

Decarbonising India's power sector to achieve the sustainability goal



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In this dynamic world, one thing that has remained constant over the years is the rising temperature across the globe. Over the past decades, mankind has increased the concentration of CO₂ in the air, continually increasing the planet's temperature. According to a report by the International Energy Agency (IEA)– India's CO₂ emissions are projected to surpass 30 million tonnes in 2021, much higher than the levels recorded in 2019. Furthermore, IEA also projects a threefold rise in coal-fired electricity generation in 2021, significantly greater than the increase in electricity generation from renewable energy sources.

Taking a strict stand to reduce emissions intensity, Prime Minister Narendra Modi has put forth India's commitments to reduce the carbon intensity of its economy by 45% and to shift half of India's electricity generation to renewable sources.

Need for decarbonizing the power sector

Incentivizing the addition of renewable sources to the power grid and decarbonizing it, is bound to be a difficult process. The power grid is efficient and extensive was mere water, gas, or coal a fraction of a second ago, stored in a power plant hundreds of kilometers away from the recipient. This simply means the power grid is a system that is designed to meet 100% of the demand instantaneously in the most efficient way possible without overproducing any electricity.

Having said that, decarbonizing India's power grid is a crucial part of meeting the country's goal to reduce emissions. Considering the significant rise in energy demand, decarbonization has brought forth several sustainable and cost-efficient ways for the transport, industrial and commercial sectors. India, being a developing nation, is projected to see a steep surge in industrial activities. This makes India's industrial

sector account for the highest share of energy consumption across the country in FY20.

As per the recent data, the CAGR growth of the manufacturing sector has increased by 5 percent between FY16 to FY20 in GVA at basic current prices. As a result, the manufacturing sector will continue to be an economic powerhouse, considering India's aggressive move to fulfill the 'Make in India' and 'Atma Nirbhar' vision. This will also change energy consumption patterns in the industrial sector and will have significant implications for the country's clean energy trajectory.

Challenges in the path of decarbonization

In electricity production, renewable energy, as opposed to conventional forms, has a unique set of challenges in that it cannot produce electricity everywhere and all throughout the day due to certain climate and location parameters. For instance, windmills usually tend to be situated offshore due to the heavy winds in coastal areas. Similarly, solar farms cannot be set up in areas with heavy rainfall and short days. Even after finding the right location for each energy source, another challenge arises to transport the energy generated along with long distances as electricity may be lost in the form of heat. This can be minimized by using high voltage transmission lines for the transfer of power that mostly connect hydro, nuclear, and fossil fuel power plants with urban centers. To completely transition to renewable energy, it is necessary to build a robust and high voltage power transmission infrastructure capable of connecting

areas of supply with areas of demand with minimal losses.

Another challenge that arises with renewable energy is instantaneously meeting the demand with appropriate supply. Solar energy works only during the day when demand is relatively low and does not produce any electricity at night when demand is high. Similarly, wind energy is highly dependent on the weather of the day and may over or underproduce as per the wind. Thus, figuring out ways to store power more efficiently can prove to be effective in decarbonizing the grid. This can be done by planning substantial investments in the research and development of batteries with high energy density and low cost, and by pairing wind and solar farms with hydroelectric dams. The excess power from renewables can be used to pump downstream water upstream to the reservoir, in effect creating a water battery and storing excess energy as potential energy which is already being done in some developed nations.

Summing up

A country like India, where demand for energy is rising continually, needs to decouple its economic sectors from GHG emissions to meet its environmental targets. However, the transition to a low-carbon economy should be accompanied by technological breakthroughs, relevant and infrastructure, and job opportunities for the workforce in fossil-fuel-dependent industries.