A decade of national climate action: Stocktake and the Road Ahead

INDIA
INSIGHTS ON CLIMATE ACTION TEN YEARS AFTER THE PARIS AGREEMENT

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INTRODUCTION

India is one of the largest democracies with the largest population in the world[1]. It is the fourth-largest economy by GDP (nominal) and the third-largest economy by GDP-PPP basis[2,3]. As a lower-middle-income country, it has set a goal to become a self-sufficient $30 trillion economy by 2047, which marks the 100th anniversary of its independence[4]. In terms of development (SDGs) since 2015, India has been able to achieve near-universal energy and water access, increased renewable energy share, improved waste management efforts, and expanded social security[5]. It focuses on the welfare and quality of life of its citizens through policies such as Pradhan Mantri Awas Yojana (Housing for All), Ujjwala Yojana (Clean cooking (LPG connection) to low-income households), Swachh Bharat Abhiyan (Clean India), Jan Dhan Yojana, Ayush-

1 United Nations Population Fund (UNFPA). (2025). *The State of World Population 2025: The real fertility crisis*. https://www.unfpa.org/swp2025
2 World Bank. (2025). *Global Economic Prospects*. Retrieved from https://www.worldbank.org/en/publication/global-economic-prospects
3 International Monetary Fund. (2025). *World Economic Outlook*. Retrieved from https://www.imf.org/en/Publications/WEO
4 NITI Aayog. (2024). *Viksit Bharat @ 2047: Vision for Developed India*. Retrieved from https://www.niti.gov.in/publications
5 United Nations. (2025). *The Sustainable Development Goals Report 2025*. https://unstats.un.org/sdgs/report/2025/

man Bharat- Pradhan Mantri Jan Arogya Yojana (Health insurance to poor families), Ayushman Arogya Mandir (comprehensive primary health care), PM-Mudra Yojana, Saubhagya (Universal household electrifications), and Start-up India[6].

INDIA'S CLIMATE COMMITMENTS

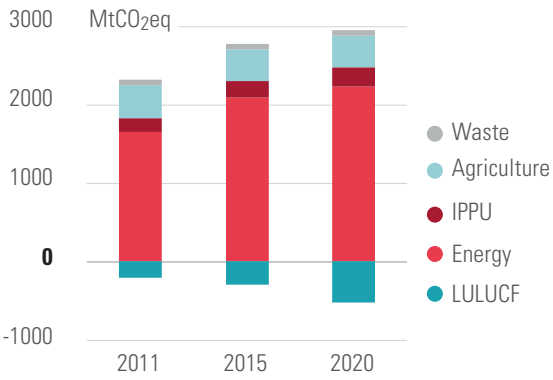
Nationally Determined Contributions (NDCs)

India's NDC, which was submitted under the Paris Agreement, outlines its climate action targets for 2030. India submitted its first NDC in 2015 at COP21 and committed to reducing the GHG emission intensity of its GDP by 33–35% by 2030 and to achieve about 40% cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030[7]. These targets were updated in August 2022 to reduce the GHG emission intensity of its GDP by 45% and about 50% cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030 at COP26 in Glasgow[8]. India has also set a net-zero emissions target for 2070. These actions are a part of the 'Panchamrit' (five nectars) strategy as the pillars of India's climate action. **Figure 1** shows the trend in the evolution of India's emissions between 2011 and 2020. By 2020, the total GHG emissions reached almost 3000 million tonnes, with the energy sector contributing up to 75% and about 8% by industry sector.

India balances sustainable development with a strong commitment to climate action. This can only be achieved with international cooperation and support on technology and finance.

India is working on its third NDC update. It should be noted that India is one of the largest economies that is on track to achieve its 2030 commitments. **Table 1** presents the list of main targets in the past ten years (IND 2015[9], NDC 2022[10], NC 2024[11], ES 2025[6]).

Figure 1. India's GHG emissions by sectors



Source: India's Bur-1, BUR-2, BUR-3 & BUR- 4.

LOW-EMISSIONS LONG TERM STRATEGIES (LTS)

India submitted its LT-LEDS to the UNFCCC in 2022 at COP27 as a follow-up to the Glasgow declaration. India's long-term strategies document aims to achieve a low-carbon transition while balancing its development needs. It is built on ambitious social, economic, environmental, and technological goals to transform the economy structurally. To become Aatma Nirbhar Bharat (Self-Reliant India), the document systematically outlines the current policies and accelerated action required in electricity, industry

6 Ministry of Finance, Government of India. (2025). *Economic Survey 2024-25*. Retrieved from https://www.indiabudget.gov.in/economicsurvey/

7 MoEFCC. (2015). *India's intended Nationally Determined Contribution: Working towards climate justice.* http://www4.unfccc.int/submissions/INDC/Published Documents/India/1/INDIA INDC TO UNFCCC.pdf

8 MoEFCC. (2022). *India's Updated First Nationally Determined Contribution Under Paris Agreement*. Ministry of Environment, Forest and Climate Change, Government of India.

9 Ministry of Environment, Forest and Climate Change, Government of India. (2015). India's Intended Nationally Determined Contribution: Working towards climate justice and sustainability. United Nations Framework Convention on Climate Change. https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/India%20First/INDIA%20INDC%20TO%20UNFCCC.pdf

10 Ministry of Environment, Forest and Climate Change, Government of India. (2022). Updating India's First Nationally Determined Contribution pursuant to decision 1/CP.21 (Paris Agreement). United Nations Framework Convention on Climate Change. https://unfccc.int/sites/default/files/NDC/2022-08/India%20Updated%20First%20NDC.pdf

11 Ministry of Environment, Forest and Climate Change, Government of India. (2023). Third National Communication to the United Nations Framework Convention on Climate Change. United Nations Framework Convention on Climate Change. https://unfccc.int/documents/637380

