Executive summary

C&I renewable power generation capacity increased by just 332 MW in Q2 2021 to reach 18,149 MW by 30 June 2021. Total open access (OA) solar, open access wind and rooftop solar capacity is estimated at 4,595 MW, 7,315 MW and 6,222 MW respectively.

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

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.
1 Capacity addition

India added 332 MW of C&I renewable power generation capacity in Q2 2021, down 45% over the previous quarter. Total installed capacity is estimated at 18,149 MW, split across OA solar (4,595 MW), OA wind (7,315 MW) and rooftop solar (6,222 MW) respectively.

Figure 1.1: Total installed C&I renewable capacity by 30 June 2021, MW

Source: BRIDGE TO INDIA research

Installation activity slowed down in Q2 due to lockdowns in multiple states. Q3 and Q4 are expected to be busier due to easing of Covid-19 restrictions.

Figure 1.2: Quarterly capacity addition, MW

Source: BRIDGE TO INDIA research
Cleantech was the leading OA developer in the last 12 months with total capacity addition of 122 MW. It was followed by CleanMax (103 MW), Amplus (100 MW), AMP (99 MW) and Fourth Partner (93 MW).

Leading developers in rooftop solar include Fourth Partner (62 MW installed in the last 12 months), followed by Amplus (47 MW) Cleantech Solar (25 MW), ReNew (24 MW), CleanMax (21 MW) and AMP (19 MW).
Figure 1.4: Leading developers by capacity commissioned in last 12 months, MW

**Open access**

<table>
<thead>
<tr>
<th>Developer</th>
<th>MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleantech</td>
<td>122</td>
</tr>
<tr>
<td>CleanMax</td>
<td>103</td>
</tr>
<tr>
<td>Amplus</td>
<td>100</td>
</tr>
<tr>
<td>AMP</td>
<td>99</td>
</tr>
<tr>
<td>Fourth Partner</td>
<td>93</td>
</tr>
<tr>
<td>Avaada</td>
<td>72</td>
</tr>
<tr>
<td>Adani</td>
<td>50</td>
</tr>
<tr>
<td>Hinduja Group</td>
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<tr>
<td>Fiza Group</td>
<td>38</td>
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<tr>
<td>Others</td>
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</tr>
<tr>
<td>Rohan Power</td>
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</tr>
</tbody>
</table>

**Rooftop solar**

<table>
<thead>
<tr>
<th>Developer</th>
<th>MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fourth Partner</td>
<td>62</td>
</tr>
<tr>
<td>Amplus</td>
<td>47</td>
</tr>
<tr>
<td>Cleantech</td>
<td>25</td>
</tr>
<tr>
<td>ReNew</td>
<td>24</td>
</tr>
<tr>
<td>CleanMax</td>
<td>21</td>
</tr>
<tr>
<td>AMP</td>
<td>19</td>
</tr>
<tr>
<td>Tata</td>
<td>15</td>
</tr>
<tr>
<td>Orb</td>
<td>13</td>
</tr>
<tr>
<td>Mahindra</td>
<td>10</td>
</tr>
<tr>
<td>Others</td>
<td>28</td>
</tr>
<tr>
<td>Sarjan Realities</td>
<td>78</td>
</tr>
</tbody>
</table>

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

Centre: Proposal for higher net metering system size limit at up to 500 kW

In a minor concession to the industry, the Ministry of Power has amended draft *Electricity Rules (Right of Consumers), 2021* to revise net metering system size limit up to sanctioned load or 500 kW (previously 10 kW), whichever is higher. The rules also acknowledge that formulating net metering regulations and determination of system size limit primarily remain responsibility of state regulators.

Centre: Amendments to REC mechanism

The Ministry of Power has proposed a belated reform of REC scheme:

i. Perpetual validity for RECs with no fixed expiry date
ii. Free market pricing as determined on the exchange
iii. Increase in validity of registration from 5 years to 15 years for existing projects and 25 years for new projects
iv. Issuance of additional RECs to less mature technologies based on multiplier system
v. Bilateral trading allowed

The proposed changes are desirable but the supply side hurdle remains unresolved. Since green attributes for most projects are passed directly to offtakers, there is a scarcity of sellers in the market.

