RE UPDATE
Q3 2022
THE WORLD'S MOST BANKABLE INVERTER BRAND

No.1 bankable for 3 consecutive years
No.1 supplier in financed projects

Source: BloombergNEF

10 GW India Manufacturing Unit
Towards Achieving an Aatmanirbhar Bharat

224GW* Deployed Worldwide
NO.1 Largest PV Inverter R&D Team
150+ Countries with Sungrow Installations
25 Years in the Solar Industry
No. 3 PV Inverter Supplier Globally in Shipment Terms in 2021
Source: IHS Markit now a part of S&P Global

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Executive Summary

In Q3 2022 (July-September 2022), about 2.82 GW of utility scale solar capacity was added. This is about 25% higher than the previous quarter's installation. In wind segment, about 1.02 GW was added, which is 138% higher than the Q2 2022 installation. In rooftop solar, more than 400 MW were added in this quarter.

During Jan-Sep 2022 period, about 9.3 GW of utility scale solar capacity was added, which is about 1.7 times higher than last year installations in the same period. About 1.89 GW of new wind capacity was added in the first nine months of 2022, which is about 46% higher than 1.3 GW capacity added during January to September 2021. Gujarat led the installations with the commissioning of more than 700 MW of new wind projects in this period. In the rooftop solar segment, about 1,334 MW of new capacity was added during January to September 2022, which is 34% less than January to September 2021 installations.

According to JMK Research, in 2022, about 13.6 GW of solar is expected to be added in India (~12 GW from utility-scale and 1.6 GW from rooftop solar). Whereas about 2.6 GW is likely to be added in 2022 in wind sector.

Further, according to the Q3 2022 equipment shipment data received by JMK Research, more than 2.9 GW of central and string inverters and about 1.56 GW of modules were shipped in India in Q3 2022. Sineng was the leading inverter supplier followed by Sungrow and FIMER. In the third quarter of 2022, Waaree was the leading module supplier contributing 14% share of all shipments in India.

With respect to tender activity, in Q3 2022, 75 new tenders with a cumulative capacity of 14.2 GW were issued across solar and wind segment, which is 25.7% higher than the previous quarter.

In Q3 2022, about 3150 MW of RE capacity was auctioned and allotted to various RE developers. Of the auctioned capacity, Tata Power won the maximum solar capacity of 450 MW followed by Avaada (325 MW), Engie, NTPC and SJVN (200 MW each). In wind segment, Ayana Renewables won the maximum capacity of 140 MW. ReNew Power (300 MW), Tata Power (200 MW) and Sprng Energy (160 MW) were awarded the highest capacities under wind solar hybrid segment.

In Q3 2022, India saw the lowest-winning solar tariff of INR 2.49/kWh under GUVNL’s 750 MW solar (Phase XVI) tender in Gujarat. The lowest-winning tariff in wind segment was INR 2.84/kWh under GUVNL’s 500 MW Phase III wind tender. While the lowest-winning tariff in wind solar hybrid segment was INR 3.03/kWh under RUMSL’s 750 MW Wind Solar Hybrid tender.

In Q3 2022, solar cells and modules exports increased by 57% and 524% respectively, compared to the previous quarter’s figures. However, the solar cells imports increased by 64% and solar modules imports decreased by 64% in Q3 2022. The significant reduction in the import numbers is because of the imposition of 40% basic custom duty (BCD) on solar modules.

The report also analyses module price trends in India, investments and deals, details of which are elaborated in further sections.
2.1 Cumulative installation trends

India’s renewable capacity installation reached 118.08 GW as of September 30, 2022. Solar continues to be the major contributor with 52% share in total renewable mix, which is followed by wind with 35% share.

As of September 30, 2022, about 60.8 GW of solar and 41.7 GW of wind capacity were installed in India. The current pipeline of combined capacity of solar, wind and hybrid projects are around 45 GW, which is likely to be commissioned in the next 4-5 years. Another 28 GW of projects are under bidding phase i.e., where tenders have been issued but auctions are not yet completed.

