

India's Climate Finance Requirements

An Assessment

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Various studies have estimated the climate finance requirement for India in the range of US\$160 billion and US\$288 billion annually. However, these estimates have been arrived at by following top-down approaches, which fail to assess sector-specific climate finance needs. This gap is sought to be bridged by this study as it follows a bottom-up approach to estimate the climate finance requirement of four key sectors—power, road transport, steel, and cement – accounting for over half of India's carbon emissions. While most other studies cover the energy sector, studies covering the road transport, steel, and cement sectors are few and far between. The period covered for assessing climate finance requirements is from 2022-2030.¹ It refrained from estimating the climate finance requirements beyond 2030 due to the many uncertainties, especially those relating to technological developments.

Climate finance estimates in this paper reflect the additional capital expenditure required solely for mitigation or moving to a low-carbon economy, *i.e.*, over and above the investment already planned in these sectors in the business-as-usual (BAU) scenario. It employs two distinct methodologies for the four sectors. For the power and road transport sectors, climate finance is estimated as an additional capital expenditure required for a progressive switching over from fossil fuel-based sources to renewables (power) and from internal combustion engine vehicles (ICEVs) to electric vehicles (EVs) - road transport. For the steel and cement sectors, climate finance has been worked out as the total capital expenditure required to mitigate existing as well as incremental carbon emissions that will arise in these two sectors up to 2030.

The study also evaluates (i) the macroeconomic consistency of the estimated climate finance; and (ii) the fiscal space to finance climate action by the public sector.

Key Findings:

Climate Finance Requirement

Total climate finance requirement for India to substantially decarbonise the four key sectors (power, road transport, steel, and cement) are estimated at US\$467 billion (at current prices) from 2022 to 2030, which works out to US\$54 billion or 1.3 per cent of its gross domestic product (GDP) annually.

¹ The period covered is 2022-2030 for the steel and cement sectors, 2024-30 for the power sector and 2023-30 for road transport.



The steel sector is estimated to need the largest amount of climate finance of US\$251 billion, followed by the cement sector of US\$141 billion. Both the steel and cement are hard-to-abate sectors, requiring largely the use of carbon capture and storage (CCS) technology to decarbonise them. CCS is expensive but is the only feasible technology option available at present.

The power sector is estimated to require an additional capital expenditure (capex) of US\$47 billion to switch from fossil-based sources of power to non-fossil-based sources. In addition, capex of US\$10 billion is estimated as storage costs for renewables. Thus, India will require climate finance of US\$57 billion for the power sector².

Overall, climate finance for road transport is estimated at US\$18 billion. The transition from ICEVs to EVs is estimated to require an additional capex of US\$10 billion. In addition, there will also be a need to develop the charging infrastructure for EVs, the capex for which is estimated at US\$8 billion.

The decarbonisation of the four sectors will reduce the use of 291 million tonnes of coal and 72 billion litres of petrol and diesel, which could mitigate 6.9 billion tonnes of CO₂ emissions (excluding road transport).

The climate finance estimates in this study are based on the cost of current available technologies. Should newer technologies develop and be more affordable, the climate finance estimates arrived at in this study could undergo a change.

Macroeconomic Consistency of Climate Finance Estimates

Overall, capital and financial flows net of the projected current account balance (external financial flows) for India are estimated at US\$530 billion during 2023–2030 in the BAU or 1.4 per cent of its GDP on an annual average basis. However, consistent with the expansion in the monetary base, India can manage only up to US\$474 billion during the same period. Thus, India would need to skilfully manage both external financial flows in the BAU and climate finance from external sources. For financing climate action in the four sectors, India may need to (i) widen its CAD, but for prudential and financial stability concerns, it should be subject to a maximum of about 2.5 per cent of GDP, depending on the availability of climate finance from external sources; and (ii) step up its saving rate.

Fiscal Space to Finance Climate Action by the Public Sector

Despite fiscal consolidation in the last few years, the debt-to-GDP ratio of the general government in India remained elevated at 82.3 per cent at end-March 2024.³ However, a reduction in the debt-to-GDP ratio to the mandated Fiscal Responsibility and Budget Management (FRBM) targets will require a significant turnaround in the primary balance from (-)3.4 per cent of GDP in 2023–2024 to 1.6 per cent by 2029–2030 for the general government, and from (-)2.3 per cent to 0.6 per cent for the central government. Thus, there is little fiscal space, and it is expected to be constrained for some years to come. This suggests that the bulk of the resources for climate action may have to be financed by the domestic private sector.

Policy Recommendations:

Sector-Specific

● Steel and Cement Sectors

- Since steel and cement plants in India are predominantly privately owned, investment for decarbonising these sectors would have to come largely from the private sector. In view of the positive externalities of mitigating emissions effectively, private investment in these sectors should be incentivised.
- The carbon capture and storage (CCS) technology required for decarbonising the steel and cement sectors would need international cooperation and technology transfers.
- Since the growth in steel and cement will be more substantial in emerging markets and developing economies (EMDEs), particularly China and India, there is a need to launch a minimum of research and development (R&D) aimed at reducing CCS costs or developing affordable alternative technologies such as green hydrogen.

● Road Transport

- While the road transport sector is largely in the private sector, the government may have to step in to develop the charging infrastructure for EVs and prescribe regulatory measures to enable the shift from ICEVs to EVs over time.

● Power Sector

- Accelerate the transition to a cleaner power grid, as the capital cost of renewables is lower than that of fossil fuel-based sources of power.

² Capex for using CCS for the power sector has also been estimated to give an idea about the magnitude of capital expenditure involved. However, we have not considered CCS capital expenditure for the power sector due to its high cost, parasitic load, and the availability of cost-effective renewable alternatives. CCS in the power sector globally is used only for 0.02 per cent of the total electricity generated.

³ The assessment in the study is based on data relating to March 31, 2024. The debt-to-GDP ratio was 82.6 per cent as of March 31, 2025.

- Address the challenges of grid management, grid battery storage and hydro-pump storage for renewables by investing in R&D.
- Periodically reassess climate finance estimates and strategies to account for evolving technologies and demand requirements.

Policy Flexibility and Review Mechanisms:

- The fiscal consolidation process needs to continue to free up resources for the private sector, including measures to increase the revenue-to-GDP ratio.
- Encourage private sector savings to facilitate the financing of climate action.

The implementation of the above-mentioned recommendations would help India to navigate the dual challenge of advancing its development goals while addressing climate vulnerabilities. The significant investment need underscores the importance of a carefully calibrated economic strategy to ensure that India continues its rapid economic growth trajectory in a manner that is also consistent with its climate change ambitions.

About the authors



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He was also Chairman of Government committees that produced the influential reports on infrastructure: The India Infrastructure Report (1996), The Indian Railways Report (2001) and The India Transport Report (2014).

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