Executive summary

C&I renewable power generation capacity increased by 481 MW in Q3 2021 to reach 18,962 MW by 30 September 2021. Total open access (OA) solar, OA wind and rooftop solar capacity is estimated at 4,716 MW, 7,647 MW and 6,582 MW respectively.

**Figure:** Total installed C&I renewable capacity by 30 September 2021, MW

![Diagram showing total installed C&I renewable capacity by 30 September 2021](image)

**Source:** BRIDGE TO INDIA research

This report provides a quarterly update on key trends and developments in the C&I renewable market including capacity addition, key players, policy issuance, financing, equipment prices and other market trends.
# Capacity addition

India added 481 MW of C&I renewable power generation capacity in Q3 2021, up 45% over previous quarter - split between 121 MW OA solar and 360 MW rooftop solar.

**Figure 1.1:** Total C&I renewable capacity by 30 September 2021, MW

As COVID-induced restrictions eased across the country in this quarter, installation activity gathered pace. However, growth remains restricted due to rise in project costs and constrained module supply.

**Figure 1.2:** Quarterly capacity addition, MW

**Source:** BRIDGE TO INDIA research
In the last 12 months, CleanMax was the leading OA renewables developer with 103 MW commissioned capacity, followed by Fourth Partner, Cleantech Solar and AMP.

**Figure 1.3:** OA solar projects commissioned in Q3 2021, MW

In the last 12 months, CleanMax was the leading OA renewables developer with 103 MW commissioned capacity, followed by Fourth Partner, Cleantech Solar and AMP.

**Figure 1.4:** Leading OA renewables developers in the last 12 months, MW

**Commissioned capacity: 754 MW**

<table>
<thead>
<tr>
<th>Developer</th>
<th>Commissioned Capacity</th>
</tr>
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<tbody>
<tr>
<td>CleanMax</td>
<td>103</td>
</tr>
<tr>
<td>Fourth Partner</td>
<td>93</td>
</tr>
<tr>
<td>Cleantech Solar</td>
<td>84</td>
</tr>
<tr>
<td>Amp</td>
<td>69</td>
</tr>
<tr>
<td>Aditya Birla</td>
<td>50</td>
</tr>
<tr>
<td>Others</td>
<td>203</td>
</tr>
</tbody>
</table>

**Source:** BRIDGE TO INDIA research
2 Policy developments

Central government

Ministry of Finance hikes GST rate
Goods and Services Tax (GST) rate on all renewable energy devices and parts has been increased from 5% to 12% with effect from October 2021. As a result, effective blended rate on renewable projects has moved up to 13.8%, increasing capital cost by 4.5%.

After implementation of impending 40% basic customs duty from April 2022, the combined effective tax and duty rate on solar modules would be an astonishing 72.48%. The decision to hike GST rate runs afoul of push to scale up renewable power capacity amidst all the other operational and financial challenges facing the sector.

Ministry of Power proposes uniform OA rules for renewable power

The Ministry of Power has issued draft electricity rules for OA renewable power.

a. All consumers with demand of more than 100 kW may procure any amount of renewable power from OA or other sources (current limit of 1 MW in most states).

b. Banking may be allowed until end of month but limited to 10% of annual consumption from the grid.

c. All OA project applications would be monitored by a central nodal agency and approved by respective state nodal agencies within 15 days.

d. Additional surcharge is proposed to be waived.

e. Cross-subsidy surcharge may not increase by more than 50% in the 12-year period after project commissioning.

f. Consumers may buy renewable power directly from DISCOMs. But green attributes in such cases would be retained by the DISCOMs.
This is the first time that the central government has acknowledged increasing potential and needs of C&I consumers. The rules need more clarity but are a promising first step in bringing uniformity to open access regulations across states. However, it remains to be seen if the central government can get states and DISCOMs to accept the new policy.

**CERC proposes to tighten DSM charges**

CERC has issued a draft regulation specifying applicability of deviation charges for solar and wind power projects connected to inter-state grid:

a. Power producers would attract no penalty if deviation is less than 10% (15% threshold at present).

b. For under-injection of power, penalty would be levied at 10% of PPA rate.

c. Generators would continue to receive payments as per schedule but would be required to payback for generation shortfall in case of under-injection.

d. No compensation would be applicable on over-injection.

CERC has justified tightening the tolerance band by claiming that overall accuracy of forecasts has improved due to sufficient forecasting experience gained by power producers over last six years. There is also a growing consensus among state regulators that tolerance bands need to be tightened as share of renewable power in consumption mix continues to grow. Tamil Nadu and Gujarat already have tolerance bands of 10% and 7% respectively. Earlier this year, Andhra Pradesh regulator had also proposed to reduce tolerance band from 15% to 10%.