In terms of cumulative solar installation, as of September 30, 2022, Rajasthan, Gujarat and Karnataka contributed around 51.3% of the total capacity. Whereas in wind segment, Tamil Nadu, Gujarat, Karnataka and Maharashtra contributed about 71.9% of the total wind capacity installed in India.
2.2 Yearly installation trends and projections

**Utility Scale Solar:** From Jan-Sep 2022, about 9.3 GW of new utility-scale solar capacity was added in India. Compared to Jan-Sep 2021 period, installations are about 1.7 times higher. Rajasthan, Gujarat and Tamil Nadu were the leading states with most of the large-scale solar installations during this period.

**Rooftop Solar:** In the rooftop solar segment, about 1334 MW of new capacity was added during January to September 2022, which is 34% less than 2068 MW capacity added during January to September 2021. Gujarat, Maharashtra, and Rajasthan were the leading states in the rooftop solar segment adding more than 800 MW during the first nine months of 2022.

In order to achieve the rooftop solar capacity target of 40 GW, the government has extended the timeline of the implementation of Rooftop Solar Programme Phase-II from December 2022 to 31 March 2026 without any additional financial support.

**Distributed/ Off-grid Solar:** From Jan-Sep 2022, about 604 MW of distributed/off grid solar capacity was added in India.

**Wind:** From Jan-Sep 2022, about 1.89 GW of new wind capacity was added, which is 46% higher than 1.3 GW capacity added during January to September 2021. Gujarat led the installations with the commissioning of more than 700 MW of new wind projects in this period.

Figure 2.2: State-wise solar and wind capacity addition in India from Jan- Sep 2022

Source: MNRE, JMK Research
2.2 Yearly Projections

According to JMK Research, in 2022, about 13.6 GW of solar is expected to be added in India (~12 GW from utility-scale and 1.6 GW from rooftop solar). Whereas about 2.6 GW is likely to be added in 2022 in wind sector.

Source: MNRE, JMK Research
Note: The projection number for solar includes Utility Scale Solar and Rooftop Solar capacity
In Q3 2022 (July-Sept 2022), about 2.82 GW of utility scale solar capacity was added. This is about 25% higher than the previous quarter installations. In wind segment, about 1.02 GW was added, which is 138% higher than the Q2 2022 installations because of the peak wind season in the country. In rooftop solar segment, more than 400 MW were added in the third quarter of 2022.

As per our estimates, the installation activity is likely to further pick up. In the next two quarters, about 5.6 GW of solar, 2.5 GW of wind and 1.05 GW of hybrid capacities are expected to get installed in the country.

Figure 2.4: Quarter-wise utility scale solar and wind installations

Source: MNRE, CEA, JMK Research
The cumulative RE generation in Q3 2022 was 49,987 MU, down by 1.2% from previous quarter’s generation data. In the third quarter of 2022, RE accounts for 12.2% of the total energy generated. Wind energy accounts for most of the energy generation (49%) from renewable energy sources in Q3 2022 due to peak wind season in the country, which is followed by solar at 42%, and other RES (including biomass) at 9%.

Figure 3.1: Source-wise Renewable Energy Generation (MU) Q3 2022 - India
4.1 Inverter Suppliers

For Q3 2022, we have received more than 2.9 GW of shipment data from 14 players providing both central and string inverters in India. In Q3 2022, Sineng was the leading inverter supplier followed by Sungrow and FIMER.

Figure 4.1: Leading central and string inverter suppliers in solar sector in India in Q3 2022

Source: JMK Research
Note: Leading players are listed based on their shipment numbers in Q3 2022 (Jul-Sep) in India. Kehua, TBEA, SMA, Solaredge, Huawei, Growatt and Delta have not shared their quarterly data, hence not included.
4.2 Module Suppliers

For Q3 2022, we have received about 1.56 GW of module shipment data from 16 leading suppliers. In this quarter, Waaree is the leading supplier contributing about 14% share of total shipments. As per the data received from the market players, nearly 85% of the module shipments in India in Q3 2022 are high-efficiency mono PERC modules.

Figure 4.3: Leading module suppliers in solar segment in India in Q3 2022

Source: JMK Research
Note: Leading players are listed based on their shipment numbers in Q3 2022 in India. Canadian Solar, JA Solar, PV Powertech, Risen Energy, Renesola and Jinko Solar have not shared their quarterly data, hence not included. Data is based on self-declaration by companies.
4.3 Project Developers

In terms of cumulative installation as of September 30, 2022, across both utility-scale solar and wind segments, Adani is the leading player, with about 6.72 GW of operational capacity and another 20.43 GW of projects in pipeline.

