

# Potential of corporate renewable electricity demand to influence India's renewables growth





## Acknowledgments

Climate Group appreciates the support of We Mean Business Coalition. We would like to thank CDP and Bridge To India who have led the technical delivery. We would also like to thank the RE100 India members for sharing their inputs and insights to develop this brief.

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## About our supporting partners



Bridge To India is a leading consultancy and knowledge services provider in the Indian renewable energy market. The company aspires to enable innovative and viable clean energy solutions in India. Operational since 2009, they have a unique vantage point on the market dynamics, combining 360-degree view from their market intelligence and consulting businesses. They work on wide ranging consulting and research assignments with all industry stakeholders including technology companies and contractors, project developers and investors, financial institutions, government agencies, think-tanks and developmental institutions.



We Mean Business Coalition works with the world's most influential businesses to take action on climate change. The Coalition brings together a group of non-profit organizations to catalyze business and policy action to halve emissions by 2030 and accelerate an inclusive transition to a global net-zero economy by 2050.



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# Background to the publications

[RE100](#) is a global initiative bringing together the world's most influential businesses committed to 100% renewable electricity. Its purpose is to accelerate change towards zero carbon grids at scale. As of December 2022, over 75 RE100 companies (including 8 India headquartered companies) had an annual aggregated electricity demand of 8.6 TWh. While this is still significantly low compared to the total Indian Commercial and Industrial (C&I) electricity demand, the potential for impact of RE100 is unprecedented.

A classic example is a case filed by the Tata Power Company Limited (Distribution) seeking approval for levying a "Green Power Tariff" to supply Renewable Electricity to consumers opting for 100% green energy to meet their entire demand.



*There is a growing demand from businesses for a rapid transition to a zero carbon economy. Over 175 of the world's most influential companies have committed to this through the global corporate leadership initiative RE100. This is driving demand for renewable electricity and shifting demand patterns away from fossil fuels across the global power system. Google & Autodesk are just a few companies that have already achieved their goal and are now powered by 100% RE." - cites the petition.*

RE100 intends to publish three documents that will emphasise the role of Commercial and Industrial (C&I) consumers in the uptake of Renewable Electricity (RE) in India and the necessary enabling environment to support Indian companies to achieve 100% RE and become RE100 members. While different organisations have undertaken substantial efforts to underpin the role of captive power, third-party PPAs and distributed renewables, the following briefs mainly focus on areas not as much part of mainstream discussions. Still, they play an equally vital role in India's net zero transition. The first of the three publications, '**The potential of renewable electricity demand to influence India's RE growth**' estimates corporate RE demand's potential to influence India's overall RE growth. The report is a brief developed to assess India's power demand under evolving policy scenarios.

# Executive Summary

The document briefly outlines the state of play for different RE procurement options for Indian companies. **Open access and rooftop solar assume a dominant share in renewable power procurement by C&I consumers** as they have a proven track record. However, several other instruments such as Renewable Energy Certificates (RECs), Green Tariffs (GT), and Virtual Power Purchase Agreements (VPPAs) will have a key role to play in RE adoption, and growth. It draws a comparison amongst the key RE procurement options and the advantages and disadvantages of each. We have analysed trends across different Indian states and how the introduction and withdrawal of regulations have impacted the growth of RE capacity addition since FY 2018 negatively. Through our partner in this study, Bridge To India, we have also analysed three different scenarios to estimate the total renewable capacity addition:

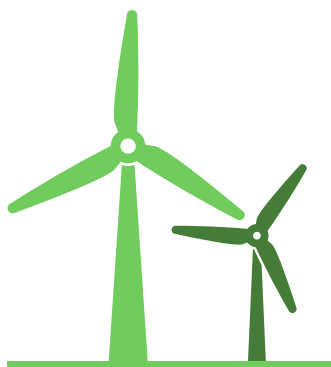
- A business-as-usual scenario
- A liberal intra-state open access scenario
- A liberal, inter-state and intra-state open access scenario

These scenarios have considered aspects such as policy certainty, banking regulations, approval processes etc., to estimate the total demand for RE. The brief helps companies and policymakers understand the true potential of RE uptake in India and the key levers that can unlock that growth.

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## 14.5 GW

of wind and solar open access capacity had been commissioned, accounting for 66% of C&I renewable capacity.

