

Power sector commitments at COP26 – How to achieve them

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India's greenhouse gas (GHG) emissions are 2.5 GtCO₂ per year, which is very low compared to the highest emitting countries, such as the United States (10 GtCO₂ per year) and China (5 GtCO₂ per year). However, it is commendable that at the United Nations Climate Change Conference (COP26) held recently in Glasgow, India set ambitious targets to reduce carbon emissions from its energy sector. This indicates that India recognises the severity and scale of potential climate change challenges from a future perspective. It is hoped that India's decisions will motivate high-polluting developed countries to take more impactful measures.

India has committed to reducing 1 Gt of carbon emissions from the projected emissions (business-as-usual scenario) in 2030. India's present CO₂ emissions are 2.88 GtCO₂ per year. India's emission is projected to be about 4.48 GtCO₂ by the year 2030. Therefore, we have committed to limit our annual emissions to 3.48 GtCO₂ in 2030, from the energy, transportation, industrial, and other polluting sectors.

The biggest challenge in achieving this is that not every resident—especially across rural and remote areas of India—has electricity access. Significant transformations will have to take place in the Indian power sector this decade for 100% accessibility. Developments in energy access, clean energy generation, and power quality need to be undertaken, alongside committed targets of emission reduction from the power sector. These developments need to be sustainable and inclusive of all factors. There are two other highly ambitious targets to achieve, including:

1. Reaching 500 GW of non-fossil fuel-based energy capacity by 2030, and
2. Meeting 50% of our energy requirements from renewable energy (RE) sources by 2030.

The target of supplying 50% energy requirements from RE sources is very challenging—India will need to increase its estimated installed RE capacity to about 450–700 GW. This needs an extensive transformation and re-invention of our power system infrastructure. Many European countries, such as Germany and the United Kingdom, are working on their power grid infrastructure upgradation to accommodate high RE generation. This is being implemented through optimal utilisation of their renewable resources, better RE forecasting, and by managing high-ramping hydro-power plants in real time. These countries are also looking to phase out their coal-based power capacities in due course.

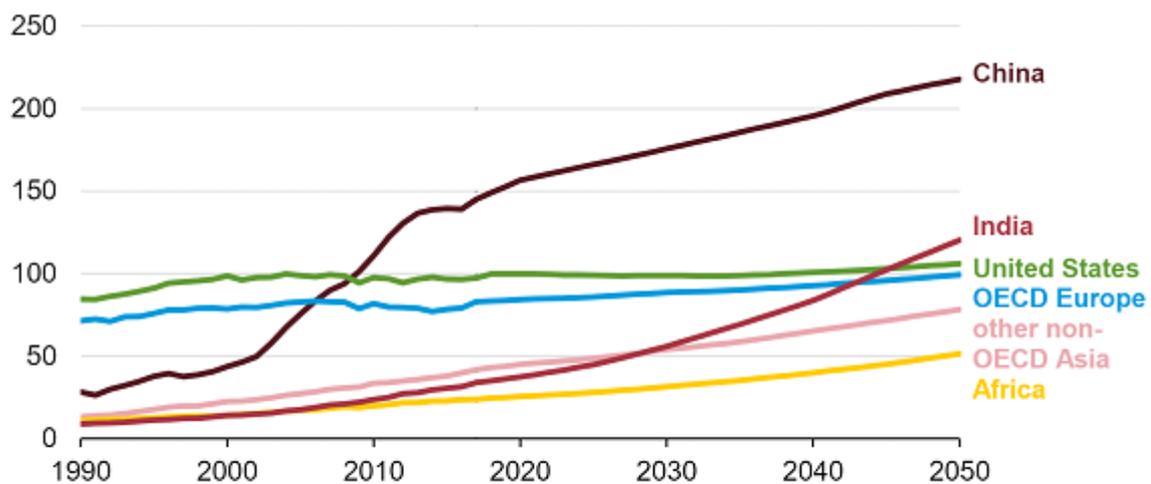
Regarding the reduction in coal power, India pledged for phasing-down of unabated coal power

and phasing-out insufficient fuel subsidies. Carbon emission reduction from thermal power plants is promoted through carbon markets. An international carbon market was established under the Kyoto Protocol, which suggested that any reduction in emission above the targets would be converted into carbon credits. These credits could then be sold to another country to help them meet their targets.

At present, India has crossed 100 GW of total RE capacity development. Therefore, it has accumulated significant carbon credits from its energy sector developments.

As the Kyoto Protocol expired in 2020, the trading of these credits remains unclear. Many developed countries have also abandoned their target midway through, symbolising their reluctance to honour their commitments and provide financial support to India for required energy transformation. However, according to COP26 discussions, India can trade its available carbon credits for meeting the NDC (Nationally determined contributions) targets.

India has committed to going net-zero by 2070 — again, highlighting the need for significant developments in new non-fossil-based power plants. New power capacity addition will have to consider the replacement of existing fossil-based plants and cope with additional projected power demand by 2070. It is expected that by 2050, India’s total energy consumption will become second highest in the world with over 120 quadrillion Btu annually—over 3 times more than the present energy consumption.



Projected Energy Consumption in Major Countries and Regions by 2050 (EIA)

India’s existing installed fossil-based power capacity of 235 GW and planned thermal capacity needs to be retired in a systematically planned manner to attain net-zero. This phased-out generation capacity, along with additionally increased power demand, will have to be balanced by installing significantly high RE and large-hydro power capacities. The high RE-generation scenarios will pose further new challenges related to power intermittency and grid balancing. The Indian

power grid needs to be transformed accordingly with the addition of sufficient energy storage solutions (such as utility-scale battery storage and pumped hydro storage) and ancillary services. As for infrastructure, remote-grid access to every household is essential. An extensive grid reliability assessment needs to be carried out through the national grid at both state and regional levels, while upgradation of the power system is critical, where necessary. These measures and policies will lead to a smooth path for complying with the net-zero target in 2070 without compromising on the development of the Indian power sector, benefits to consumers, and interests of the stakeholders.

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