Figure 4.4: Top 15 project developers across utility-scale solar and wind segment as of September 30, 2022

Source: JMK Research
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5.1 New Tenders

In Q3 2022, 75 new tenders aggregating to a total capacity of 14.2 GW were issued across renewable segment which is about 25.7% higher than the previous quarter.

Key RE tenders issued in Q3 2022 were:

- MSEDCL issued three solar tenders with a total capacity of 2500 MW in Maharashtra.
- REMCL floated a tender for setting up of 1548 MW land based solar power plant on Private/Farmers land near the Traction Sub-station (TSS) at 25 kV connectivity under TSS-II category.
- GUVNL floated a tender of 750 MW solar power projects under phase XVI with greenshoe option of additional up to 750 MW. GUVNL also issued a tender of 600 MW solar power projects under Phase XVII with greenshoe option of additional up to 600 MW.
Storage tenders issued in Q3 2022

- SECI floated a tender for supply of 2250 MW of Round-the-Clock (RTC) power from RE power projects, complemented with power from any other source or storage in India under RTC-III category.
- REMCL also issued a tender for supply of 1000 MW of RTC power from RE power projects with or without storage across the country.
- GUVNL issued a tender for setting up of pilot projects of 500 MW/1000 MWh under Phase I of standalone Battery Energy Storage Systems (BESS) scheme in Gujarat.

Figure 5.2: New RE Tender Issuance in Q3 2022
In Q3 2022, 9.97 GW of project development RE tenders were issued. Out of the total issued capacity, about 5.96 GW and 4.01 GW of project development tenders were floated under solar and hybrid segment respectively.

Figure 5.3: Details of key Project Development tenders issued in Q3 2022

<table>
<thead>
<tr>
<th>Tender Description</th>
<th>Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SECI 1250 MW RE with ESS Storage (RTC III) Pan India</td>
<td>2250</td>
</tr>
<tr>
<td>REMCL 1548 MW Solar Pan India Jul 2022</td>
<td>1548</td>
</tr>
<tr>
<td>SECI 2250 MW RE with ESS Storage (RTC III) Pan India</td>
<td>1000</td>
</tr>
<tr>
<td>SECI 1000 MW Solar India Jul 2022</td>
<td>1000</td>
</tr>
<tr>
<td>REMCL 1000 MW Solar India Jul 2022</td>
<td>1000</td>
</tr>
<tr>
<td>GUVNL 750 MW Solar Gujarat Jul 2022</td>
<td>750</td>
</tr>
<tr>
<td>GUVNL 600 MW Solar Gujarat Sep 2022</td>
<td>600</td>
</tr>
<tr>
<td>GUVNL 500 MW Solar Gujarat Sep 2022</td>
<td>500</td>
</tr>
<tr>
<td>GUVNL 500 MW with 1000 MWh BESS Storage (Phase-I)</td>
<td>500</td>
</tr>
<tr>
<td>MSEDCL 500 MW Solar (Tranche V) Maharashtra Sep 2022</td>
<td>300</td>
</tr>
<tr>
<td>MSEDCL 250 MW Solar Maharashtra Aug 2022</td>
<td>255</td>
</tr>
<tr>
<td>AUTL 15 MW Solar Ladakh Sep 2022</td>
<td>15</td>
</tr>
</tbody>
</table>

Source: JMK Research
In Q3 2022, 7 new KUSUM tenders were issued, with a total capacity of 1,695 MW, wherein MPUVNL issued a 1250 MW tender for selection of Renewable Power Generators (RPGs) for setting up of solar power plants under feeder solarization under PM KUSUM Component C scheme in Madhya Pradesh.

Madhya Pradesh (1,258 MW), Maharashtra (298 MW) and Gujarat (60 MW) have issued the majority of these tenders in this quarter.

Figure 5.4: KUSUM solar tenders issued in Q3 2022
5.2 Successful Auctions

About 3150 MW of RE capacity was auctioned and allotted to various RE developers in the third quarter of 2022.

Out of the total auctioned capacity, 1,750 MW has been allocated to various developers under solar segment, 1260 MW to hybrid segment and 500 MW to wind segment.