**Ministry of Power proposes to allow producers to sell power in open market if DISCOMs delay payments**

The Ministry of Power has proposed to allow power producers to sell contracted power in open market if DISCOMs delays payments by over seven months. The draft rules also propose that any payment from DISCOMs would be adjusted first against late payment surcharge – starting with the longest pending bill.

These rules would offer relief to producers who have about **INR 970 billion in unpaid dues as of September 2021**. These rules are aimed at DISCOMs that have failed to clear outstanding dues even after implementation of liquidity injection package with loans from REC and PFC.
State government

Delhi: Restricts exemption on OA charges
Delhi power regulator amended its order on OA charges whereby 100% exemption from wheeling and transmission charges and additional surcharge shall now be allowed only for renewable power procured for RPO compliance (19.18% in FY 2022). This exemption was earlier allowed for all renewable power procurement.

Removal of these exemptions would increase landed cost of power by up to INR 1.37/ kWh. The move is detrimental for market growth especially in a renewable power deficient state like Delhi.

Chhattisgarh: OA and rooftop policy relaxed
Chhattisgarh has announced a series of positive policy changes:

a. Consumers may set up captive and open access projects up to 200% and 300% of their sanctioned load respectively.
b. Banking charges have been increased from 2% to 5%. Banking is now allowed until end of financial year with compensation of surplus power at the lowest rooftop solar bid. Consumers would be able to withdraw only 70% of banked power during peak hours, but there is no restriction during off-peak hours.
c. All grid charges including CSS, transmission charges, wheeling charges and SLDC charges would be exempted for projects commissioned within two years of this order for a total capacity of 300 MW.
d. Transmission and wheeling charges have been revised to 8% in-kind and fixed for entire life of project (previously 6%).
e. Rooftop systems up to 500 kW size would be eligible for net metering connectivity and exempted from banking and grid charges.

The new amendments provide welcome long-term clarity for OA projects. Exemption from grid charges for total capacity of 300 MW is likely to create a rush among developers. The state is regarded as a high growth prospect over next two years.
Tamil Nadu: Introduction of net metering, net billing and gross metering

Tamil Nadu has introduced net metering for residential consumers and net billing and gross metering for other consumers:

a. Consumers opting for net metering and net billing may set up systems up to sanctioned load (subject to maximum capacity of 1 MW) while systems under gross metering are limited to 1 MW.

b. Banking is proposed to be allowed until end of financial year with no compensation for surplus power injected in the grid.

c. DISCOM would buy power at INR 3.12-3.99/ kWh from net billing and gross metering-based systems with 20% premium for storage-equipped systems for power injected between 6-9 pm.

d. Network charges of INR 1.27/ kWh and INR 0.83/ kWh would be levied on LT and HT consumers respectively.

Tamil Nadu has remained an underdeveloped rooftop market due to lack of regulatory clarity. Levy of network charges on all consumers would continue to impair growth prospects.

Karnataka: Several changes made to rooftop solar policy

Karnataka regulator has allowed net metering for system sizes up to sanctioned load with an upper cap of 500 kW. Earlier, the regulator had released a draft amendment proposing a lower system size limit of 10 kW.

Separately, the regulator has increased tariff for gross metering-based rooftop solar systems by 4% to INR 3.19/ kWh for PPAs signed in FY 2022 and FY 2023. Increase in tariff has been necessitated because of rising equipment cost but does not go far enough. Maximum size limit for gross metering-based systems may be equivalent to sanctioned load subject to a higher limit of 2 MW.

Karnataka: Generic tariff for wind projects set at INR 3.26/ kWh

Karnataka regulator has maintained generic tariff for wind power and tariff for procurement of all banked power by DISCOMs at INR 3.26/ kWh, same level as in FY 2021.
Himachal Pradesh: Proposal to verify status of captive projects
The state regulator has directed SLDC to verify status of captive producers and consumers against requirements under the Electricity Act. DISCOMs would levy additional surcharge and CSS if total power procurement in a financial year falls below 51%.

Rajasthan: HPO targets proposed
Rajasthan has issued draft amendment to RPO regulation setting targets for hydro power procurement. HPO targets may be fulfilled by procuring power from hydro projects and pumped hydro projects commissioned between 8 March 2019 and 31 March 2030. Only 70% of power generated by eligible hydro power projects in first 12 years of operations, excluding free power contributed towards Local Area Development Fund, may be used for HPO compliance.

