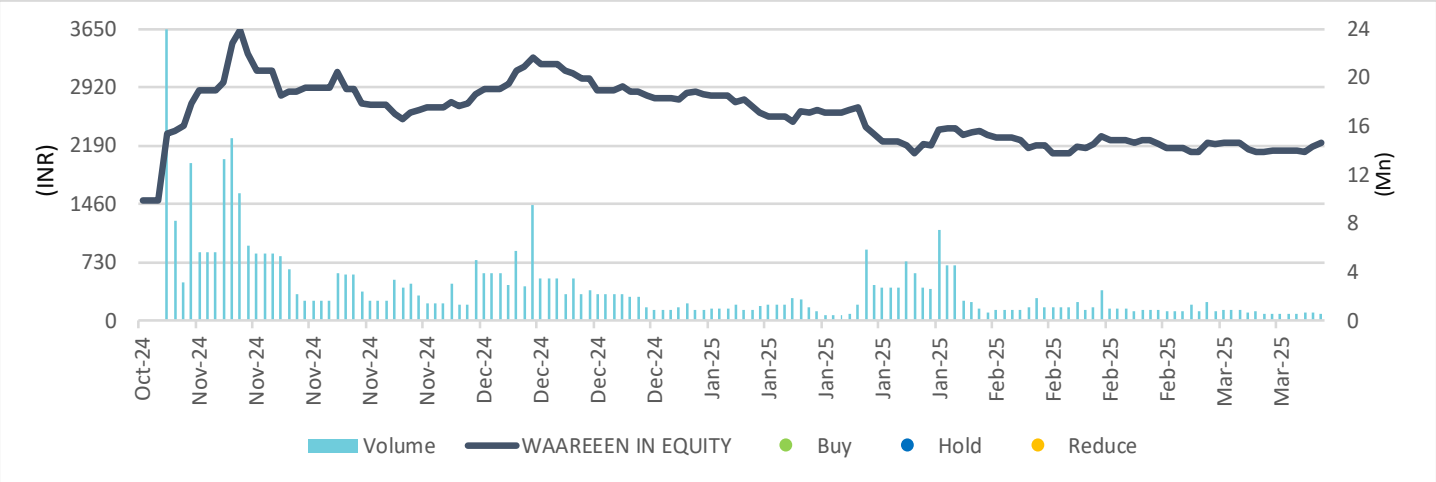
Recent Company Research

Date	Title	Price	Reco
31-Jan-25	Margins expand on input cost decline; *Result Update*	2,393	Not Rated
19-Nov-24	Muted performance; expansion on track; *Result Update*	2,902	Not Rated

Recent Sector Research

Date	Name of Co./Sector	Title
31-Jan-25	Sterling and Wilson	Channel checks; lowered risk; deep value; *Company Update*
22-Jan-25	New Energy	Race to the bottom continues; *Sector Update*
17-Jan-25	Sterling and Wilson	Guidance cut negative; prospects bright; *Result Update*

Rating and Daily Volume Interpretation



Source: Bloomberg, Nuvama research

Rating Rationale & Distribution: Nuvama Research

Rating	Expected absolute returns over 12 months	Rating Distribution
Buy	15%	235
Hold	<15% and >-5%	61
Reduce	<-5%	23

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