Figure 5.5: RE tenders allotted in Q3 2022
Of the auctioned capacity, Tata Power won the maximum solar capacity of 450 MW followed by Avaada (325 MW), Engie, NTPC and SJVN (200 MW each). In wind segment, Ayana Renewables won the maximum capacity of 140 MW followed by Blupine Energy (100 MW), O2 Power and GSECL (70 MW each). ReNew Power (300 MW), Tata Power (200 MW) and Sprng Energy (160 MW) were awarded the highest capacities under wind solar hybrid segment.

In addition, JSW Energy was awarded 500 MW under SECI’s pilot projects of 500 MW/1000 MWh Standalone BESS Systems at INR 1.08 million/MW/month in Q3 2022.

Figure 5.6: Developer wise project won in Solar tenders in Q3 2022
5.3 Tariff Trends

In Q3 2022, India saw the lowest-winning solar tariff of INR 2.49/kWh under GUVNL’s 750 MW solar (Phase XVI) tender in Gujarat. This is about 25% higher than the lowest solar tariff, INR 1.99/kWh that was discovered under GUVNL’s 500 MW solar Phase XI tender auctioned in 2020. The lowest-winning tariff in wind segment was INR 2.84/kWh under GUVNL’s 500 MW Phase III wind tender. While the lowest-winning tariff in wind solar hybrid segment was INR 3.03/kWh under RUMSL’s 750 MW Wind Solar Hybrid tender in Q3 2022.

Figure 5.7: Lowest winning Tariff range in auctioned RE tenders

Source: JMK Research
The investment flow in RE sector in Q3 2022 was more than $6,627 million. About 8,737 MW RE assets were acquired in this quarter with total investment of more than $4600 million. Another $1358 million equity investments were also raised by various players.

Key investments in Q3 2022 were:

- Sembcorp Industries has entered into a share purchase agreement to sell 100% of the shares of Sembcorp Energy India Limited (“SEIL”) to Tanweer Infrastructure Pte. Ltd for $1430 million. Tanweer Infrastructure will settle the final consideration through a deferred payment note (“DPN”) provided by Sembcorp Industries.

- Shell completed the acquisition of Sprng Energy group in Q3 2022.

- JSW Neo Energy, a wholly owned subsidiary of JSW Energy, has agreed to acquire a portfolio of 1,753 MW of renewable energy generation capacity from Mytrah Energy (India) for $1320 million.

- KKR and Hero Future Energies, the renewable energy arm of the Hero Group, has signed the definitive agreements under which KKR and the Hero Group will invest $450 million in the Company.

- Continuum Green Energy has raised $350 million in debt through a bond issue to expand its solar, hybrid and wind projects.

Figure 6.1: Quarter-wise investment flow in Indian RE sector (US$ million)

Source: JMK Research
Note: Other includes IPO, JV, grant, debt and mezzanine funding
Figure 6.2: Investments by deal type in Q3 2022

Source: JMK Research
In the overseas market, the prices of solar cells have increased by 5.6% while the prices of mono-PERC solar modules have decreased marginally by 0.8% on QoQ basis.

Figure 7.1: Global price trends of solar cells and modules in Q3 2022

In the Indian market, the landed price for Chinese multi crystalline module suppliers (excluding GST and BCD), was about 23-26 cents/Wp in Q3 2022 while prices for mono PERC modules was in the range between 25-27 US cents/Wp.

Figure 7.2: India price trends of solar modules in Q3 2022

Note: Modules prices given are FOB (Free on Board) prices. These prices are excluding safeguard duty and GST.
In Q3 2022, solar cells and modules exports increased by 57% and 524% respectively, compared to the previous quarter’s figures. However, the solar cells imports increased by 64% and solar modules imports decreased by 64% in Q3 2022. The significant reduction in the import numbers is because of the imposition of 40% basic custom duty (BCD) on solar modules.

Figure 8.1: Quarter-wise import-export data of solar cells and modules

Source: Ministry of Commerce and Industry, JMK Research
During Jul-Sept 2022, among the private players, the highest revenue was incurred by ReNew Power with INR 2,168 crore followed by Tata Power (INR 1,826 crore), Adani Green Energy (INR 1,686 crore) and Suzlon Energy (INR 1,438 crore) while maximum profit was generated by Tata Power and Adani Green Energy of INR 171 crore and INR 146 crore respectively.