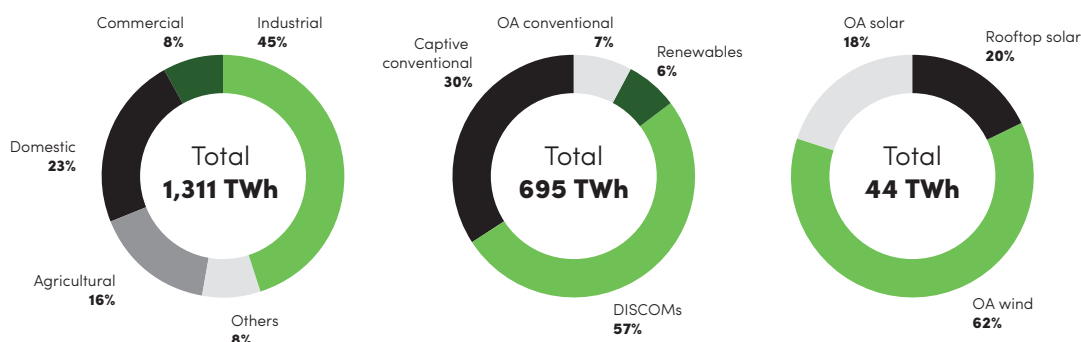


# Power procurement trend among C&I consumers in India

In India, C&I businesses account for 53% of total electricity consumption, and only 6% of it is procured through renewable power projects. Open access and rooftop solar assume a dominant share in renewable power procurement by C&I businesses as they have a proven track record as evident in the figure below. Other options like RECs and green power exchange are constrained by low volume and high cost.

C&I businesses account for **53%** of total electricity consumption, and only **6%** of it is procured through renewable power projects

**Figure 1: Share of various consumer categories and the share of RE in the C&I procurement mix**



## OPEN ACCESS

Open Access (OA) allows consumers with a connected load of more than 1 MW and connectivity voltage of at least 11 kV to procure power directly from any power generator or distributor across the country. While options for short-term (less than one month) and medium-term (three-five years) are also available, **long-term OA (12-25 years) is the preferred route for renewable power projects** because of financial certainty for project investors. Capacity addition slowed down between FY 2019 and FY 2021 due to the removal of incentives (like banking and exemption from grid charges), increased challenges in project approvals and increase in project cost.

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## ROOFTOP SOLAR

The rooftop solar construction and operation approach is proven and low risk, but limited onsite space, roof structural issues and interaction with onsite electrical systems can pose operational challenges. **CAPEX model dominates with an estimated 65% market share, but the OPEX model is gaining popularity with consumers (no CAPEX, assured cost savings, no technology or construction risk).** OPEX market growth is limited by a lack of suitable customers with sufficient scale and acceptable creditworthiness. Market prospects remain attractive, but growth has slowed down over the last two



years due to increased capital costs on account of safeguard duty on modules (July 2018 onwards) and 8.9% GST on capital cost. Withdrawal of net metering for C&I businesses in many states has also been a contributing factor.

## RENEWABLE ENERGY CERTIFICATES (RECS)

C&I companies with conventional captive plants or procuring power from open access (known as obligated entities) are required to meet a specified Renewable Purchase Obligation (RPO) target, which varies from state to state.

**Consumers unable to comply with RPO targets can purchase RECs on the exchange.** However, the REC market has low liquidity due to poor regulatory design and enforcement. The market has also been prone to many legal disputes with the Central Electricity Regulatory Commission (CERC) currently re-determining prices.

## RENEWABLE POWER EXCHANGE

Renewable power trading on the exchange commenced in August 2020, but volumes are minimal due to limited availability of capacity not tied up in long-term PPAs. A large majority of renewable power is traded between RE-rich and RE-deficient states. C&I consumers account for 40% share of traded volume. In the 12 months ending September 2021, 3.3 TWh of renewable power was traded at Indian Energy Exchange (IEX), accounting for less than 4% of total traded power. The share of renewable power is expected to remain low over the next five years as developers are unlikely to add any material merchant capacity.

## GREEN TARIFFS

Andhra Pradesh and Karnataka have tested green tariffs, and Maharashtra, Gujarat and various other states have recently introduced them. However, uptake has been very low due to the high cost. Green tariffs in these states are **typically between 5-10% over normal grid tariffs**, making them unattractive. Additionally, DISCOMs retain green attributes in most cases, and businesses cannot claim them. **Green tariffs at current rates are unlikely to stir demand among C&I consumers unless consumers are offered green attributes and more flexibility to procure power.**

## VIRTUAL POWER PURCHASE AGREEMENTS (VPPAS)

Because of various policy and regulatory complexities, virtual power purchase agreements (VPPAs) are yet to be tested in India. Power and commodity exchanges are expected to introduce new market instruments soon. However, volumes are expected to remain muted over the next five years due to a lack of awareness and familiarity among C&I businesses.