Table 1. Tracking India's targets and commitments under the Paris Agreement

Targets by 2030	INDC (First NDC) (2015)	Updated NDC (2022)	Status as of Nov. 2024	Comments
Emissions intensity reduction of GDP (from 2005 level)	33-35%	45% [NDC 3 updated]	36% in 2020 from the 2005 level (BUR-4)	On track
Share of non-fossil fuel electric power capacity (from 2005 level)	40%	50% [NDC 4 updated]	50.1% of the total non-fossil fuel power capacity achieved as of July 2025[1]	Achieved
Additional carbon sink (billion tonnes of CO_2 equivalent) ($BtCO_2e$)	2.5-3 $BtCO_2e$	2.5-3 $BtCO_2e$ [NDC 5, no update]	Additional carbon sink of 2.29 $BtCO_2e$ created in 2021	On track
Net Zero by 2070 target	Not applicable	Not in NDC	Mentioned in LT-LEDS 2022. Net Zero to be achieved by 2070.	The document is not clear if the NZ includes or excludes non-CO_2 emissions.
Lifestyle for Environment (LiFE)	NDC Goal 1	First goal of the updated NDC [NDC1 goal modified and promoted as global mass movement]	Encourage energy saving measures such as using LED lights, setting AC temperatures to 24-26°C keeping electronic devices in energy-saving mode, utilizing smart switches for frequently used appliances, etc[2].	Reflects principle of climate justice. Mindful production and consumption. Pro circular economy. Yield co-benefits in reduced air pollution and improved health.
Adaptation component	NDC Goal 6	Adaptation is actively promoted with multifaceted approach.	Adaptation Communication submitted to UNFCCC. National Adaptation Plan is under preparation	Aligns with sustainable development and climate resilience across regions.
Mobilization of funds	NDC 7	Remains same	Around US$ 4.5 trillion worth of investments is required by India till 2040 to develop infrastructure, to improve economic growth and community wellbeing[3]	Aligned with article 4.4 of the UNFCCC
Building capacities [national and international cooperation]	NDC 8	Remains same	Fostering innovation and collaboration in the field of climate technology, integrate advanced solutions, promote R & D for future technology, etc.	Aligned with article 4.5 of the UNFCCC

1 Press Information Bureau (PIB). (2025, July 14). *India's Renewable Rise: Non-Fossil Sources Now Power Half the Nation's Grid.* https://www.pib.gov.in/PressReleasePage.aspx?PRID=2144627
2 LiFE Life style for Environment (2022). https://www.niti.gov.in/sites/default/files/2023-02/Brochure-10-pages-op-2-print-file-20102022.pdf
3 Ministry of Finance, Government of India. (2018). Economic Survey 2017-18. Retrieved from https://www.indiabudget.gov.in/economicsurvey/

(energy-intensive and light industries), transport (passenger and freight), buildings (residential and commercial), agriculture, and the forestry sector[12].

India's LT-LEDS highlights the importance of energy in meeting the nation's development needs and aspirations to support its demographic shifts from rural to urban areas and the resulting need for infrastructure. Hence, the strategy focuses on key areas such as the decarbonization of the energy sector, sustainable urbanization, and building climate resilience. India continues its efforts to decouple its emissions from economic growth by promoting low-carbon development in every sector. LT-LEDS acts as a master document that links various ongoing and planned initiatives across sectors. For example, it frames the National Green Hydrogen Mission, the Production Linked Incentive (PLI) scheme for EVs, and the National Clean Air Programme as integral parts of India's long-term climate strategy. Mindful of the tradeoffs and related costs, India has recognized the co-benefits of integrating climate action in its development pathways, considering its national circumstances[13].

India's LT-LEDS is based upon an economy-wide multiple objectives approach, including integrating dimensions of gender equity and inclusion of marginalized and vulnerable groups, that consciously seeks to move to a low-carbon development path. It is one of the LTS documents that is also closely aligned with its NDC targets. It also emphasizes on the 'Mission LiFE' which focuses on three main changes, i.e., change in demand, supply, and policy through a comprehensive approach, and contributes directly and indirectly to almost all SDGs. Mission LiFE lists a broad and non-exhaustive list of 75 individual LiFE actions across 7 main categories (energy saved, water saved, reduced consumption of single use plastic, adopting sustainable food systems, reduction of waste, adoption of healthy lifestyles and reduction of e-waste). These were identified such that most actions are: 1) Specific and measurable, 2) Easy to practice by individuals, communities and institutions with minimal supply-side dependencies, and 3) Non-disruptive to ongoing economic activity[14],[15].

Reaching this goal will necessitate cost-effective and sustainable investment options. There are several estimates with a wide range for the financing needs of achieving India's net zero targets. As per the first NDC, India would require investments worth almost USD 170 billion per year between 2015 and 2030 – a total of USD 2.5 trillion.[16] For a net-zero 2070, India would require approximately USD 10.1 trillion as per an IFC estimate[17] while an assessment by CEEW from 2021 also puts total investment needs at USD 10.1 trillion between 2020 and 2070 for achieving the net zero target[18]. An assessment by IEA puts the investment needs at an average of USD 160 billion per year between 2022 and 2030 in India's energy sector[19]. A Moody's-ICRA assessment report from February 2025 pegs the need for investment in the power sector alone at USD 53 billion to USD 76 billion until 2035[20].

WHAT HAS PARIS AGREEMENT TRIGGERED IN INDIA? – PROGRESS ACROSS NATIONAL TRANSITIONS

Even though it is a developing country, India has played an active role and made significant prog-

12 MoEFCC - Ministry of Environment, Forest and Climate Change, Government of India. (2022). *India's Long-Term Low-Carbon Development Strategy*. Retrieved from https://unfccc.int/documents/623511

13 Ministry of Finance, Economic survey 2017-18

14 MoEFCC - Ministry of Environment, Forest and Climate Change, Government of India. (2022). *India's Long-Term Low-Carbon Development Strategy*. Retrieved from https://unfccc.int/documents/623511

15 LiFE Life style for Environment (2022). https://www.niti.gov.in/sites/default/files/2023-02/Brochure-10-pages-op-2-print-file-20102022.pdf

16 Vishwanathan, S.S., and Garg, A. (2020). Energy system transformation to meet INDC, 2°C and well below 2°C targets for India Climatic Change.

17 IFC, 2023. Blended Finance for Climate Investments in India. Available at: https://www.ifc.org/en/insights-reports/2023/blended-finance-for-climate-investments-in-india

18 CEEW, 2021. "Investment Sizing India's 2070 Net-Zero Target". Available at: CEEW-CEF-Investment-Sizing-India's-2070-Net-Zero-Target.pdf

19 IEA, 2022. "India's clean energy transition is rapidly underway, benefiting the entire world"

Available at: https://www.iea.org/commentaries/india-s-clean-energy-transition-is-rapidly-underway-benefiting-the-entire-world

20 Moody's, 2025. https://www.icra.in/CommonService/OpenMediaS3?Key=b8af5de7-ceb3-4030-806d-7f2557c6255f

ress toward its climate commitments since the Paris Agreement. The national transitions unlike many countries need to encompass energy security, energy access, energy affordability in addition to its development priorities and climate ambitions related to GHG mitigation, resilience to climate impacts and adaptation actions. The Indian Government has introduced/implemented more than 650 policies across the national, state and sectoral levels since 2015 to till date. This section describes transitions that have been initiated in the past decade. This includes energy transitions for sectors such as power (including coal), and industry (steel). The section discusses selected policy, technology, finance, and governance aspects at the national and subnational levels that have enabled the transition and/or the discourse around them. We also discuss Impacts, vulnerability, and adaptation here.