Figure 10.1: Revenue of Leading RE Players during past four quarters, Quarter wise

ReNew Power’s revenue decreased by around 7% in the quarter Q3 (July-Sept 2022) as compared to previous quarter i.e., Q2 2022, because of ~1.55% PPAs are pending out of the total portfolio 13.4 GW.

In Q3 2022, Adani’s revenue and PAT has decreased by 1% and 33% respectively as compared with the previous quarter because their solar and wind CUF has decreased by 4.4% and 20.3% respectively in this quarter. The reason behind the reduction in wind CUF is primarily due to a one-off disruption in the transmission line of 150 MW wind power plant in Gujarat.

Suzlon Energy’s Revenue has increased by 4.2% and PAT performance has also increased significantly by 255% in Q3 2022 as compared to last quarter due to new orders of nearly 193 MW.

In Q3 2022, Tata Power’s revenue and PAT have decreased by 16.1% and 10.5% respectively. Additionally, the sales of Tata Power’s Solar Pumps have decreased by 54% as compared to the previous quarter Q2.

Source: Companies websites, JMK Research
Note: Consolidated financial data has been considered for the above-mentioned companies
-Tata Power includes revenue and profit numbers for Tata Power Solar, Tata Power Renewable and Walwhan Renewable Energy Ltd
Figure 10.2: Profit After Tax (PAT) of Leading RE Players during past four quarters, Quarter wise

Source: Companies websites, JMK Research
Note: Consolidated financial data has been considered for the above-mentioned companies
Tata Power includes revenue and profit numbers for Tata Power Solar, Tata Power Renewable and Walwhan Renewable Energy Ltd
-Suzlon Energy net Profit/Loss shown is excluding “exceptional items”
The IEX and PXIL together traded a total of 517.2 MU in GTAM in Q3 2022, which is 49% lower than the volume traded in the second quarter of 2022. The average trade price in IEX-GTAM for Q3 2022 was INR 5.57/kWh, while for PXIL it was INR 4.92/kWh. This is approximately 31% and 46% less than the respective previous quarter’s prices.