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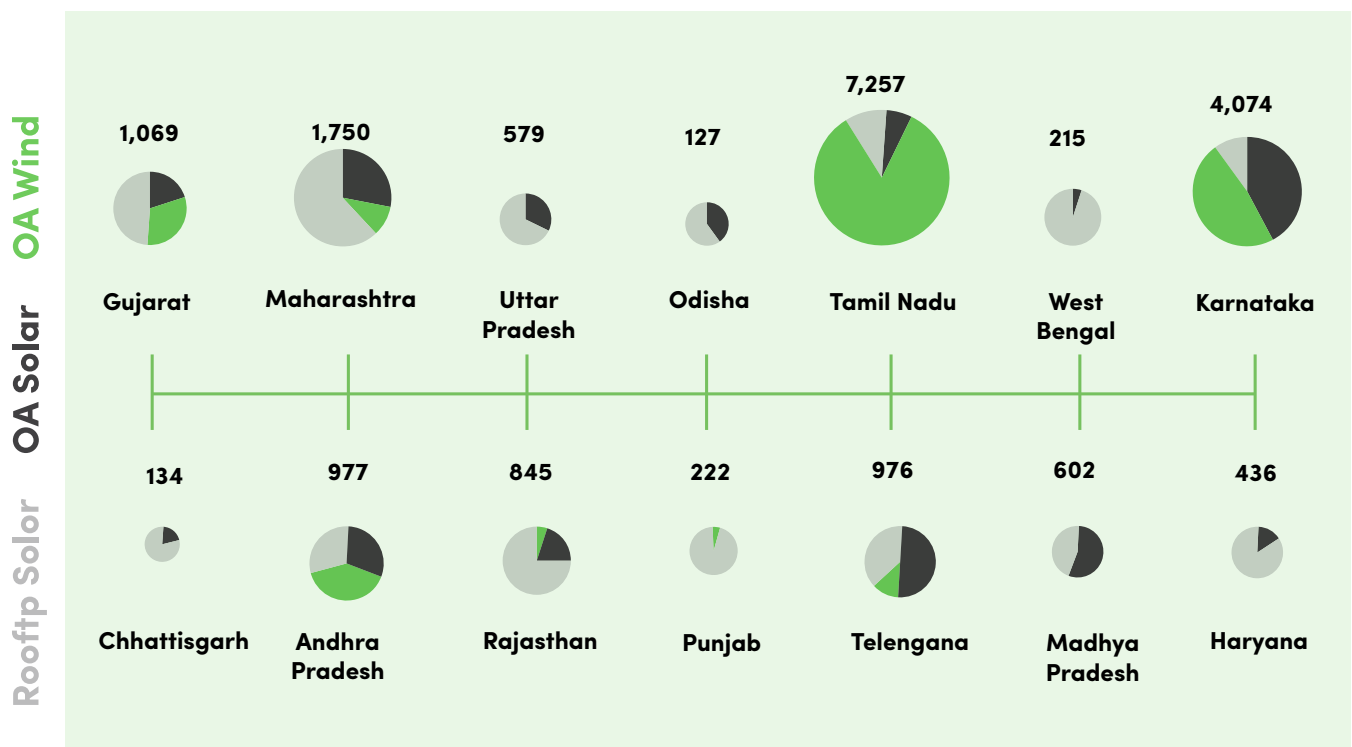
Parameter	Open Access	Rooftop Solar	Green Tariffs	REC	Green Power Exchange
<b>Eligibility</b>	Connected load 1 MW and above	It varies from state to state	Direct power connection with DISCOM, it varies from state to state	None	Connected load of 1 MW and above
<b>Duration</b>	10-25 years	20-25 years	One year or more	NA	Intra-day to 11-days ahead
<b>Maturity</b>	High	High	Low	High	Low
<b>RE penetration possible</b>	40-50% typically	10-15% typically	100%	100%	100%
<b>Advantages</b>	<ul style="list-style-type: none"> <li>• Low cost</li> <li>• Choice of business model</li> <li>• Mature, proven route</li> </ul>	<ul style="list-style-type: none"> <li>• Low cost</li> <li>• Choice of business model</li> <li>• Mature, proven route</li> </ul>	<ul style="list-style-type: none"> <li>• No long-term commitment</li> <li>• Easy to adopt</li> </ul>	<ul style="list-style-type: none"> <li>• No long-term commitment</li> <li>• Easy to adopt</li> </ul>	<ul style="list-style-type: none"> <li>• Highly flexible</li> <li>• No long-term commitment</li> </ul>
<b>Disadvantages</b>	<ul style="list-style-type: none"> <li>• Denial of approval</li> <li>• High policy risk</li> <li>• Curtailment risk</li> </ul>	<ul style="list-style-type: none"> <li>• Can meet limited demand</li> <li>• Regulatory uncertainty</li> </ul>	<ul style="list-style-type: none"> <li>• High cost</li> <li>• Green attributes are not transferred to the consumer</li> </ul>	<ul style="list-style-type: none"> <li>• Limited supply</li> <li>• No price or volume certainty</li> </ul>	<ul style="list-style-type: none"> <li>• Limited supply</li> <li>• No price or volume certainty</li> </ul>



