WORKING PAPER | EXECUTIVE SUMMARY

A Medium-Term Strategy for Transitioning to Net Zero by 2070

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This paper provides a comprehensive assessment of a medium term strategy for achieving India's target of net-zero emissions by 2070, in the backdrop of the global stocktake undertaken at the Conference of the Parties (COP) 28 in Dubai. The stocktake established that the world is significantly off track to meet its agreed-upon global warming target. This highlights the urgent need for all countries to ramp up their efforts to reduce emissions and avert potentially catastrophic climate change. This issue is of particular importance to India, which is projected to be among the world's most severely affected by the impacts of climate change. Furthermore, India's actions are of critical global significance, as its rapid economic growth is driving a corresponding increase in emissions, solidifying its position as the fourth-largest emitter globally, following China, the United States (US), and the European Union (EU).

The paper explores what is involved in developing a credible medium-term plan for India that aligns with its net-zero emissions by 2070 goal, as announced at the COP26. The paper begins with an assessment of the technical feasibility of achieving net-zero emissions, drawing on a range of quantitative studies that have examined this question. It proceeds to analyse the potential role of price-based interventions, such as a carbon tax or a comparable alternative, in accelerating the transition from polluting to non-polluting energy sources. It also explores the sector-specific interventions in key areas of the economy, such as transport, that offer significant opportunities for decarbonisation. The paper further examines the steps needed to build domestic manufacturing capacity to support the energy transition, and provides estimates of the investment requirements necessary to achieve these ambitious goals. Finally, it summarises the main conclusions arising from the analysis.

India has adopted a long term target of achieving developed country status by 2047. This requires average economic growth of over 8% over the next two decades. This will involve increased energy demand and, without intervention, higher energy-related emissions. However, this growth trajectory can be reconciled with the net-zero target of 2070, through a three-pronged strategy: (i) aggressively improving energy efficiency across all sectors to minimise the growth in total energy demand; (ii) strategically electrifying sectors wherever technologically and economically feasible, to reduce direct use of fossil fuels; and (iii) fundamentally shifting electricity generation from coal to renewables and other clean sources of energy.

Improving energy efficiency involves a broad range of measures, from adopting more efficient industrial processes to promoting the use of energy-efficient appliances for consumers. It also includes shifting towards more energy-efficient systems, such transitioning from private car use to public transport systems, and from long-distance road freight to rail-based transport.

Electrifying key sectors entails reducing the direct consumption of fossil fuels, a strategy that is already commercially viable in some sectors but faces significant hurdles in areas such as heavy freight transportation, aviation, shipping, mining, and the production of steel, cement, fertilisers, etc. Synthetic or biofuels, alternative energy carriers, such as green hydrogen, and carbon capture, utilisation, and storage (CCUS) technologies, may offer potential solutions for these hard-to-abate sectors. However, the commercial viability and scalability of these solutions remains uncertain. Electrification, in isolation, is insufficient to achieve decarbonisation unless the electricity used to power these electrified sectors is generated from clean sources.

A fundamental shift in electricity generation towards renewable and other clean sources is a crucial complement to the electrification strategy. India has a considerable potential for solar and wind power generation, making this a promising element of the overall strategy. These sources of energy are however intermittent in nature and require balancing systems (e.g. grid-scale batteries) to supply steady power. Adding the cost of storage to RE makes it more expensive than coal power, but it is argued that over time these costs will decline making the switch to renewables much more economical. The paper acknowledges the potential for expanding hydro and nuclear capacity as conventional, non-polluting sources of power, although these sources are subject to various environmental and social constraints. It also highlights the financial unviability of India's distribution companies, which poses a major constraint on RE capacity expansion.

While action will also be necessary in industry, agriculture, and buildings sectors, the paper suggests that a detailed strategy for these may take more time to put in place since technologies needed are yet to fully mature.