Figure 11.3: Quarter wise GTAM Traded volume and Price Trend

Source: IEX, PXIL, JMK Research
## Annexure

Table 12.1: List of new tenders issued in Q3 2022

<table>
<thead>
<tr>
<th>Tender Name</th>
<th>Date of issue</th>
<th>Tendered Capacity (MW)</th>
<th>State</th>
<th>Technology</th>
<th>Tender Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>REMCL 1548 MW Solar Pan India Jul 2022</td>
<td>Jul-22</td>
<td>1548</td>
<td>Pan India</td>
<td>Utility Scale Solar</td>
<td>Project Development</td>
</tr>
<tr>
<td>MPUVNL 1250 MW Solar (Under KUSUM scheme Component C) Madhya Pradesh Jul 2022</td>
<td>Jul-22</td>
<td>1250</td>
<td>Madhya Pradesh</td>
<td>Rooftop/Small Scale Solar</td>
<td>Project Development</td>
</tr>
<tr>
<td>REMCL 1000 MW RE with or without ESS Storage Pan India Jul 2022</td>
<td>Jul-22</td>
<td>1000</td>
<td>Pan India</td>
<td>RE with ESS</td>
<td>Project Development</td>
</tr>
<tr>
<td>GUVNL 750 MW Solar (Phase XVI) Gujarat Jul 2022</td>
<td>Jul-22</td>
<td>750</td>
<td>Gujarat</td>
<td>Utility Scale Solar</td>
<td>Project Development</td>
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<tr>
<td>NLC 500 MW Solar (EPC) Pan India Jul 2022</td>
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<td>500</td>
<td>Pan India</td>
<td>Utility Scale Solar</td>
<td>EPC</td>
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<td>RUMSL 300 MW Floating Solar Phase II Madhya Pradesh Jul 2022</td>
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<td>300</td>
<td>Madhya Pradesh</td>
<td>Floating Solar</td>
<td>Project Development</td>
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<td>MSEDCL 1000 MW Solar Tranche VIII Maharashtra Aug 2022</td>
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<td>Maharashtra</td>
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<td>Project Development</td>
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<td>IRCON 500 MW Solar (EPC) Karnataka August 2022</td>
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<td>Karnataka</td>
<td>Utility Scale Solar</td>
<td>EPC</td>
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<td>GUVNL 500 MW with 1000 MWh BESS Storage (Phase-I) Gujarat Aug 2022</td>
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<td>500</td>
<td>Gujarat</td>
<td>Hybrid</td>
<td>Project Development</td>
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<td>MSEDCL 298 MW Solar (Under KUSUM Scheme Component A) Maharashtra Aug 2022</td>
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<td>298</td>
<td>Maharashtra</td>
<td>Rooftop/Small Scale Solar</td>
<td>Project Development</td>
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<tr>
<td>Tender Name</td>
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<td>Tendered Capacity (MW)</td>
<td>State</td>
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<td>Tender Scope</td>
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<tr>
<td>TPDDL 255 MW Wind Solar Hybrid Pan India Aug 2022</td>
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<td>255</td>
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<td>Hybrid</td>
<td>Project Development</td>
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<tr>
<td>MSEDCL 250 MW Solar Maharashtra Aug 2022</td>
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<td>250</td>
<td>Maharashtra</td>
<td>Utility Scale Solar</td>
<td>Project Development</td>
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<tr>
<td>SECI 2250 MW RE with ESS Storage (RTC III) Pan India Sep 2022</td>
<td>Sep-22</td>
<td>2250</td>
<td>Pan India</td>
<td>RE with ESS</td>
<td>Project Development</td>
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<tr>
<td>GUVNL 600 MW Solar Gujarat Sep 2022</td>
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<td>600</td>
<td>Gujarat</td>
<td>Utility Scale Solar</td>
<td>Project Development</td>
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<td>MSECL 500 MW Solar (Phase IX) Maharashtra Sep 2022</td>
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<td>500</td>
<td>Maharashtra</td>
<td>Utility Scale Solar</td>
<td>Project Development</td>
</tr>
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</table>

Source: JMK Research
Note: Tenders with 200 MW and above capacities have been mentioned in the above table
Table 12.2: List of tenders auctioned in Q3 2022 (Jul-Sep 2022)

<table>
<thead>
<tr>
<th>Tender Name</th>
<th>Capacity Tendered (MW)</th>
<th>Capacity Allotted (MW)</th>
<th>Minimum CUF</th>
<th>Commissioning Timeline</th>
<th>Winner details</th>
</tr>
</thead>
</table>
| GUVNL 750 MW Solar (Phase XVI) Gujarat Jul 2022 | 750 | 750 | 17% | 18 months | • Solarcraft Power India 2 Private Ltd (Blupine Energy)-120 MW (INR 2.49/kWh)  
• Solairedirect Energy India Private Ltd (Engie)-200 MW (INR 2.50/kWh)  
• Tata Power Renewable Energy Limited-300 MW (INR 2.65/kWh)  
• Utkrrisht Solar Energy Private Limited (UPC Renewables)- 130 MW (INR 2.66/kWh) |
| RUMSL 750 MW Wind Solar Hybrid Madhya Pradesh Apr 2022 | 750 | 750 | 30% | - | • Sprng Ojas Private Limited-160 MW (INR 3.03/kWh)  
• Tata Power Renewable Energy Limited-200 MW (INR 3.03/kWh)  
• ReNew Solar Power Private Limited-300 MW (INR 3.03/kWh)  
• TEQ Green Power IX Private Limited (O2 Power)-90 MW (INR 3.04/kWh) |
| GUVNL 500 MW Wind (Phase III) Gujarat May 2022 | 500 | 500 | 15% | 18 months | • GSECL – 70 MW (INR 2.84/kWh)  
• EDF – 30 MW (INR 2.98/kWh)  
• Juniper Green – 40 MW (INR 3.04/kWh)  
• Bluepine – 100 MW (INR 3.05/kWh)  
• O2 Power – 70 MW (INR 3.17/kWh)  
• Acme – 50 MW (INR 3.26/kWh)  
• Ayana Renewable – 140 MW (INR 3.27/kWh) |
| KSEBL 10 MW with 20 MWh BESS Solar Kerala | 10 | 10 | - | 15 months | • Hero Future Energies – 10 MW |
| MSEDCL 500 MW Solar Phase VII Tranche III, Maharashtra, Jun 2022 | 500 | 500 | 19% | 15 months | • SJVN – 200 MW (INR 2.9/kWh)  
• Juniper Green – 75 MW (INR 2.9/kWh)  
• Tata Power – 150 MW (INR 2.91/kWh)  
• Sukhbir Agro – 50 MW (INR 2.91/kWh)  
• Avaada – 25 MW (INR 2.91/kWh) |
| SECI, 500 MW with 1000 MWh BESS, Rajasthan, Apr 2022 | 500 | 500 | - | 18 months | • JSW Renew Energy Five Limited – 500 MW (INR 1.08 million/MW) |
| MSEDCL, 500 MW, Solar Phase VIII Tranche VI, Maharashtra, Jun 2022 | 500 | 500 | 19% | 15 months | • NTPC – 200 MW (INR 2.82/kWh)  
• Avaada – 300 MW (INR 2.83/kWh) |