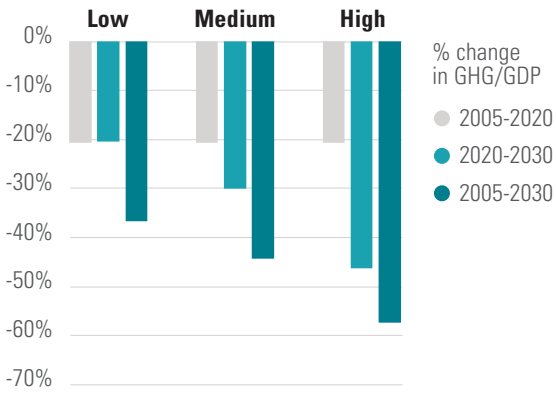
Energy Transitions

Power Sector

Fossil fuels dominate India's current primary energy mix. The share of coal in total primary energy supply (TPES) stood at 60.21%, followed by crude oil at 29.83% and natural gas at 6.99% in 2023-24[21]. Over the past decade, the share of renewable energy sources has consistently increased - 17,682 ktoe during 2014-15 to 31,847 ktoe by 2023-24. While final energy consumption has also experienced a rise of almost 38% in the past decade, the GHG emissions from the energy sector have not followed a similar trajectory. India's current climate commitments like the NDC and LTS, coupled with the existing development and economic policies, have contributed to the decoupling of economic growth and emissions and led to decarbonization of the economy in the past decade. **Figure 2** presents an assessment of the decoupling under various growth scenarios.

The share of electricity in India's final energy consumption stood at 19% in 2023[22]. The power sector in India has been growing significantly in the past decade. The total installed capacity increased from 305 GW in 2015-16 to 475 GW by 2024-25, leading to an increase in electricity generation from 1168 billion units to 1824 billion units in the same period[23]. The per capita electricity consumption also observed a proportional rise from 957 kWh in 2013-14 to 1395 kWh in 2023-24[24]. While India is rapidly expanding its renewable energy capacity and has reached the NDC target of achieving 50% installed capacity of electricity generation from non-fossil sources in 2025 (5 years ahead of the 2030 target)[25], coal-based thermal power will continue to play a crucial role. Projections indicate it will account for 55% of the power mix by 2030, before its

Figure 2. Decoupling energy and emissions in India



Source: Garg et al (2024).

21 Ministry of Statistics and Programme Implementation, Government of India. (2025). *Energy Statistics India 2025*. https://mospi.gov.in/sites/default/files/publication_reports/Energy_Statistics_2025/Energy%20Statistics%20India%202025_27032025.pdf

22 International Energy Agency. (2025). *Electricity*. https://www.iea.org/countries/india/electricity

23 Central Electricity Authority. (2025). Installed Capacity Report March 2025. Retrieved from https://cea.nic.in/wp-content/uploads/installed/2025/03/IC_March_2025_allocation_wise.pdf

24 Ministry of Power. (2025, January 1). *Year End Review - 2024*. Press Information Bureau (PIB), Government of India. https://pib.gov.in/PressReleasePage.aspx?PRID=2089243

25 Press Information Bureau, Government of India. (2025, July 14). India's Renewable Rise: Non-Fossil Sources Now Power Half the Nation's Grid. Retrieved from https://www.pib.gov.in/PressReleasePage.aspx?PRID=2144627#:~:text=by%20PIB%20Delhi-,India%20has%20achieved%20a%20landmark%20in%20its%20energy%20transition%20journey,Prime%20Minister%20Shri%20Narendra%20Modi

share decreases to 27% by 2047[26]. As of June 2025, the share of installed capacity of coal-based power plants in India stood at almost 44%[27]. Hence, coal is here to stay as the backbone of India's economy until at least the next two decades[28,29,30].

Coal transitions require a large-scale transformation of the Indian economic systems, energy mix, labor markets, and production processes. In the past few years, due to the international commitments (Glasgow Pact 2021) to phase down fossil fuels, there has been an active debate at the national and subnational levels to transition away from coal. The Government of India set up an inter-ministerial committee on just transitions from coal at the national level as part of the India-U.S. Strategic Clean Energy Partnership. Formed in 2021 and chaired by the Ministry of Coal, the committee consisted of representation from Indian Bureau of Mines, Central Electricity Authority, Coal India Ltd., NITI Aayog , and civil society organization, academician, and counterparts from the US. The committee's report, which was finalized in 2023, has proposed a framework and a roadmap, focused on human-centric approach for energy transitions, assessing the stranded assets, alignment with national policies, regional diversification, local adaptation, and community engagement[31]. The report's recommendations are being integrated into existing policy and regulatory mechanisms. One outcome that cane be attributed to the report is the establishment of a Sustainability & Just Transition Division within the Ministry of Coal. Jharkhand, the coal producing state was the first to establish Task Force on Sustainable Just Transition to focus on development framework to transit away from coal[32].

There have also been some noteworthy advancements in making coal use more efficient and less polluting. India has promoted supercritical and ultra-supercritical thermal power plants, which operate at higher efficiencies and produce fewer emissions per unit of electricity generated. The government has also encouraged biomass co-firing especially utilizing agricultural waste.

India updated its Energy Conservation Act in 2022 to support its climate pledges, known as 'Panchamrit,' made under its revised Nationally Determined Contribution. The amendments aim to boost energy efficiency, accelerate the reduction of carbon emissions, and promote sustainable development. Other key features included developing a carbon credit market to incentivize emission reductions, mandatory use of non-fossil fuels in emission-intensive industry, a penalty for not meeting the requirements of non-fossil fuel share, the energy conservation building code for residential and commercial buildings, and introducing energy codes for vehicles and ships[33]. The electricity sector has already implemented several policies that have induced a shift towards low-carbon electricity generation. These measures include: a) phasing out of old, inefficient power plants and replacement with new supercritical plants with higher efficiency, b) adjusting the power market design to integrate renewables and thermal power generation more efficiently, and c) removing existing barriers to the achieving India's current renewable energy goals in the power sector[34].

India has made substantial progress in pushing renewables, which is evident from achieving the

26 Ministry of Coal, Government of India. (2024, February 26). Economic significance of the Coal Sector Extends Beyond Energy Production. Press Information Bureau. Retrieved from https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=2009196#:~:text=in%3A%20Urdu%20%2C%20Hindi-,Ministry%20of%20Coal,7%3A05PM%20by%20PIB%20Delhi

27 Central Electricity Authority. (2025). Installed capacity report June 2025. Retrieved from https://cea.nic.in/wp-content/uploads/installed/2025/06/IC_June_2025_allocation_wise.pdf

28 Garg A., Patange, O., Vishwanathan S.S., Nag, T., Singh, U., and Avashia V., (2024). Synchronizing energy transitions toward possible Net Zero for India: Affordable and clean energy for all. Retrieved from ESN Report-2024_New-21032024.pdf

29 1. Vishwanathan,S.S., Bataille, C., Nogueira, E.,Cunha, S., Rovere, E., Wrs, U., Patange, O., Garg, A., McCall, B., Trillop, H.,Burton, J.,and Gunfaus, M. (2025,Accepted). Power Sector Transformation in emerging economies. Climate Policy.