Haryana: Banking facility limited to 100 MW capacity

The state regulator has made various regressive changes to banking provisions for renewable power projects:

i. Restriction of banking to 100% captive power projects with a cumulative capacity of 100 MW
ii. Banking allowed until end of financial year but the banked power may only be utilised between October and March during off-peak hours
iii. Banking charges revised to INR 1.50/ kWh, up from 5% at present
iv. No compensation for unutilised banked power

The new regulation follows a series of negative policy developments in the state in recent years.
Haryana: Guidelines for development of solar parks by private companies

The state has allowed private companies to set up solar power parks with minimum capacity of 50 MW. Developers would be required to complete solar parks within 24 months of approval date and are not allowed to invest in solar projects in the park.

Haryana: HERC issues detailed process for grant of connectivity and open access

The state has defined requirements for intra-state open access. If consumers fail to fulfil RPO targets in a financial year, open access approval shall be suspended until RPO target is fulfilled. The procedures define approval timeline for technical feasibility as 55 days but there is no clear timeline for final connectivity approval. The issue has been ongoing for many years in the state with the latest instance involving AMP Solar. The developer was denied final connectivity for its 50 MW project in the state.

Haryana: Draft solar power policy

Haryana has proposed a target to set up 1.6 GW of rooftop capacity by FY 2025. There is no target specified for other projects.

<table>
<thead>
<tr>
<th>Rooftop solar</th>
<th>Open access</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System size limit</strong></td>
<td>2 MW</td>
</tr>
<tr>
<td><strong>Banking</strong></td>
<td>No size limit for projects set up to fulfil RPO targets</td>
</tr>
<tr>
<td>• Allowed until end of year</td>
<td>• Allowed on rolling basis until end of six-month period with banked power drawl limited to off-peak hours</td>
</tr>
<tr>
<td>• No compensation for surplus power</td>
<td>• No compensation for surplus power</td>
</tr>
<tr>
<td><strong>Incentives</strong></td>
<td></td>
</tr>
<tr>
<td>• No processing fee for captive systems</td>
<td>• Exemption from land approval fee, infrastructure development charges and stamp duty</td>
</tr>
<tr>
<td>• No permission required from building plan sanctioning authority</td>
<td>• Exemption from requirement for environmental clearance</td>
</tr>
<tr>
<td>• Net metering, virtual net metering, group net metering and bulk supply virtual net metering allowed</td>
<td>• Projects set up by PSUs would be exempt from all open access charges for 25 years</td>
</tr>
</tbody>
</table>

Source: BRIDGE TO INDIA research
The new policy fails to address policy hurdles facing open access projects but could spur growth in the rooftop solar market.

Gujarat: New wind-solar hybrid power regulations

The regulator has approved several incentives for wind-solar hybrid (WSH) projects commissioned by March 2023:

i. Capacity for open access projects capped at 50% of sanctioned load
ii. Banking allowed in 15-minute time blocks for consumers claiming renewable attributes, or on a monthly basis for other consumers
iii. Surplus power up to 15% of annual generation purchased by DISCOMs at INR 1.75/ kWh; further surplus power purchased at INR 0.87/ kWh
iv. Captive projects eligible for 50% exemption on wheeling charges and losses; third-party sale projects eligible for 50% exemption on additional surcharge and CSS for 25 years
v. Transmission charges waived off for 25 years for new solar or wind projects where no augmentation of transmission network is required

The regulation is expected to spur WSH open access with estimated capacity addition of 350 MW over the next 1.5 years.

Gujarat: Change in captive project definition

Gujarat regulator has rejected a controversial provision of state solar policy requiring 100% ownership by consumers for claiming captive status. Ownership requirements shall continue to be governed by Electricity Act, 2005 and Electricity Rules, 2005 – consumers to own minimum 26% equity and consume at least 51% electricity generated annually. The regulator has also removed project capacity limits (50% of sanctioned load) and relaxed banking period from one day to one month. The amendment is a major boost for group captive model in the state.