Source: JMK Research
<table>
<thead>
<tr>
<th>Date</th>
<th>Company name</th>
<th>Deal type</th>
<th>Sector</th>
<th>Asset acquired (MW)</th>
<th>Acquirer/ Investor</th>
<th>Deal Value (US$ mn)</th>
<th>Stake acquired</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jul-22</td>
<td>Continuum Green Energy</td>
<td>Bond</td>
<td>Renewable</td>
<td>-</td>
<td>-</td>
<td>$350 million</td>
<td>-</td>
</tr>
<tr>
<td>Jul-22</td>
<td>Tata Power</td>
<td>Equity</td>
<td>Renewable</td>
<td>-</td>
<td>Greenforest New Energies Bidco</td>
<td>$245 million</td>
<td>11%</td>
</tr>
<tr>
<td>Jul-22</td>
<td>Wind Two Renergy Private Ltd</td>
<td>Acquisition</td>
<td>Wind</td>
<td>50</td>
<td>Torrent Power</td>
<td>$4.10 million</td>
<td>100%</td>
</tr>
<tr>
<td>Jul-22</td>
<td>Aerem</td>
<td>Equity</td>
<td>Solar</td>
<td>-</td>
<td>Blume Ventures</td>
<td>$2.50 million</td>
<td>-</td>
</tr>
<tr>
<td>Jul-22</td>
<td>Fourth Partner Energy</td>
<td>Equity</td>
<td>Solar</td>
<td>-</td>
<td>Filatex India</td>
<td>$1.29 million</td>
<td>26%</td>
</tr>
<tr>
<td>Jul-22</td>
<td>Ampyr Renewable Energy</td>
<td>Equity</td>
<td>Solar</td>
<td>-</td>
<td>Syngene International</td>
<td>$0.4 million</td>
<td>26%</td>
</tr>
<tr>
<td>Aug-22</td>
<td>Sprng Energy</td>
<td>Acquisition</td>
<td>Renewable</td>
<td>2100</td>
<td>Shell</td>
<td>$1550 million</td>
<td>100%</td>
</tr>
<tr>
<td>Aug-22</td>
<td>Mytrah</td>
<td>Acquisition</td>
<td>Renewable</td>
<td>1753</td>
<td>JSW Neo Energy Limited</td>
<td>$1320 million</td>
<td>100%</td>
</tr>
<tr>
<td>Aug-22</td>
<td>Tata Power</td>
<td>Debt</td>
<td>Renewable</td>
<td>-</td>
<td>Bank of America</td>
<td>$320 million</td>
<td>-</td>
</tr>
<tr>
<td>Aug-22</td>
<td>Atha Group</td>
<td>Acquisition</td>
<td>Solar</td>
<td>400</td>
<td>Actis</td>
<td>$263.97 million</td>
<td>26%</td>
</tr>
<tr>
<td>Aug-22</td>
<td>Tata Power</td>
<td>Equity</td>
<td>Renewable</td>
<td>-</td>
<td>BlackRock-backed GreenForest New Energies Bidco</td>
<td>$251 million</td>
<td>5.27%</td>
</tr>
<tr>
<td>Aug-22</td>
<td>O2 Power</td>
<td>Equity</td>
<td>Wind (Open access)</td>
<td>-</td>
<td>Syngene International</td>
<td>$0.38 million</td>
<td>26%</td>
</tr>
<tr>
<td>Aug-22</td>
<td>Emmvee</td>
<td>Acquisition</td>
<td>Solar</td>
<td>55</td>
<td>O2 Power</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Date</td>
<td>Company name</td>
<td>Deal type</td>
<td>Sector</td>
<td>Asset acquired (MW)</td>
<td>Acquirer/ Investor</td>
<td>Deal Value (US$ mn)</td>
<td>Stake acquired</td>
</tr>
<tr>
<td>-------</td>
<td>---------------------------------------------------</td>
<td>------------</td>
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<td>---------------------</td>
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</tr>
<tr>
<td>Sep-22</td>
<td>Sembcorp Energy India Limited</td>
<td>Acquisition</td>
<td>Solar</td>
<td>4300</td>