Table 2.1: RPO targets in Rajasthan

<table>
<thead>
<tr>
<th></th>
<th>WIND</th>
<th>BIOMASS</th>
<th>HYDRO</th>
<th>SOLAR</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 2022</td>
<td>8.90%</td>
<td>0.90%</td>
<td>0.18%</td>
<td>8.50%</td>
<td>18.48%</td>
</tr>
<tr>
<td>FY 2023</td>
<td>9.10%</td>
<td>1.00%</td>
<td>0.35%</td>
<td>9.50%</td>
<td>19.95%</td>
</tr>
<tr>
<td>FY 2024</td>
<td>9.40%</td>
<td>1.10%</td>
<td>0.66%</td>
<td>10.50%</td>
<td>21.66%</td>
</tr>
</tbody>
</table>

Haryana, Gujarat and Punjab set rules for rooftop solar systems
Haryana regulator has removed net metering connectivity for OA consumers. Project capacity for availing net metering benefit has been capped at sanctioned load, with upper threshold of 500 kW. Banking would be allowed until end of financial year with no compensation for unused banked power. Gross metering tariff has been set at INR 3.11/ kWh.

Gujarat has proposed to restrict net metering up to 10 kW with only gross metering allowed for capacities above 10 kW. Punjab is set to allow net metering for consumers with sanctioned load of up to 500 kW. Other consumers may avail only gross metering or net billing-based connectivity.
Uttar Pradesh, Delhi and Madhya Pradesh set retail tariffs for FY 2022
Uttar Pradesh and Delhi have decided not to hike tariffs for FY 2022. Madhya Pradesh has increased fixed charges for domestic consumers and select industrial consumers by 6% and 5% respectively. Variable charges for all consumers remain unchanged.

Key orders and petitions

Tamil Nadu: Additional surcharge set for open access consumers
TANGEDCO had filed a petition before the state regulator to set additional surcharge at INR 0.85/ kWh. After due consideration of stranded capacity and their fixed cost obligations, the commission determined additional surcharge at INR 0.70/ kWh (unchanged from previous six-month period), applicable from October 2021 to March 2022.

Uttar Pradesh: Net metering approval for a 2.4 MW rooftop system

The state-owned Hindustan Aeronautics Limited (HAL) has obtained net metering approval for its 2.4 MW rooftop solar project in Uttar Pradesh. The state had set a ceiling for net metering facility at 1 MW in 2019 but the request was approved since HAL had submitted its application before the 2019 notification.
3 Pricing update

3.1 Landed cost of power

Renewable power continues to be financially attractive across all states. Rooftop solar is the cheapest power procurement option at about INR 3.50-75/kWh.

**Figure 3.1:** Industrial landed cost comparison, INR/ kWh

Source: BRIDGE TO INDIA research

Notes: Grid power cost denotes energy charges, variable surcharges, taxes and duties for consumers connected at 33 kV. Assumptions: i) CUF - 25% for solar, 35% for wind, ii) Solar power tariff - INR 3.75/kWh, wind power tariff - INR 4.50/kWh
3.2 EPC cost

Prices for mono-PERC modules increased to USD cent 27/ W by September 2021, up 6% over previous quarter due to tight supply conditions. A bigger challenge for developers now is to get assured supply as Chinese suppliers have been delaying and/or renegotiating orders. With supply being constrained, the industry faces risk of delayed projects amidst steep import duties next year. We expect tight availability and price conditions to persist for at least next two quarters.

Total EPC cost for solar projects dipped slightly from INR 32.69/ W in Q2 2021 to INR 31.19/ W in Q3 2021 on account of safeguard duty expiration. Similarly, EPC cost for rooftop solar projects moved down from INR 39.00/ W in last quarter to INR 37.00/ W in Q3 2021. With hike in GST rate from 5% to 12%, the cost is expected to shoot up to INR 36.78/ W and INR 42.8/ W for OA and rooftop solar projects respectively in next two quarters. EPC cost for wind projects is estimated at INR 65/ W. Cost is expected to rise further by about 5-6% in next three months due to rise in turbine prices.

Figure 3.2: Equipment and EPC cost, INR / Wp

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>EPC Cost (INR/Wp)</th>
<th>YOY Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mono-crystalline modules</td>
<td>27</td>
<td>29%</td>
</tr>
<tr>
<td>OA solar EPC</td>
<td>31</td>
<td>20%</td>
</tr>
<tr>
<td>OA wind EPC</td>
<td>65</td>
<td>7%</td>
</tr>
<tr>
<td>Rooftop solar EPC</td>
<td>37</td>
<td>11%</td>
</tr>
</tbody>
</table>

Source: BRIDGE TO INDIA research
Note: Module price is specified for imported modules on a CIF basis before any local tax or duties. EPC cost for OA solar is estimated using central inverters and mono-crystalline modules. EPC cost for rooftop solar is estimated for a 500 kW industrial installation. Cost includes GST.
4 Other market developments

4.1 Slump in supply of solar components

The quarter saw a massive module production slump in China amidst a worsening power supply crunch. The country has implemented an energy rationing policy and set aggressive consumption reduction targets for various provinces. As a result, manufacturing operations at over 1,000 companies have been significantly curtailed in the last few months hampering output across the solar value chain.