Odisha: Draft open access regulations

The state regulator has issued draft open access regulation:

i. Exemption from CSS for projects under third-party sale model
ii. Banking restricted to within 15-minute time block
iii. No compensation for surplus power

The regulation could open another state for C&I market provided final regulation is approved without any changes.
Rajasthan: Restriction on net metering

Rajasthan has relaxed net metering system size limit from 10 kW to 500 kW. Other key highlights of the amendments are mentioned below.

i. Gross metering allowed for all consumers
ii. Banking allowed on a monthly basis
iii. No compensation for surplus power
iv. Wheeling charges, CSS and AS fully exempted for LT and CAPEX consumers availng net metering; wheeling charges, 50% AS and 50% CSS exempted for other consumers
v. Wheeling charges, CSS and AS fully exempted for consumers availng gross metering

Rajasthan: Electricity duty on captive solar projects

Rajasthan DISCOMs have retrospectively levied a duty of INR 0.60/ kWh on captive solar power projects and net metered-rooftop solar systems. The state solar power policy of 2019 had waived electricity duty for all solar power systems. However, the move has attracted legal challenges and the state High Court has put a stay order.

Maharashtra: New gross metering tariff determined

Maharashtra regulator has determined tariff for gross metered systems commissioned in FY 2022 at average pooled purchase cost, currently between INR 3.94-4.50/ kWh in the state. This tariff shall be applicable for entire PPA term of 25 years. The regulator has also determined compensation for surplus power from net metering-based systems at INR 2.90/ kWh, a small premium on tariff for utility-scale projects.

Himachal Pradesh, Karnataka and Uttarakhand: Revised retail tariffs for FY 2022

Himachal Pradesh, Karnataka and Uttarakhand have issued retail supply tariff orders for FY 2022.

i. Himachal Pradesh: peak hour charges reduced by INR 0.50/ kWh for industrial consumers, 15% rebate for three years for industries starting production on or after 1 June 2021
ii. Karnataka: 1-2% increase in energy charges and 16-48% increase in fixed charges
iii. Uttarakhand: marginal increase in tariffs for industrial consumers
Punjab and Haryana: revised RPO targets

Punjab regulator has issued draft RPO targets until FY 2023 (17.85%) and reduced target for FY 2021 to 8% (11.50% earlier). The relief has been granted to the DISCOM to mitigate impact of Covid-19.

Haryana regulator has also increased RPO targets over FY 2022-25 as 11.00% to 16.66%.

Key orders and petitions

<table>
<thead>
<tr>
<th>STATE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maharashtra</td>
<td>C&amp;I consumers denied open access approvals</td>
</tr>
<tr>
<td></td>
<td>Four C&amp;I consumers had filed separate petitions against MSEDCL for restricting open access capacity to 1.4x contract demand. The state regulator had rejected the petition but APTEL passed a judgement in their favour. MSEDCL has now approached Supreme Court for final decision.</td>
</tr>
<tr>
<td>Punjab</td>
<td>PepsiCo allowed to carry forward RPO shortfall in FY 2016 and FY 2017 to FY 2021</td>
</tr>
<tr>
<td></td>
<td>PepsiCo had filed a petition to carry forward RPO shortfall in FY 2016 and FY 2017 to FY 2021. The regulator allowed the petitioner to meet shortfall by procuring RECs, within two months of resumption of trading, subject to a nominal penalty.</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>MERC asks Exide Industries not to pay additional surcharge to MSEDCL</td>
</tr>
<tr>
<td></td>
<td>Exide Industries procures power from a 21 MW group captive project set up by Cleantech Solar in Maharashtra. The consumer had filed a petition against levy of additional surcharge by MSEDCL. MERC has waived the levy for all captive projects.</td>
</tr>
<tr>
<td>West Bengal and Tamil Nadu</td>
<td>Verification of status of captive projects</td>
</tr>
<tr>
<td></td>
<td>West Bengal became the second state after Tamil Nadu to scrutinise financial structure of group captive projects. Consumers are required to submit affidavit claiming that they meet required conditions on shareholding and power consumption.</td>
</tr>
</tbody>
</table>

Source: BRIDGE TO INDIA research
State rankings

We have rated 11 key states on their growth potential based on savings over grid tariff, policy and regulation framework, ease of implementation and C&I power demand.
3 Pricing update

