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A CLEAN ENERGY TRANSITION PLAN FOR INDIA

Relevant for: Economy | Topic: Infrastructure: Energy incl. Renewable & Non-renewable

A shepherd walks past photovoltaic cell solar panels in the Pavagada Solar Park on October 11, 2021 in Kyataganacharulu village, Karnataka. | Photo Credit: Getty Images

Energy security warrants the uninterrupted supply of energy at affordable prices. India faces the twin challenges of meeting the aspirations of its 1.3 billion population even as it safeguards its energy security and contributes to global efforts to mitigate climate change. Thanks to the Electricity Act of 2003, the installed coal-fired thermal power plant (TPP) generation capacity in India more than doubled from 94 GW to 192 GW between March 2011 and 2017. This sharp increase in the installed capacity has enabled the government to increase per capita electricity consumption by 37% while reducing peak demand deficit from 9.8% (2010-11) to 1.6% (2016-17). However, India has a long way to go in providing electricity security to its people since its per capita electricity consumption is still only a third of the global average.

Coal is the only fuel that India has in abundance and the geopolitics of India's neighborhood do not permit ready access to piped natural gas. TPPs contributed 71% of the 1,382 billion units (BU) of electricity generated by utilities in India during FY 2020-21 though they accounted for only 55% of the total installed generation capacity of 382 GW (as of March 2021). Coal, therefore, plays a vital role in India's ongoing efforts to achieve Sustainable Development Goal 7, which is "to ensure access to affordable, reliable, sustainable and modern energy for all".

India's 450GW renewable energy goal by 2030 doable, says John Kerry

While variable renewable energy (VRE) sources (primarily, wind and solar) account for 24.7% of the total installed generation capacity, as of March 2021, they contributed 10.7% of the electricity generated by utilities during FY 2020-21. However, the ramp-up of VRE generation capacity without commensurate growth in electricity demand has resulted in lower utilisation of TPPs whose fixed costs must be paid by the distribution companies (DISCOMs) and passed through to the final consumer.

The rapid growth of VRE sources in India has been largely aided by policy measures as well as financial incentives whose cost is borne by the consumer. The current level of VRE in the national power grid is increasing the cost of power procurement for DISCOMs, leading to tariff increases for electricity consumers. Specifically, the Forum of Regulators has estimated the total additional burden of grid integration of VRE sources includes 1.11 of balancing cost and 1.02 of stranded capacity cost, totalling 2.13 per unit. Therefore, India must implement a plan to increase energy efficiency and reduce the emissions of carbon dioxide (CO_2) and airborne pollutants from TPPs without making power unaffordable to industries that need low-cost 24x7 power to compete in the global market.

We have developed a time-bound transition plan for India's power sector involving the progressive retirement of 36 GW of installed generation capacity in 211 TPPs(unit size 210 MW and below) based on key performance parameters such as efficiency, specific coal consumption, technological obsolescence, and age. The resulting shortfall in baseload electricity generation can be made up by increasing the utilisation of existing High-Efficiency-Low-Emission (HELE) TPPs that are currently under-utilised to accommodate VRE and commissioning the 47 government-owned TPPs (total capacity of 31.6 GW) that are at an advanced stage of construction in which 1,77,742 crore have already been invested by government utilities. These TPPs have already signed power purchase agreements with the

respective DISCOMs; and thanks to the two-part tariff policy, their fixed costs must be borne by power consumers irrespective of their usage. In addition, the Nuclear Power Corporation of India Limited (NPCIL) is also constructing 11 nuclear power plants with a total generation capacity of 8,700 MW that will supply 24x7 power without any CO2 emissions.

India, U.S. commit to accelerating development and deployment of clean energy solutions

With the implementation of our transition plan, the total installed capacity of TPPs operated by utilities will increase from the current level of 209 GW (as of September 2021) to 220 GW by FY 2029-30 even after retiring 211 inefficient and obsolete TPPs that are more than 25 years old and need major sustenance capital expenditures (Capex) for life extension, modernisation, and retrofit of flue gas desulphurisation plants (FGDs). The combined thermal (220 GW) and nuclear (15 GW) capacity of 235 GW can meet the baseload requirement (80% of peak demand) during the evening peak in FY 2029-30 without expensive battery storage, while the optimal utilisation of existing and under-construction HELE TPPs with faster-ramping capabilities and lower technical minimums also facilitates VRE integration.

As per our transition plan, India's power generation from TPPs is expected to reduce from the FY 2020-21 level of 71% to 57% of the total electrical energy (2,172 BU) projected to be generated by utilities during FY 2029-30. Further, the share of HELE TPPs in the total TPP generation capacity will increase from the FY 2018-19 level of 25% to 44% in FY 2029-30. More importantly, the share of inefficient TPPs with obsolete technology in the total TPP generation capacity will reduce from the FY 2018-19 level of 46% to 4%. Consequently, total CO2 emissions from the power sector will go down by 57 Mt even as coal-fired electricity generation is projected to increase by 21% to 1,234 BU in 2029-30.

Glasgow climate meet | India doesn't rule out 'net zero' commitment

Since HELE TPPs minimise emissions of particulate matter (PM), SO2, and NO2, our transition plan offers operational, economic, and environmental benefits including avoidance of sustenance Capex and FGD costs in the 211 obsolete TPPs to be retired besides savings in specific coal consumption and water requirement leading to reductions in electricity tariffs and PM pollution.

This plan prioritises the installation of high-efficiency electrostatic precipitators that can remove 99.97% of the PM pollution without extensive shutdowns or hiking tariffs unlike expensive, imported FGDs. The implementation of this plan will enable India to safeguard its energy security and ensure efficient grid operations with lower water consumption, PM pollution, and CO2 emissions. Ultimately, this plan demonstrates India's commitment to climate change mitigation by optimising the use of our land, coal, water, and financial resources with indigenous technology.

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Once cybertechnology becomes a key variable in the defence policies of a nation, land size or GDP size are irrelevant

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