COP28 had urged all countries to submit updated NDCs by 2025 containing more ambitious mitigation actions for the period 2025–2035. India's current NDCs include a commitment to reducing the emissions intensity of its GDP by more than 45% by 2030, compared to 2005 levels; increasing the share of non-fossil fuel-based electricity generation capacity to 50% of total capacity (500 gigawatts) by 2030; and creating an additional 2.5 to 3 gigatonnes of carbon dioxide (CO2) equivalent forest sink by 2030.

There is an opportunity for India to strengthen its NDCs by adopting quantitative medium-term targets for total emissions, aligning with the approach taken by many other countries. For example, the EU aims to achieve net-zero emissions by 2050 and has committed to reducing emissions by 55% by 2030 and is considering 90% reductions by 2040, relative to 1990 levels. The US had committed to reducing emissions by 50–52% by 2030 compared to 2005 levels, achieving 100% carbon-free electricity by 2035, and reaching net-zero emissions by 2050, although this is now off the table following the US' withdrawal from the Paris Agreement. China has pledged to peak CO2 emissions before 2030, reduce the CO2 emission intensity of GDP by more than 65% by 2030 from 2005 levels, and achieve net-zero emissions by 2060. Several other countries, including Indonesia, Brazil, and South Africa, have also defined emission targets in terms of absolute emission levels to be reached by 2025 and 2030. The paper suggests that India could define more specific targets related to the total level of emissions for the period 2025–2035, as well as a date for peaking coal use or achieving peak emissions from the electricity generation sector. Setting such targets would enhance international recognition of India's commitment to mitigating climate change while also promoting greater public awareness within the country.

One of the key challenges will be the need for coordinated action across a complex landscape of stakeholders across different levels of the government. The paper suggests establishing a high-level commission, chaired by the Prime Minister, with key central ministers and all Chief Ministers, to foster collaboration, ensure coherence, and drive effective implementation. Recognising the potential political difficulties associated with certain policy changes, the paper emphasises the importance of building a broad political consensus around the urgent need for climate action. This could be facilitated by engaging State governments in the strategy's design and implementation phases. The paper proposes that a carefully selected subset of the strategy's goals and milestones could be incorporated into India's updated Nationally Determined Contributions (NDCs), to be presented to the United Nations Framework Convention on Climate Change (UNFCCC) in 2025.

Key Takeaways

India can achieve net-zero emissions by 2070 through a three-pronged strategy: improving energy efficiency, electrifying sectors wherever feasible, and replacing fossil-fuel-based electricity generation with renewables. Price-based instruments, ideally a carbon tax or an emissions trading system, are necessary to discourage carbon-intensive activities and generate revenue for the transition. The expansion of renewable energy and the electrification of transport should be immediate priorities, alongside building domestic capacity to manufacture solar panels, wind turbines, and batteries.

Achieving these goals will require investments of about 2 per cent of GDP by 2030, to be financed through private and public resources, both domestic and foreign. Close coordination between the central and state governments is vital, and a high-level commission chaired by the Prime Minister could oversee implementation. Incorporating stronger medium-term emission targets into India's next NDC would demonstrate commitment to climate action and help mobilise broader political support.

About the authors

Montek Singh Ahluwalia is Distinguished Fellow at CSEP. He is former Deputy Chairman of the erstwhile Planning Commission of India. He joined the Government of India in 1979 as Economic Advisor in the Ministry of Finance and subsequently held a series of positions including Special Secretary to the Prime Minister; Commerce Secretary; Secretary in the Department of Economic Affairs; Finance Secretary; Member of the Planning Commission and Member of the Prime Minister's Economic Advisory Council. In 2001, he was appointed as the first Director of the newly created Independent Evaluation Office of the IMF. He resigned from that position in 2004 to take up the position of Deputy Chairman of the Planning Commission, which he held from 2004 to 2014. For his contribution to economic policy and public service, he was conferred the Padma Vibhushan, India's 2nd highest civilian award for exceptional and distinguished service, in 2011. Mr Ahluwalia graduated from Delhi University and holds an MA and an MPhil in Economics from Oxford University. In 2020, he published his book, Backstage: The Story Behind India's High Growth Years, an insider's account of policymaking from 1985 to 2014.

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