30 Singh, U., Vishwanathan, S.S., Garg, A, Singh, A. K., Iyer, S.H. (2025). Socio-technical feasibility of coal transitions in India: Results from stakeholder interviews, Energy and Climate Change, 6 (100188).

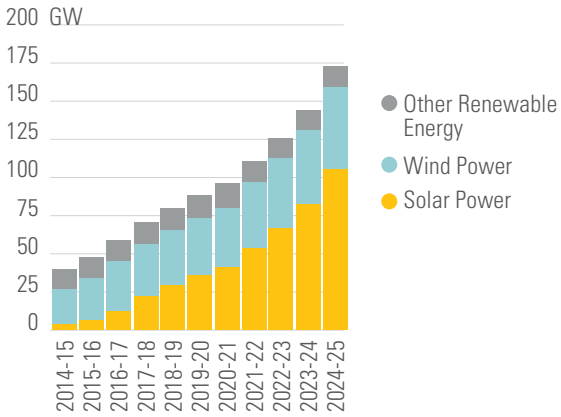
31 NITI Aayog, Government of India. (2023). Report of the Committee on Just Transition. Retrieved from https://www.niti.gov.in/sites/default/files/2023-02/Report_Just-Transition-Committee_compressed.pdf

32 https://www.justtransition-jharkhand.in/about-us/

33 Government of India. (2022). The Energy Conservation (Amendment) Act, 2022.

34 Vishwanathan,S.S., Bataille, C., Nogueira, E.,Cunha, S., Rovere, E., Wrs, U., Patange, O., Garg, A., McCall, B., Trillop, H.,Burton, J.,and Gunfaus, M. (2025,Accepted). Power Sector Transformation in emerging economies. Climate Policy.

Figure 3. Growth of renewable energy in India



Source: Garg et al (2024).

NDC target of 50% of its installed electricity capacity from non-fossil sources five years ahead of its 2030 timeline. The renewable energy capacity increased from 76 GW in 2014 to 227 GW in 2025. **Figure 3** describes the growth in renewable energy capacity in India over the past decade. This renewable energy penetration was possible as India has implemented more than 230 national and sub-national policies, measures and programs over the past decade to accelerate the clean transition from renewable energy sources. These include the PLI scheme (financial) to boost domestic manufacturing of solar PV modules, Solar Park scheme with capacities of more than 500 MW to facilitate rapid deployment of solar power, Wind re-powering policy to replace less efficient wind turbines with newer, more efficient ones, Wind Solar hybrid policy, National offshore wind energy policy and several others. The key feature of development of solar park policy includes setting up of solar projects by project developers with suitable developed land with all clearances, transmission system, water access, road connectivity, communication network, etc. It also facilitates and accelerates the installation of grid-connected solar projects for large scale generation with financial assistance of up to 2 million INR per MW (~$22555.00 at current exchange rate) or 30% of the project cost. Solar Parks are developed in collaboration with the state governments and their agencies, central public sector undertakings, and private entrepreneurs. Approved solar parks (total capacity ~38 GW) across 12 states are at various stages of implementation in India as on June 2023.[35].

Garg et al. (2024) emphasized the role of nuclear as an alternative to decarbonize India's power generation sector by the baseload power required to complement the intermittency of renewables and provide grid stability along with existing hydropower. Nuclear is also one of cost-effective sources of electricity and can compete with renewables in the medium to long-term horizon The government has set a goal of expanding the nuclear capacity from 8 GW (2024) to 22.5 GW in 2032 and 100 GW in 2047 (PIB 2025)[36]. The Union Budget introduced Nuclear Energy Mission to accelerate the deployment of small modular reactors (SMRs) to expand the nuclear role in the decarbonization of industries6.

A successful renewable energy transition requires a multifaceted approach that goes beyond simply installing solar panels and wind turbines. Energy storage is important for large-scale deployment and grid integration of variable renewable energy sources like solar and wind. Although pumped hydro storage is the dominant technology for energy storage right now, Battery energy storage system (BESS) is catching up due to falling costs, suitable characteristics, and scalability of battery technologies[37] . Further, to promote the use of battery storage systems, the Government of India has put some initiatives in place. The Ministry of Power introduced Energy Storage Obligation in July 2022 as a regulatory mechanism for utilities and power distribution companies to gradually increase their energy storage capacity, rising from 1% in 2023-24 to 4% by 2029-30. The PLI scheme includes finances to promote domestic manufacturing of batteries. A policy to waive off

35 https://mnre.gov.in/en/development-of-solar-parks-and-ultra-mega-solar-power-projects/

36 Source: Press Information Bureau (PIB). (2025, August 7). Nuclear Power in Union Budget 2025-26. https://www.pib.gov.in/PressNoteDetails.aspx?NoteId=153709&ModuleId=3#:~:text=The%20government%20has%20allocated%20%E2%82%B9,and%20operational%20SMRs%20by%202033.

37 Garg, A., Singh, U., Patange, O., Jain, S. K., Maheshwari, J., Nag, T., Avashia, V., Vishwanathan, S. S., & Singh, A. K. (2023). *Financing needs for new age critical clean energy technologies: Battery energy storage (BES)*. Indian Institute of Management Ahmedabad.

inter-state transmission system charges has also been put in place to incentivize BESS projects in 2025.

The renewable energy ecosystem and BESS expansion need the underpinning of the availability and access of critical minerals. Over the past decade, the discourse on critical minerals has come to the forefront due to the push for clean-energy and high-tech goods manufacturing. Since India is dependent on imports, strategies to ensure resilient supply chains are being put in motion. In 2023, a committee from the Ministry of Mines identified 30 critical minerals essential for India's economic development and national security. Further, Mines and Minerals (Development and Regulation) Act Amendments (2023) de-listed six minerals, including lithium and beryllium, from the list of "atomic minerals," thereby allowing private sector participation in their exploration and mining. There has also been an emphasis on domestic exploration and resource augmentation. In 2024, National Critical Mineral Mission (NCMM) outlined the targets for domestic and foreign sourcing of minerals. Further, there have been customs duty cuts on mineral imports to encourage domestic processing.

With the increase in energy demand as India develops and the increasing share of renewable energy in the power sector, evacuation infrastructure and transmissions lines become critical. Over the past decade, India has expanded and strengthened its gird infrastructure. An inter-state Transmission system is also being put in place. The average technical and commercial losses at the national level have reduced from 23% to 16% in the past decade. This has been made possible through the policy support from initiatives like the Ujjwal DISCOM Yojana, Revamped Distribution Sector Scheme and Re-structured Accelerated Power Development and Reforms Programme. The target is to further reduce these losses to 10-12%.