# State-wise view of the current status of RE options

As of June 2021, solar and wind capacity supplying power to **C&I companies** accounted for **19.5 GW of India's total solar and wind capacity**. It's dominated by large-scale open access projects that account for 68% of installed capacity, while rooftop solar systems account for 32%. Tamil Nadu and Karnataka account for 59% of this capacity. High renewable energy resources, C&I power demand and friendly open-access policies helped these states add significant capacity between FY 2016 and FY 2018.

Figure 2: C&I RE power capacity as of June 2021, MW



**C&I companies accounted for 19.5 GW of India's total solar and wind capacity**

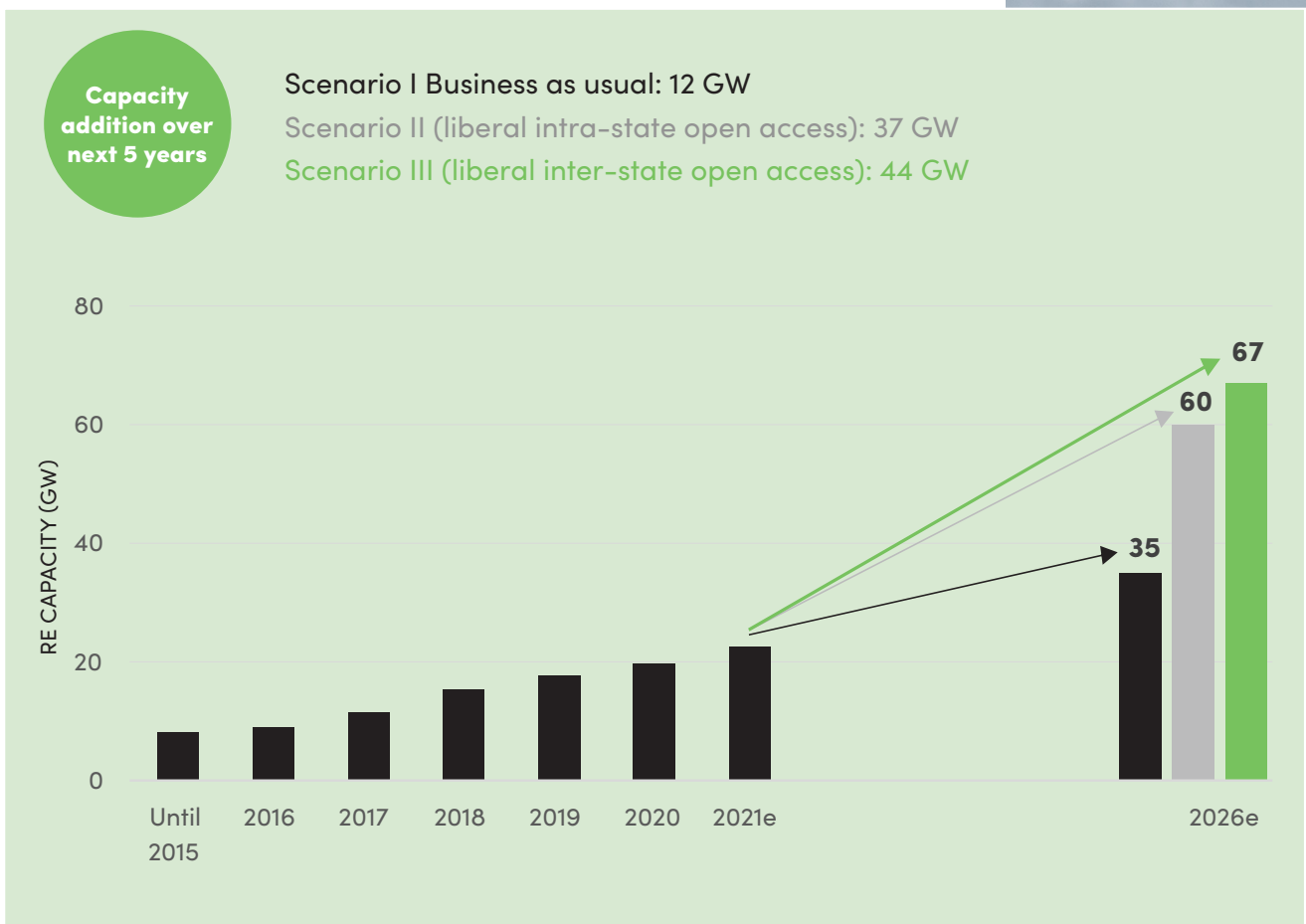
**Accelerated adoption has not been possible with state-level interventions.** Annual capacity addition started to decline after FY 2018 as states withdrew grid cost incentives and project approvals became challenging in some states. States like Telangana, Gujarat, Haryana and Rajasthan have been reluctant to grant approvals for third party sale projects, while Rajasthan and Gujarat have refused approval to group captive projects. States like Tamil Nadu and West Bengal have increased scrutiny of captive projects to ensure shareholding and power consumption pattern meets the criteria mentioned in Electricity Rules, 2005 (consumers must hold a minimum 26% equity stake in the captive project and consume a minimum of 51% electricity generated in a financial year).