3.1 Landed cost of power

OA 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:** Landed cost comparison for industrial consumers, INR/ kWh

<table>
<thead>
<tr>
<th>State</th>
<th>Energy Source</th>
<th>Tariff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maharashtra</td>
<td>OA solar - Third party</td>
<td>2.0</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>OA solar - Captive</td>
<td>4.0</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>OA wind - Third party</td>
<td>6.0</td>
</tr>
<tr>
<td>Karnataka</td>
<td>OA wind - Captive</td>
<td>8.0</td>
</tr>
<tr>
<td>Gujarat</td>
<td>Grid tariff - Industrial consumers</td>
<td>10.0</td>
</tr>
<tr>
<td>Uttar Pradesh</td>
<td>Grid tariff - Commercial consumers</td>
<td>12.0</td>
</tr>
</tbody>
</table>

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 25.50/ W, up 4% over previous quarter. Total EPC cost for open access solar projects and rooftop solar projects increased by 3% to INR 32.69/ W and INR 39.00/ W respectively. The cost is expected to fall by about 8-10% in Q3 due to expiry of 14.5% safeguard duty from 30 July 2021 onwards. However, the developers face a huge challenge in getting assured supply as Chinese suppliers seem reluctant to pick up orders even at these prices.

EPC cost for wind open access projects increased by 1.5% over the previous quarter to INR 65/ W. Prices are expected to rise further by about 7-8% in the next six months due to rise in turbine prices.
4 Other market developments

4.1 Reliance’s grand entry in the sector

India’s largest private company, Reliance has announced stunning plans to enter the renewable energy sector. The oil & gas, telecom and retail giant plans to invest INR 750 billion (USD 8 billion) in the next three years to produce solar modules, storage batteries, hydrogen electrolysers and fuel cells, and invest in future technologies. The company aims to establish 100 GW of solar power capacity by 2030 primarily through rooftop solar and decentralised installations.

The company could be a major market player with its strong integrated approach and cheap financing.

4.2 Renewable power trading

Green power trading volume increased 344% over previous quarter. Daily solar volume increased substantially to an average of 4,754 MWh against just 922 MWh in Q1 2021, while non-solar volume increased to 5,714 MWh against 1,625 MWh in the previous quarter. Average price decreased to INR 3.31 and INR 4.14 for solar and non-solar power, a premium of INR 0.61 and INR 1.44 respectively over conventional power price.

Figure 4: Renewable power traded volume and price

Source: Indian Energy Exchange, BRIDGE TO INDIA research
In the past one year, Vedanta has been the largest corporate buyer of green power. But total demand is dominated by DISCOMs looking to fulfil their RPO targets.

4.3 Financial deals

Funding activity increased significantly in the quarter with major equity funding and M&A deals involving Radiance, Azure, SunSource and Fourth Partner.

SHV Energy, the Danish gas company, acquired a significant stake in SunSource Energy. It is aiming to invest USD 245 million over next three years in the company to increase its installed capacity from 43 MW in 2020 to 360 MW by 2023.

Fourth Partner Energy raised USD 125 million from Norfund (USD 100 million, 40% stake), a Norwegian private equity, and TPG Growth, an existing investor (USD 25 million). The developer also raised USD 34 million mezzanine capital from CDC group.

Radiance Renewables acquired 152 MW rooftop solar portfolio from Azure Power for USD 73 million. Azure made a loss of USD 44.5 million on the transaction. Amplus acquired 7 MW rooftop solar portfolio from Sterling & Wilson. The deal indicates a trend amongst utility scale players to exit rooftop solar business. ReNew is also believed to be looking for an exit from the business.

Other key announcements

- Godawari Power & Ispat to set up a 250 MW captive solar plant in Chhattisgarh
- Wipro to reach net-zero greenhouse gas emissions by 2040
- Rolls-Royce outlines plans for net zero emissions by 2050
- ReNew Power pledges to achieve net zero emissions by 2050
- Netflix’s behind-the-scenes script for achieving net-zero
- India working on a ‘green tariff’ policy
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