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ICRA's CLIMATE SERIES

Carbon Capture Utilisation and Storage (CCUS)

CCUS inevitable for climate goals; timely
policy intervention to help attract global
technology and funding

August 2023

CLIMATE CHANGE

The biggest crisis of our time

CCUS is inevitable for meeting climate goals with unavoidable fossil fuel dependence.

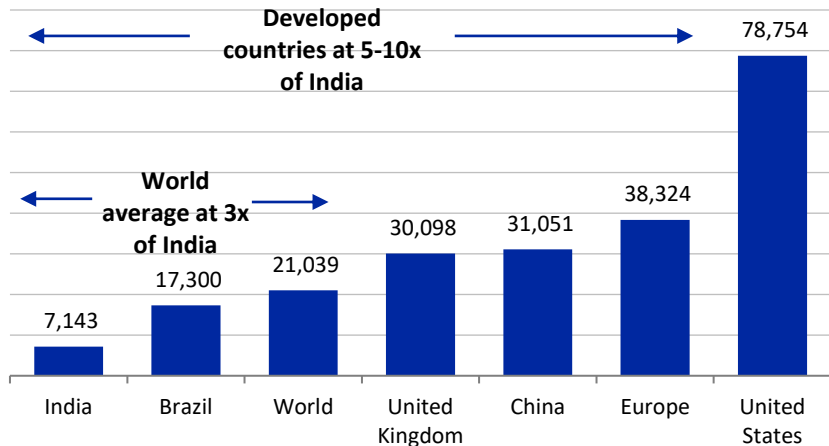
Investment may range from Rs. 400 billion to Rs. 700 billion towards capex and infrastructure for CCUS projects till 2030, apart from the recurring capture cost.

Given the nascent stage and high costs, policy intervention may help India to attract global technology, investors and funding.

- As the Indian economy continues to grow at a healthy pace, energy consumption in the country is likely to expand by 3-7x by 2070. To meet the surging demand with increase in population, India will remain dependent on fossil fuels at least for the next 40 years.
 - To achieve the climate goals with continued dependence on fossil fuels, India needs to explore more ways of carbon sequestration (the process of capturing and storing atmospheric carbon dioxide). Carbon Capture Utilisation and Storage (CCUS) and forestation are some of the ways of carbon sequestration.
- Globally, CCUS facilities capture only 0.2% of the total carbon emissions. With more than 500 projects planned till 2030, the share of carbon capture to global Co2 emissions will remain negligible at 2%.
 - The US and Canada, which have nearly 80% of the global CCUS facilities, eye Government support and funding as critical factors for success.
 - India, which is 4th largest carbon emitter in the world, is at a pilot stage currently for CCUS projects against China, which has 2% share in global operational CCUS facilities. China being the largest carbon emitter in the world, started the first facility in 2015.
- Coal-fired power plants, iron and steel, and cement are the most carbon-emitting sectors; focus on these sectors will help while implementing CCUS in India.
 - Co2 emissions in India from these sectors are estimated to rise to around 2,300-2,600 million tonne per annum (mtpa) by 2030 from around 1,300-1,600 mtpa in 2020. For India to successfully capture around 30% of the estimated carbon emissions, the required capital investment in carbon capture is estimated at Rs. 400 bn to Rs. 700 bn, including transportation and storage till 2030 (as per Niti Aayog). Additionally, the capture cost will be a recurring expense, varying according to the carbon capture volume.
 - Considering the high capex and operational cost, timely policy intervention will help attract investors, technology, funding and private sector participation.

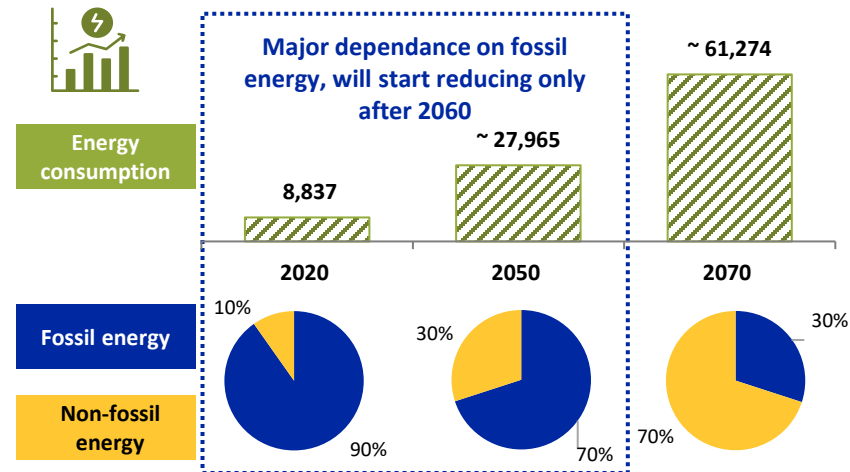
India's multi-fold expansion in energy consumption could keep it bound to fossil fuels in the visible future

Exhibit : Energy consumption per capita (kwh) – Year 2022



Source: Our World In database, ICRA Research

Exhibit : Energy consumption for India in tWh (terawatt-hour)



Source: Our World In database, ICRA Research

- The world average stands at ~3x of India's per capita energy consumption, skewed by developed economies (up to 10x of India). Even Emerging Market (EM) countries like China and Brazil stand at 3x and 2x of India's per capita energy consumption. As India continues to grow, we see energy consumption for the country expanding by 3-7x by 2070.
- To meet this surging demand along with an increasing population, India will remain dependent on fossil fuels at least for the next 40 years.



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