<td>Tanweer Consortium</td>
<td>$1430 million</td>
<td>100%</td>
</tr>
<tr>
<td>Sep-22</td>
<td>Hero Future Energies</td>
<td>Equity</td>
<td>Renewable</td>
<td>-</td>
<td>KKR and Hero Group</td>
<td>$450 million</td>
<td></td>
</tr>
<tr>
<td>Sep-22</td>
<td>Mahindra Susten</td>
<td>Equity</td>
<td>Renewable</td>
<td>-</td>
<td>Ontario Teacher's Pension Plan Board</td>
<td>$300 million</td>
<td>30%</td>
</tr>
<tr>
<td>Sep-22</td>
<td>Apraava Energy</td>
<td>Equity</td>
<td>Renewable</td>
<td>-</td>
<td>CDPQ Infrastructures</td>
<td>$82.6 million</td>
<td>10%</td>
</tr>
<tr>
<td>Sep-22</td>
<td>SenseHawk</td>
<td>Acquisition</td>
<td>Solar</td>
<td>79</td>
<td>Reliance Industries</td>
<td>$32 million</td>
<td>-</td>
</tr>
<tr>
<td>Sep-22</td>
<td>Serentica Renewables (SPV of Sterlite Power)</td>
<td>Equity</td>
<td>Renewable</td>
<td>-</td>
<td>Hindustan Zinc</td>
<td>$18.79 million</td>
<td>26%</td>
</tr>
<tr>
<td>Sep-22</td>
<td>Clean Max Kratos</td>
<td>Equity</td>
<td>Renewable</td>
<td>-</td>
<td>UPL Limited</td>
<td>$4.96 million</td>
<td>26%</td>
</tr>
<tr>
<td>Sep-22</td>
<td>Navitas Alpha Renewables Private Limited</td>
<td>Equity</td>
<td>Solar</td>
<td>-</td>
<td>Niveshaay with the participation of Action Tesa Group, Madhusudan Sarda, IVY Growth Associates and others</td>
<td>$0.87 million</td>
<td></td>
</tr>
</tbody>
</table>

Source: JMK Research
Infineon’s OptiMOS™ power MOSFET family expands its high performance package offerings with the introduction of the TO-Leaded top-side cooling (TOLT) package to its portfolio. The TOLT package offers the same high current low profile benefits as the TO-Leadless (TOLL) package with the additional advantage of top-side cooling for optimum thermal performance.

This innovative package combined with the key features of OptiMOS™ 5 power MOSFET technology enables best-in-class products in 80V and 100V as well as high current rating >300A for high power density designs.

With top-side cooling, the drain is exposed at the surface of the package allowing for 95% of the heat to be dissipated directly to the heatsink, achieving 20% better RthJA and 50% improved RthJC compared to the TOLL package.

Benefits

- Increased system efficiency enabling extended battery life time
- Improves overall system cost by minimizing heatsink and thermal gel
- Reduce size with high power density, ease of manufacturing with FR4 PCB
- High power density with Best in Class performance (very low RDS(on) and high current capability)
- Superior thermal performance which improves the overall system reliability with longer end product life time

https://www.infineon.com/optimos-tolt
**INCLUSIONS**

- Online access for 12 months
- Weekly RE Newsletter (48 in a year)
- Monthly RE Summary (12 in a year)
- Access to research support team
- Optional Project Excel tracker

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