Bioenergy is another element of India's energy transition story that the Government of India has been pushing since 2018 to move towards cleaner energy systems along with renewables and hydrogen. All forms of bioenergy are being promoted - Solid biofuels (biomass) is burned for production of electricity and heat as co-firing thus replacing coal to a certain extent in India. Biogas generated from livestock waste, wastewater treatment, landfill gas capture and processing of industrial and municipal wastes now has a mandatory blending mandate with natural gas in a phased manner for natural gas supplied for transportation and domestic uses. Liquid biofuels - ethanol and biodiesel are under a blending mandate. ethanol blended petrol programme-was launched in India in 2003. However, the big push for the programme came in 2018 through the National Biofuel Policy. The ethanol blending rates in petrol increased from 1.5% in 2014 to 20% in 2025. This was achieved 5 years ahead of initial target for 2030. The new aim is to reach E27 (27% blending of ethanol in petrol) by 2030. Going bullish on sugarcane based ethanol production has its limitations and socio-economic and environmental impacts. Thus, the government is pushing grain-based ethanol production capacity augmentation.

The role of green hydrogen is deemed indispensable for enabling the developmental and low-carbon transitions that India envisions. Thus, the Government of India has expressed its commitment to transitioning towards a clean hydrogen economy through the National Green Hydrogen Mission announced in January 2023. The mission aims to develop a green hydrogen production capacity of at least 5 MMT (Million Metric Tonne) per annum. The overarching objective of the Mission is to make India the Global Hub for production, usage and export of Green Hydrogen and its derivatives. One of the key tenets of the mission is the allocation of Rs 17,490 crore (~USD 1.98 Billion) under Strategic Interventions for Green Hydrogen Transition (SIGHT) programme, which will be distributed through a Production-Linked Incentive (PLI) scheme for manufacturing electrolysers and production of green hydrogen[38]. The Ministry of New & Renewable Energy has defined Green Hydrogen as having a well-to-gate emission (i.e., including water treatment, electrolysis, gas purification,

38 https://mnre.gov.in/en/national-green-hydrogen-mission/

drying and compression of hydrogen) of not more than 2 kg CO_2e/kg H_2[39]. India's Green Hydrogen Roadmap presents a clear vision for transitioning towards a hydrogen-powered economy through a combination of policy movement and business interests to accelerate the deployment of green hydrogen projects and drive innovation in the sector.

Transport Sector

Battery technologies are also vital in driving transitions in the transport sector. The shift to electric vehicles (EVs) is one of the critical elements of transport sector transition along with other policies such as promotion of alternative fuels like biofuels and green hydrogen. The government has set aggressive targets for EV adoption, aiming for EVs to make up 30% of private car sales, 70% of commercial vehicle sales, and 80% of two- and three-wheeler sales by 2030[40]. Key policies to promote and incentivize the purchase of electric vehicles by offering financial subsidies include Faster Adoption and Manufacturing of Hybrid & Electric Vehicles (FAME) since 2015 i.e. FAME Phase I (2015), FAME Phase II (2019), PM E-DRIVE Scheme (FAME III in 2024). About 1.47 million electric two wheelers (e-2W), 0.18 million e-3W and 0.023 million e-4W have been sold under FAME (Phase I & II) policy with offered financial incentives of 68250 million INR as on 17th September 2025[41]. While EV sales are growing, particularly in the two- and three-wheeler segments (due to PM E-DRIVE scheme), challenges such as high upfront costs and a lack of charging infrastructure remain. Beyond the fuel, modal shift especially in freight and urban transport is a strategy that Government of India is promoting. India aims to increase the modal share of railways in freight transport from the current ~36% to 45% by 2030. PM Gati Shakti (power of speed) National Master Plan, National Logistics Policy Inland Waterways policies are some initiatives undertaken to increase the share of railways and waterways in freight transport. One prominent infrastructure project that enabled the modal shift to railways is the Dedicated Freight Corridor (DFC). DFC, freight transport policy started in 2006, aims to develop the freight corridors to decongest already saturated road network and promote shifting of freight transport to more efficient rail transport and would save more than 450 Mt-CO_2 in first 30 years of operation. More than 96% of total length (2843 KMs) of DFC has been commissioned with about 93% of financial progress till date and remaining DFC length will be commissioned by December 2025 [42],[43].

Building Sector

Various energy efficiency policies and demand side management (DSM) measures have been initiated and implemented at national and sub-national level to decarbonize building sector in India. Some of these key policies/measures include energy efficiency labeling program called 'Standards & Labeling' program (regulatory program for about 34 end-use appliances since 2006), Building codes to improve energy efficiency in residential buildings (ECO Niwas Samhita 2018, updated in 2021 & 2024) and commercial buildings (Energy Conservation Building Code-2017 in new commercial buildings, Energy Conservation and Sustainable Building Code-2024 for commercial and office buildings), Star Rating of Commercial Buildings-2009 to benchmark the energy usage (kWh/sqm/year) for commercial building[44], 'Building Energy Efficiency Programme-2017' to reduce energy consumption and costs in public/commercial buildings through energy-efficient retrofitting of lights, AC, ceiling fans, and implementing smart energy management systems[45], promoting use of energy efficient LED lighting (lamps and tubelights) in building sector through 'Unnat Jyoti

39 https://www.pib.gov.in/PressReleaseIframePage.aspx-?PRID=1950421
40 https://economictimes.indiatimes.com/industry/renewables/india-aims-for-30-percent-of-all-vehicle-sales-to-be-electric-by-2030-care-edge-ratings/articleshow/108746707.cms?from=mdr
41 https://fame2.heavyindustries.gov.in/dashboard.aspx
42 https://dfccil.com/Home/ProgressStatusImage
43 https://dfccil.com/Home/DynemicPages?MenuId=3
44 https://beeindia.gov.in/star-rating-for-buildings.php#en/programmes
45 https://eeslindia.org/en/building-energy/

by Affordable LEDs to All' since 2015[46], 'Energy Efficient Fan Programme-2023' to promote the use of energy efficient fans, 'Street Lighting National Programme-2015' to improve public lighting infrastructure across India by replacing conventional streetlights with energy efficient LED streetlights[47].

Industry (Steel)

Industry is a hard to abate sector for India, however the major energy intensive sector like steel, cement, chemicals have been actively discussing sub sectoral measures with either a firm level goal to achieve net zero (SBTi 2025) and/or targets to assist with India achieve its Net Zero 2070 mission. The steel sector in India was driven by energy efficiency mandates since the Government of India had introduced the Perform, Achieve and Trade (PAT) scheme in 2012. However, over the past decade, it has moved to a more comprehensive approach towards climate action. Large steel sector players have committed to net-zero goals. In the annual sustainability disclosures, mandated by the market regulator, 6 large firms indicated a net-zero target independently or as a part of the Science Based Target initiative (SBYi). The union budget 2025 introduced the Green Steel Mission to decarbonize India's steel industry with the mission to make it competitive at the global level. It proposes integration with enewable energy policy, a green hydrogen mission, and mainstreaming the steel scrap industry to promote a circular economy. In December 2024, India came out with a Green Steel Taxonomy becoming the first country to define 'green steel' based on the carbon intensity of steel. The government and industry are exploring options in green hydrogen, carbon capture, utilization and storage (CCUS) and use of biochar.