# Renewable capacity addition estimation

At the current rate of capacity addition, 'Bridge To India' estimates that **12 GW of C&I renewable power capacity would be added over the next five years, taking the total capacity to 35 GW by 2026**. Uncertainty regarding policies and regulations and increasing opposition by DISCOMs to group captive projects will likely limit annual capacity addition to up to 2.5 GW per year.

**There is potential to add up to 37 GW over the next five years** (split equally between open access and rooftop solar) if regulatory procedures are smoothed, stakeholders have long-term visibility of open access policy and open access charges decline at a gradual and predictable rate. Under such a liberalized intra-state open access regime, an estimated 7.4 GW per year can be added over the next five years.

Figure 3: Estimated C&I renewable power capacity in 2026, GW





## Key assumptions

- C&I power consumption grows at a historical growth rate of 5% CAGR.
- High Tension consumers procure power from open access and rooftop solar projects, while Low Tension consumers only procure power from rooftop solar power systems. (*High Tension (HT) consumer means a consumer who is supplied electricity at a voltage higher than 650 volts but not exceeding 33000 volts. Low Tension (LT) consumer means a consumer who is supplied electricity at a voltage upto 440 volts*)
- Open access projects can meet up to 40%, and rooftop solar systems can fulfil up to 10% of power demand.
- Average Capacity Utilisation Factor (CUF) for wind and solar power projects is 26%. Average CUF for rooftop solar systems is 18%.
- The project penetration rate under scenarios II (A liberal intra-state open access scenario) and III (A liberal, inter-state and intra-state open access scenario) is 25% for open access and 40% for rooftop solar power systems



**An additional 7 GW capacity can be added if the inter-state open access regime is also liberalised.** This can be achieved through centralised, single-window approval of open-access applications and waiver of inter-state transmission charges for projects commissioned by 30 June 2025. Demand for additional capacity is expected to be driven by RE-deficient states like Punjab, Uttar Pradesh, Haryana, Odisha and West Bengal. Consumers in RE-rich states would continue to prefer intra-state projects due to comparative simplicity in procedures and lower tariffs. Developers are unlikely to set up merchant capacity for the sale of power at green exchanges due to a lack of assured offtake and price uncertainty.

Limited land, renewable power resources, transmission capacity, and rising module and equipment costs shall remain limiting factors for capacity addition across all three scenarios. Major factors likely to influence C&I renewable capacity growth over the next five years are listed below.