Grappling with curtailed power supply and higher costs, solar manufacturers have been cutting back production volumes and raising prices. In September, silicon prices rose by 147% month-over-month, while polysilicon prices moved up by a further 40% in the same period. EVA sheets, in short supply, also saw a 33% price increase over August. China-India freight costs rose even further to USD 9,000 per container – equivalent to about US cents 3/ W – up about 10x in just one year.

4.2 Renewable power trading

Green power trading volume increased by 77% in Q3 2021. Average daily solar volume stood at 6,682 MWh moving up 41% QOQ, while average daily non-solar volume moved up 103% QOQ to 1,625 MWh.

Average traded price for solar and non-solar power stood at INR 3.42 and INR 4.78 respectively, a premium of INR 0.33 and INR 0.87 respectively over conventional power price. DISCOMs looking to fulfil RPO targets continue to drive trading volumes but supply side remains constrained due to lack of merchant capacity.
4.3 Financial deals

Funding activity remained robust this quarter with major equity funding and M&A deals involving ReNew, Avaada, CleanMax, Amp and Fourth Partner:

ReNew – total OA portfolio of 335 MW – became the first Indian renewable IPP to complete an IPO in two years. The company listed on NASDAQ after merging with RMG Acquisition Corporation II in August. The combined new entity, ReNew Energy Global PLC, has a market capitalisation of about USD 4 billion.

PTT, the Thai utility with a renewable portfolio of more than 2.1 GW across five countries, invested USD 453 million in Avaada to acquire a 41.6% stake in the company (OA solar portfolio of 250 MW spread across Karnataka and Maharashtra).

Augment Infrastructure Partners, a US-based private equity fund invested USD 222 million in CleanMax to infuse fresh equity as well as acquire 66% stake held by Warburg Pincus and IFC in the company. The company plans to use this investment to accelerate growth in C&I renewable energy space in India, Middle East and Southeast Asia.
Amp Energy raised USD 100 million from Copenhagen Infrastructure Partners.

Statkraft exited its rooftop solar OPEX business by selling its 9 MWp rooftop solar portfolio in Karnataka to Fourth Partner.

### 4.4 Banking

Many states have been withdrawing or restricting previously generous banking benefits, particularly for third party sale projects. A summary of banking period for OA projects across key C&I renewable states is summarised below.

**Figure 4.1:** OA banking period in key C&I renewable states

*Source: BRIDGE TO INDIA research*
### 4.5 Other miscellaneous announcements

<table>
<thead>
<tr>
<th>Announcement</th>
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<tbody>
<tr>
<td>Vedanta Aluminium becomes India’s largest purchaser on GTAM</td>
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<tr>
<td>Tata Power plans to raise up to $750 million for green business</td>
</tr>
<tr>
<td>Greenko Group signs up to become Net Zero Carbon by 2040</td>
</tr>
<tr>
<td>Gujarat High Court issues notice on solar energy subsidy pullback</td>
</tr>
<tr>
<td>NTPC releases EOI for C&amp;I open access projects</td>
</tr>
<tr>
<td>Ayana Renewable partners with Norway’s Greenstat for green hydrogen production</td>
</tr>
<tr>
<td>Morgan Stanley hires CITI to find a buyer for CGE stake</td>
</tr>
<tr>
<td>Mahindra &amp; Mahindra strengthens its commitment to achieve carbon neutrality</td>
</tr>
<tr>
<td>CEAT to procure OA solar power from Tata for Maharashtra factory</td>
</tr>
<tr>
<td>Australian firm partners JSW Energy on green hydrogen projects in India</td>
</tr>
</tbody>
</table>
About WWF India and REDE initiative

WWF India and Confederation of Indian Industry (CII) launched the Renewable Energy Demand Enhancement (REDE) Initiative for Commercial & Industrial (C&I) consumers in 2018. REDE is an alliance of C&I consumers to enhance uptake of renewable energy (RE) and to co-develop practical and commercially viable solutions to address challenges that are significantly restricting demand.

The REDE Initiative provides a national forum to discuss the challenges to large-scale corporate RE procurement, co-develop solutions, and build greater capacity for C&I consumers, through policy engagement, capacity building, member networking, fostering innovation towards renewable energy purchase models, global connect and market intelligence.

Till date, 30+ corporate groups/ individual companies with combined electricity footprint of 18 GW have signed the REDE principles.

For further information on Renewable Energy Demand Enhancement (REDE), please contact:

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- India Solar Open Access Market
- Estimating cost of capital for Indian solar projects