Adaptation

India is preparing its National Adaptation Plan (NAP) to be submitted to the UNFCCC as outlined in the outcomes of the 1st Global Stocktake (GST) of the Paris Agreement. In December 2023, as a part of its Third National Communication, India submitted its Adaptation Communication to the UNFCCC, a key mechanism under the Paris Agreement that provides countries a platform to share their efforts, priorities, and needs related to adapting to climate change. The adaptation communication describes the adaptation efforts in critical sectors such as agriculture, water management, forestry, and disaster risk reduction. While India's LT-LEDS is focused on mitigation, it also integrates adaptation into its framework, particularly in urban development, with a focus on sustainable urbanization, energy, and material efficiency in buildings. Over the past decade, the adaptation strategies in India have also evolved. Instead of a single national plan, now there are more specific, local, and sector-focused approaches to build resilience in areas like farming, water, and urban development. Beyond the National Action Plan on Climate Change (NAPCC) launched in 2008, in the case of adaptation planning, the State Action Plans on Climate Change (SAPCCs) are also a critical contributor in tailoring national priorities to regional vulnerabilities and local contexts.

Urban Heat

Adaptation isn't just a top-down effort but bottom-up initiatives also influence the discourse. A good example is the Heat Action Plans (HAPs). It was originally a new local initiative by the Ahmedabad city, launched in 2013 after a devastating heatwave in 2010 that led to over 1,300 deaths. As the initiative started showing tangible success, it started getting adopted by other cities and states, serving as a blueprint and developed into a wide-spread, multi-level policy tool. It demonstrated to the national policy makers that long-term resilience requires integrating public health, urban planning, and climate science. Local HAPs influenced the National Disaster Management Authority (NDMA) to create a national framework for heatwave management. By adopting lessons from these local initiatives, the NDMA's guidelines now prioritize proactive, multi-sectoral strategies, showing how grassroots efforts can drive significant national policy changes. The

46 http://ujala.gov.in/documents/about-ujala.pdf
47 https://eeslindia.org/en/ourslnp/

HAPs are also an example of evolving adaptation-related governance in India. This has been instrumental in shifting the national discourse from a reactive, disaster-centric approach to one of proactive climate adaptation.

Agriculture Sector

India has been promoting sustainable agriculture practices for sustainable transition in agriculture sector via National Mission on Sustainable Agriculture (NMSA) in 2010 through various adaptation measures focusing on Improved crop seeds, livestock and fish cultures, water use efficiency, pest management, improved farm practices, soil and nutrient management, agricultural insurance, credit support, markets, access to information and livelihood diversification, etc. NMSA also targets to promoting location specific improved agronomic practices through soil health management, enhanced water use efficiency, wise use of chemicals, crop diversification, progressive adoption of crop-livestock farming systems and integrated approaches like crop-sericulture, agro-forestry, fish farming, etc [48]. Other key polices/measures in agriculture sector include National Policy on Agriculture 2000, National Project on Organic Farming 2010, National Project on Management of Soil Health & Fertility 2007, Neem Coated Urea application 2004 (higher use efficiency and lower loss of nitrogen due to inhibition of nitrification process in soil), Crop Diversification Programme 2014, Direct Seeded Rice 2014 (Water conservation, reduction in production costs and emissions), etc.

Climate finance

Climate Policy Initiative (CPI) has been tracking the green financial flows. Their "Landscape of Green Finance in India 2024" report states that mitigation finance flow in India reached a total of USD 57.3 billion in 2021/22 from USD 15 billion in 2016/17, growing at a rate of 20% between 2019/21 and 2021/22 despite of COVID-19 impacts[49]. Around 34% came from public sources in 2019/21 as compared to 29% in 2017/18. The adaptation-related financial flows have also increased by almost 3 times between 2019/20 and 2021/22. 98% of the USD 14.7 billion (total finance flow) for adaptation in 2021/22 came for state and central government budgets. These trends show that there has been progress in India on the climate finance aspects in past decade and steps have been taken to strengthen the climate finance framework.

A large share of India's climate finance flows is publicly funded. The Union budget 2023–24 allocated almost USD 4.2 billion for the energy transition and steps toward Net Zero emissions by 2070. The governments have introduced several policies specifically in energy and transport sectors to push a transition towards low-carbon future. A portfolio of policies for renewable energy push include the budgetary allocations on the National Solar Mission and its schemes and programmes like the PM Surya Ghar- Muft Bijli Yojana -2024 (residential solar roof-top scheme to light up 10 million households), Grid Connected Rooftop Solar Programme, PM-KUSUM Scheme-2019 (solar agricultural pump-sets and grid-connected solar power plants for farmers), and Development of Solar Parks (40 GW by 2026) and Ultra Mega Solar Power Projects-2014. National Biofuels policy and waste to energy programmes also contribute towards the transition away from fossil fuels. National Green Hydrogen Mission has also come into play. In its 2025-26 budget, the Government of India has also made financial allocations to the nuclear energy development[50].

National Clean Energy and Environment Fund (NCEEF) replaced the National Clean Energy Fund (NCEF) that was established using a cess on coal to finance and advance clean energy initiatives, support research in clean energy. The change aligned the fund with India's larger environmental aspirations (like waste management and river cleaning) beyond just energy and is serving as an extra-budgetary resource for environmental and clean energy initiatives. The National Adaptation Fund for Climate Change

48 https://nmsa.dac.gov.in/

49 CPI, 2024. "Landscape of Green Finance in India 2024". Available at https://www.climatepolicyinitiative.org/publication/landscape-of-green-finance-in-india-2024/