Scenario I – Business as usual	Scenario II – Liberal intra-state open access	Scenario III – Liberal inter-state open access
<ul style="list-style-type: none"> <li>• Policy uncertainty               <ul style="list-style-type: none"> <li>- Arbitrary and retrospective changes</li> <li>- Delay in approval of open-access application and transmission connectivity</li> <li>- Limited predictability in the determination of cross-subsidy surcharge (CSS) and additional surcharge (AS)</li> </ul> </li> <li>• Limitation on group captive projects               <ul style="list-style-type: none"> <li>- Denying approval for group captive projects preferred by medium and small consumers</li> <li>- Increased scrutiny of captive projects and demand for cross-subsidy surcharge and additional surcharge from consumers</li> </ul> </li> <li>• Restrictions on banking               <ul style="list-style-type: none"> <li>- Banking available only to captive projects</li> </ul> </li> </ul> <p>Banking facility reduced to daily or time block basis (15 minutes)</p>	<ul style="list-style-type: none"> <li>• Policy certainty               <ul style="list-style-type: none"> <li>- 5-year certainty in state policy</li> <li>- 100% approval of open access projects</li> <li>- Gradual reduction in CSS and AS</li> </ul> </li> <li>• Liberal banking and net metering regime               <ul style="list-style-type: none"> <li>- Monthly banking allowed</li> <li>- Net metering available for LT consumers up to sanctioned load</li> </ul> </li> <li>• Better awareness and financing options:               <ul style="list-style-type: none"> <li>- Increased awareness among consumers and DISCOMs due to policy changes</li> <li>- Improved financing for MSMEs through credit guarantee schemes</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• All conditions under scenario II</li> <li>• Waiver of transmission charges               <ul style="list-style-type: none"> <li>- Charges waived for projects commissioned before 30 June 2025</li> </ul> </li> <li>• Easy approval               <ul style="list-style-type: none"> <li>- Single-window, centralised approval of open access applications</li> </ul> </li> </ul>

# Glossary

**1 CAPEX-** The CAPEX or the capital expenditure model is a self-funding model where consumers have to bear all the capital expenses incurred in installing a RE system upfront.

**2 OPEX-** The OPEX or the operating expenses model is a system where the developer owns the RE project, and the consumer only has to pay for the energy generated. This model is also called the Renewable Energy Service Company (RESKO) model.

**3 VPPAs-** A Virtual PPA is a contract structure in which a power buyer (or offtaker) agrees to purchase a project's renewable energy for a pre-agreed price. In this agreement, the utility-scale solar project receives the market price at the time the energy is sold.

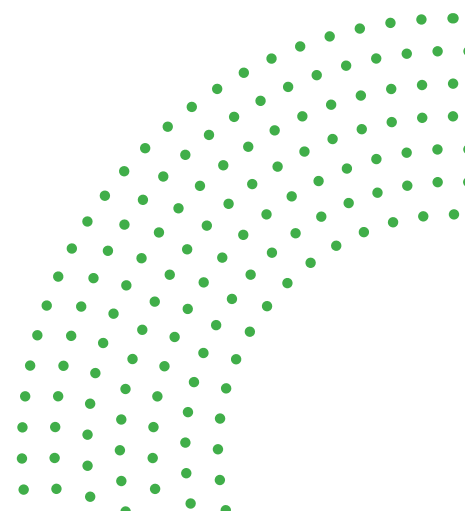
**4 Captive power-** A captive power plant is a facility that provides a localised source of power to an energy user.

**5 Open Access-** Non-discriminatory provision for the use of transmission lines or distribution systems or associated facilities with such lines or system by any licensee or consumer or a person engaged in generation in accordance with the regulations specified by the appropriate Commission- *As per section 2 (47) of Electricity Act 2003 ("EA 2003")*

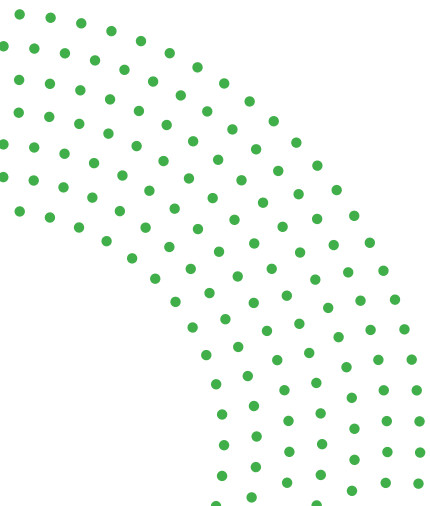
**6 Renewable purchase obligation (RPO)-** It is a mechanism by which the obligated entities are obliged to purchase a certain percentage of electricity from Renewable Energy sources, as a percentage of the total consumption of electricity. – As per Section 86(1) (e) of the Electricity Act 2003 ("EA 2003")

**7 Green Tariff-** A green tariff is a price structure, or an electricity rate, offered by a local utility and approved by the state's Public Utility Commission that allows eligible customers to source up to 100% of their electricity from renewable resources.