50 https://www.indiabudget.gov.in/doc/bh1.pdf

(NAFCC) in India, was established in 2015 to provides financial assistance to states and union territories vulnerable to climate change's adverse effects. There have also been efforts on piloting Climate Budget Tagging (CBT) initiatives at state level (e.g. Orisa, Meghalaya) and city level (e.g. Mumbai, Indore) for tracking the investments going towards climate change mitigation and adaptation. This indicates the increasing awareness and integration and mainstreaming of climate finance and governance across various tiers (center, state, local). However, there is no formal national-level framework yet. Putting in a finalized climate finance taxonomy will provide a standardized system to define and classify green activities, which will be a significant step toward a formal national climate budget tagging system.
For stimulating the wind energy sector, a viability gap funding scheme was introduced to develop offshore wind projects in Tamil Nadu and Gujarat. Investments have also been budgeted for setting up infrastructure for e.g. Green Energy Corridor Scheme, Ultra Mega Renewable Energy Parks, Waiver of Inter State Transmission System charges, Viability Gap funding for battery energy storage systems (BESS), and PLI scheme for manufacturing of solar PV and batteries.
IEven with significant domestic public funding, private investment is crucial for climate action given the financial requirements. For attracting private investments, the climate finance should align with the how financial markets operate. Since private investors tend to avoid risk, they seek higher returns to compensate for any added risk they take on. When a project involves multiple risks, investors expect even greater returns, and the mere uncertainty around those risks can deter investment altogether. Hence, the Government of India has taken steps to instill confidence of private investors. The efforts have been in place for developing a market for Green bonds, and the Reserve Bank of India (RBI) has created a framework for the same. Several public and private entities like State Bank of India, National Thermal Power Corporation, and REC) have been actively issuing green bonds since 2016. With Ministry of Finance, the MoEFCC has worked on initiatives such as the issuance of Sovereign Green Bonds. The RBI issued a sovereign green bond worth almost USD 2 billion in 2023 earmarked for clean energy, transport and sustainable agriculture. This helps expand and strengthen India's green bond market, drawing in more private companies and investors. India is also actively pushing blended finance models. They use public or concessional capital—like grants, low-cost loans, first-loss capital, or guarantees—to make projects less risky. This strategy is designed to attract a much larger pool of private investment.
Further India is preparing to put a carbon market in place through the carbon credit trading scheme (CCTS), the framework for which is evolving.
India has been progressively strengthening its sustainability disclosure ecosystem. Transparency is a critical element in preventing greenwashing and attracting private investors. In 2021-22, India's market regulator, Securities Exchange Board of India (SEBI), launched the Business Responsibility and Sustainability Report (BRSR), a disclosure framework mandatory for top 1000 listed companies. The RBI issued a "Disclosure framework on climate-related financial risks, 2024," which emphasized on climate risk assessments, green lending frameworks, and potential stress testing for banks. It is aligned with similar international frameworks like the EU CSRD, the US SEC's climate disclosure rules, the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD), and IFRS S2 (Climate-related Disclosures), thereby enhancing the competitiveness and resilience of India's financial sector[51].In 2025, India introduced a draft Climate Finance Taxonomy to guide and standardize green investment, prevent greenwashing and align capital flows with national goals. The taxonomy supports mitigation, adaption and transitions of hard-to-abate sectors.

51 Advancing ESG: India's New Disclosure Frameworks by RBI and SEBI, accessed on May 22, 2025, https://www.nishithdesai.com/fileadmin/user_upload/Html/Hotline/Yes_Governance_Matters_June0424-M.html

STILL A LONG ROAD AHEAD

Energy Transitions

Power Sector

Coal transitions is and will remain one of the toughest policy measures to be implemented in India. This is because coal remains the cheapest, most convenient domestic source of energy that provides energy security at affordable prices and accessible to all at 24X7. It is most difficult where the revenue generation at subnational and local level cross-subsidies development policies. Without diversification of economy, reskilling policies, safety net for livelihoods, it will be really tough for states to transform to newer systems. Energy transitions in India would need to prioritize equity and justice in its role as a major Global South economy. Energy transitions require a large amount of financing. Coal sector contributes over USD 7.94 billion annually to the central and state governments through royalties, GST, and other levies. Additionally, it contributions to the District Mineral Fund, National Mineral Exploration Trust, and GST. The revenue generated bolster government finances, supporting socio-economic and infrastructure development initiatives. Energy transitions will affect the fiscal and economic losses (revenue from mining and power sector). Furthermore, it will induce loss of employment (direct and indirect), and socio-economic loss in communities. Each state's ability to diversify its economy, power mix through understanding its resource availability in addition to state government's governance capacity and the management of the state finances will play a crucial role. Energy systems mitigation with CO_2 capture, utilization and storage (CCUS) will be increasingly important over the next three decades as unabated fossil fuel use would look incompatible with global 1.5/2°C targets of the Paris accord. CCUS is expected to be a key part of the future clean energy investments globally in scenarios where the end-of-century temperature rise is limited to 1.5°C. If India continues to rely on coal, it will be essential to invest in CCUS infrastructure and technology. Currently, only the enhanced Oil Recovery and urea production are the most feasible CO_2 Removal technology used in India. Along with green hydrogen, CCUS (use for blue hydrogen and otherwise), would be particularly significant for decarbonizing hard-to-abate sectors in India.

Significant progress has been made in battery energy storage, but few barriers still prevent it from fully supporting the energy transition. One is the technological uncertainty since many battery technologies are still in the development stage, and their scalability for commercial use poses a significant risk for project developers. This can lead to uncertainties in the cost of energy storage and, consequently, the cost of electricity. The second is high short-term capital costs, despite the falling costs of Li-ion batteries over the past decade. High financing costs and need for low-cost financing options are a challenge. Availability of efficient grid infrastructure is another challenge. All these converge to the commercial viability challenge – add on to this are the delays in the purchase agreements. the Central Electricity Regulatory Commission (CERC) cancelled a major Solar Energy Corporation of India (SECI) BESS tender in January 2025 due to significant delays in signing project agreements.

As indicated earlier, critical minerals and their availability have a huge bearing on the growth of BESS. There is substantial reliance on minerals like Lithium, Cobalt, Nickel, and Manganese, and their limited availability and concentration in a few geographic locations pose an energy security risk. To reduce its dependence on the import of critical minerals, India needs to invest in developing renewable and battery technologies that are based on domestically available mineral resources. Further, new research investments are coming into developing alternative technologies. Because of sodium's abundance and cost-effectiveness, sodium-ion batteries have great potential to be a counterpart to lithium-ion batteries, both for stationary energy storage and EVs.

Refurbishing, recycling, and mineral recovery will play a vital role in meeting future mineral demands and limiting import dependencies and therefore as a country India needs to prioritize

investing in such new technologies and processes. India would also need to propel ahead in not just research and development of the recycling and mineral recovery technologies but also promoting it at commercial scale and putting in place appropriate regulations to drive this market.

On the bioenergy and ethanol blending front, India needs a longer term vision on what comes after the 20% target. The implementation of E27 target needs to be strategically designed. The scenario options could be many and varied specially in reference to India's Net zero 2070 commitment. One of the options is to allow higher blending rates in states that produce higher quantities of ethanol – thus reducing ethanol transportation needs and related emissions. Also, transportation and inter-state movement of ethanol needs to be eased in order to achieve uniform blending rates across the country. Again, an increased blending mandate would require switch in the automobile technology (upgrading certain vehicle parts) and bringing in flex-fuel vehicles. Investing in 2nd generation ethanol is another way forward. There are possibilities of crop waste-based ethanol production from locally grown crops and from plantations such as bamboo. Recently, Indian Oil Corporation operationalized a 2G ethanol plant at its Panipat refinery that would utilize agricultural waste.

On the green hydrogen front also costs are a concern. The current cost of green hydrogen is in the range of $5-6 per kg of which 20-25% can be attributed to the cost of electrolyzers. Similar to the BESS situation, the capital costs for green hydrogen facilities are high. Storage and transport infrastructure and their costs also pose significant hurdles. India needs to establish a market for green hydrogen through strong demand, supportive policies, and infrastructure development to drive down costs and ensure commercial viability.