**8 Maturity of RE-** Renewable energy technological solutions that are commercially mature and can compete with conventional technology are referred to as mature ("first-generation") technologies.

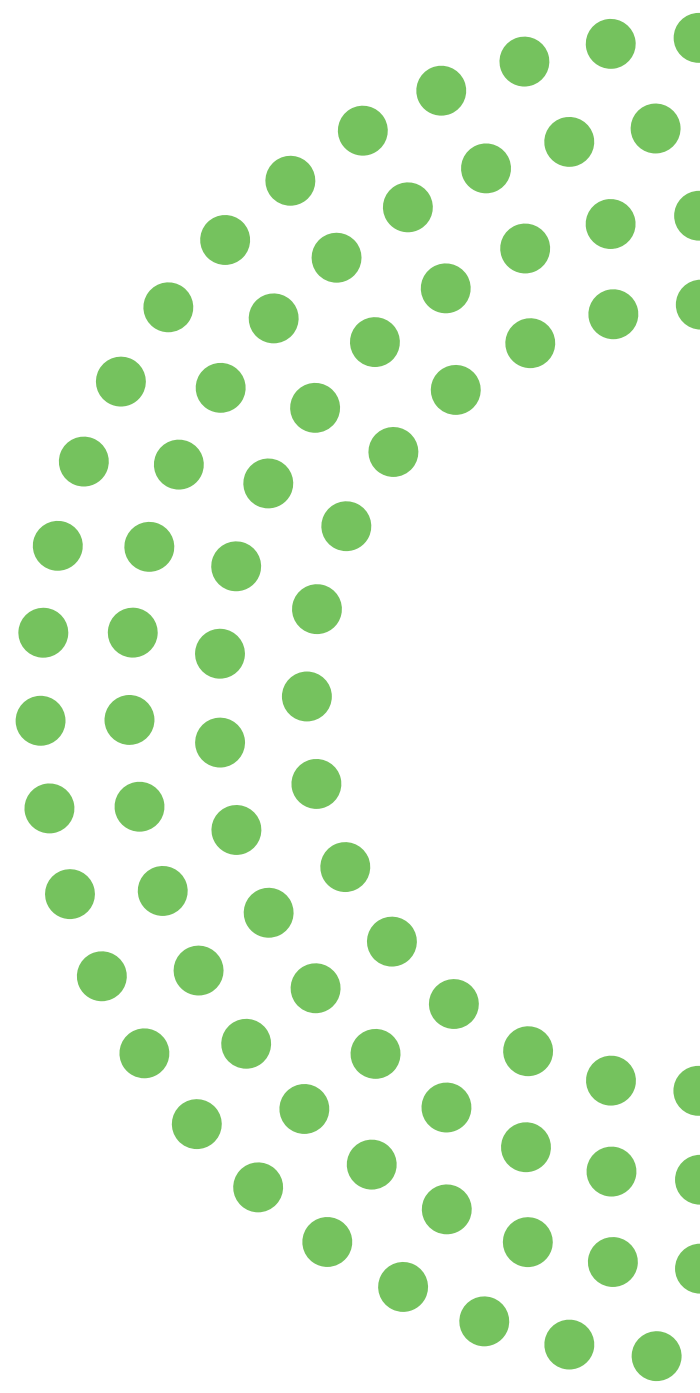






**Disclaimer**

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# RE100

**CLIMATE GROUP**



RE100 is a global initiative bringing together the world's most influential businesses committed to 100% renewable electricity. Led by Climate Group, in partnership with CDP, our mission is to drive change towards 100% renewable grids, both through the direct investments of our members, and by working with policymakers to accelerate the transition to a clean economy. The initiative has over 370 members, ranging from household brands to critical infrastructure and heavy industry suppliers. With a total revenue of over US\$6.6 trillion, our members represent 1.5% of global electricity consumption, an annual electricity demand higher than that of the UK.