While essential for a low-carbon energy, nuclear power's expansion in India also faces challenges. Large-scale nuclear projects are capital-intensive and even with private sector involvement, securing long-term, low-cost financing remains a significant challenge. Small Modular Reactors (SMRs) are relavively new technology hence, research, development, and commercial-scale deployment will require substantial time and resources. There are also concerns of long-term fuel security due to reliance on imported uranium. These are compounded by the legislative challenge of amending the Atomic Energy Act and the Civil Liability for Nuclear Damage Act.

Adaptation policy

Beyond the financial gap related challenges that have been discussed in section 4.3, there have been impediments on the governance and socio-technical fronts that hampers progress in adaptation planning, policy and implementation. Adaptation is a cross-cutting issue that requires coordination across multiple government departments and ministries, from agriculture and water to health and urban development. Efficient communication and alignment of initiatives is required for adequate and effective adaptation. A large share of adaptation happens at the local level. The road ahead requires focusing on building the capacity of local officials to utilize funds effectively and avoid implementation lags.

Climate Finance

Several nations including India have either established a green taxonomy or are in the process of doing so. However, a global alignment of these taxonomies is essential to reduce information asymmetry and transaction costs for international investors. A common ground globally accepted green taxonomy would indeed significantly ease financial flows towards sustainable activities. To prevent greenwashing, this taxonomy must be paired with transparent reporting. In 2021, SEBI mandated that the top 1000 Indian listed companies submit Business Responsibility and Sustainability Reports (BRSR). Several global disclosure frameworks make the landscape complex. Linking these disclosures to the taxonomy could simplify reporting for green projects. This would not only benefit large firms but also help MSMEs access climate finance by making compliance easier while ensuring transparency.

India is shifting its disaster management from a reactive, relief-focused approach to a proactive, mitigation-centric strategy. This is evidenced by increased budgetary allocations for the National Disaster Mitigation Fund and improved early warning systems. Despite this progress, a significant gap exists between policy and implementation. A major issue is the underutilization of allocated funds, which compromises the effectiveness of these initiatives. There has also been a reduction in the funds available under the National Adaptation Fund for Climate Change (NAFCC) between 2017-18 and 2022-23. Furthermore, broader climate adaptation and resilience-building efforts continue to face a financial deficit.

CLIMATE GOVERNANCE

National

The Ministry of Environment and Forest was officially re-christned to Environment, Forest and Climate Change in 2014, expanding its scope and mandate. It has played critical role in in initiatives like the International Solar Alliance and the Global Biofuels Alliance. The MoEFCC is a key member of several inter-ministerial committees that address climate-related issues. It works with the Ministry of Power, the Ministry of New and Renewable Energy, and the Ministry of Heavy Industries to ensure that environmental goals are integrated into industrial and energy policies including co-chairing the National Steering Committee for the Indian Carbon Market alongside the Ministry of Power.

In the past, the NDCs have been prepared by an expert committee that developed the document. However, for the LT-LEDS, Ministries that govern the resources, electricity, industry, transport, urban, agriculture, forestry and land use sectors have been brought together under seven taskforces to develop the document. The taskforce led by MoEFCC composed of members from the NITI Aayog, Ministries of Power, Finance, New and Renewable Energy, Coal, and Heavy Industries as well as research support from civil society organizations and academia. The document development underwent consultations with state governments, think tanks, research organizations, civil society and private sector representatives. This institutional set-up ensures policy coherence across ministries and organizations. Each of the ministries in India is working towards transforming the systems not only national level but also the institutional processes as well. The inter-ministerial task force also drew on a review of various quantitative and analytical studies from different institutions, synthesizing a range of modeling outputs to build a cohesive national strategy. This indicates the expanding technical capacity in India especially in reference to climate modelling. The establishment of the India Climate and Energy Modelling Forum (ICEMF), launched by NITI Aayog, and development of the India Energy Security Scenarios (IESS) 2047 tool, by NITI Aayog, for policy-focused scenario assessments are some examples of the same.

As a consequence of India's strong commitment, the governments at national and now at state level have championed the cause leading to multiple inter-ministerial and/or committees with ministries and representatives from private firms and academia to discuss and develop relevant climate polices at national, sectoral and subnational levels.

Climate Finance

The Government of India has also put in active efforts to create institutional mechanisms that support in mobilizing climate finance through specialized public financial institutions like the Indian Renewable Energy Development Agency (IREDA), Power Finance Corporation (PFC), Rural Electrification Corporation (REC) and National Bank for Agriculture and Rural Development (NABARD) to channelized funds for renewable and clean energy as well as rural infrastructure development. India Infrastructure Finance Company Ltd (IIFCL) is a Government of India owned company, established in 2006 has expanded into green and sustainable projects. The National Investment and Infrastructure Fund (NIIF) was established in 2015 as India's first sovereign-anchored investment fund, to augment

and channelize capital for the infrastructure and related sectors including renewable energy. GIFT City (Gujarat International Finance Tec-City) hosts the International Financial Services Centre (IFSC) and the International Financial Services Centres Authority (IFSCA) – a unified regulatory body to attract foreign capital and sustainable/ green finance. The IFSCA is actively looking into making it a Re-insurance hub, hosting alternative investment funds (AIFs) for pooled investments, supporting the India International Bullion Exchange (IIBX), and initiatives to strengthen access to sustainable finance.

INTERNATIONAL COOPERATION

Institutions

India has played a significant role in establishing the International Solar Alliance (ISA) in 2015. It aims to mobilize USD 1 trillion in solar investments globally by 2030. Coalition for Disaster Resilient Infrastructure (CDRI) was launched by India, CDRI aims to promote resilience of new and existing infrastructure systems to climate and disaster risks, involving collaboration on knowledge sharing, capacity building, and financing for resilient infrastructure.

Climate Finance

In order to continue the momentum of efforts being put in ensuring smooth financial flows for climate change mitigation and adaptation, international cooperation is paramount. Beyond the national efforts on streamlining climate finance and its easy access, India played a crucial role during its G20 Presidency in 2023 to call to attention the need for transfer of climate finance and also low-cost climate finance by developed countries and multilateral development banks (MDBs) for implementation of climate actions by the developing countries[52]. MDBs have a significant role to play in climate finance since loan is the key instrument second only to grants. Hence, MBDs need to provide grants and heavily concessional loans with low-cost financing. Insurance and re-insurance sectors have to be involved through MDBs. The G20 2023 endorsed a "Roadmap towards Better, Bigger, and More Effective MDBs" outlining concrete recommendations for enhancing their capacity and impact. This roadmap is a result of collaborative work between G20 members and MDBs themselves.

52 G20 (2023) 2023 Sustainable Finance Report 1 under Indian G20 Presidency. New Delhi: Sustainable Finance Working Group (SFWG), G20

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