



Climate Finance in India: A Stocktake of Sources and Instruments

Priyadarshi Dash and Vaishali Chaudhary



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Climate Finance in India: A Stocktake of Sources and Instruments

Priyadarshi Dash* and Vaishali Chaudhary**

Abstract: Climate finance ecosystem in India remains highly fragmented and mitigation-heavy. Adaptation finance is overwhelmingly dependent on union and state budgets, even as climate risks intensify. At the same time, innovative instruments such as blended finance, green and municipal bonds, concessional multilateral funds, and climate taxonomy are beginning to reshape India's climate finance landscape. The paper analyses trends in domestic budgets, private capital, MDB support, and emerging-market instruments, and highlights both the opportunities and systemic constraints facing India. It is observed that mobilisation of climate finance requires deepening institutional capacity, reducing the cost of capital, rebalancing adaptation and mitigation flows, mobilizing private investment along with concessional finance and financing by MDBs.

Keywords: Climate finance, Adaptation finance, Mitigation finance, Blended finance, Private investment

1. Introduction

Climate change is the most pressing challenge for humanity in the 21st century necessitating concerted and sustained action from every corner of the world and crucially, the mobilization of large-scale financing to support climate action. Recent data show that 2024 was the first year that witnessed the average global temperature exceeding the critical threshold of 1.5°C above pre-industrial levels,¹ marking an unprecedented milestone in climate records. This development highlights the growing urgency of the climate crisis and serves as a stark warning of potentially severe and compounding climate impacts in the future, including more frequent and intense heatwaves, extreme rainfall, and ecological disruptions that may unfold if temperatures continue to rise.

Over the years, countries have pledged to keep their contributions to global warming low. Since the Paris Accord in 2015, participating countries have strengthened their climate commitments to curb emissions and support

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developing countries in adapting to extreme weather. The UN Framework Convention on Climate Change (UNFCCC), ratified by 197 countries in 1992, is known for establishing the Conference of the Parties (COP), which, since then, has been serving as an international platform for stabilizing the level of emission of greenhouse gases (GHG) in the atmosphere. So far, 30 annual meetings of COP have taken place in different parts of the world; the latest was in Belem, Brazil, in November 2025.

Further, the Kyoto Protocol 1997 and the Paris Agreement 2015 are two landmark multilateral instruments for climate action. The Kyoto Protocol is the first legally binding climate treaty that requires developed countries to reduce emissions by an average of 5 per cent below the 1990 levels and established a system to monitor the progress. Likewise, the Paris Agreement 2015 aims to prevent the global average temperature from rising to 2°C (3.6°F) above the pre-industrial levels and keep it below 1.5°C (2.7°F) by setting the Nationally Determined Contributions (NDCs). It also seeks to achieve global net zero emissions by balancing the greenhouse gases released with those removed from the atmosphere during the latter half of the century.

Delivering on these climate commitments requires sustained flow of finance to all three domains - adaptation, mitigation and loss & damage. Climate finance broadly covers mobilization of funds to reduce greenhouse gas emissions and aid nations in adapting to the unavoidable impacts of global warming. The annual global climate finance more than doubled from USD 674 billion in 2018 to surpass its first trillion in 2021-22. Early estimates indicate that in 2023, it continued to grow, albeit more slowly, to USD 1.5-1.6 trillion. Yet, the current flows remain far short of USD 7.4 trillion per annum needed through 2030 under the 1.5°C scenario. For developing countries like India, which bear a disproportionate burden of climate finance while facing significant resource constraints, scaling up climate finance is paramount.

Against this backdrop, this paper presents a stocktake of India's climate finance landscape, examining the sources, instruments, and mechanisms, and captures key challenges and opportunities for the climate finance landscape in India. The paper is organised into six sections. Following the introduction, Section 2 traces India's climate climate action landscape

in India, Section 3 examines sources and instruments of climate finance, including mitigation, adaptation, and blended finance, and Section 4 trends in climate finance in India. Section 5 draws insights from sub-national financing initiatives especially experiences from Indore, Vadodara, Odisha, and Chhattisgarh, and Section 6 concludes.

2. Climate Action Landscape in India

India is at the crossroad of climate transition with emphasis on renewable energy, energy efficiency, and additional carbon sink.² India's emission intensity has declined by over 36 per cent in 2020, and a total of 283.46 GW of capacity from non-fossil fuel sources has been installed in the country as on 31 March 2026, accounting for over 50 per cent of total installed electricity generation capacity and marking achievement of NDC target five years ahead of 2030 goal.³ This progress highlights India's commitment to cleaner, non-fossil fuel energy and its broader climate action goals. These efforts align with India's NDC under the Paris Agreement. Furthermore, coal remains the most reliable energy source for India. The country holds about 10 per cent of global coal reserves but only 0.7 per cent of global natural resources.⁴ To reduce emissions, India is working to improve the efficiency of coal use by adopting Super Critical (SC), Ultra Super Critical (USC), and Advanced Ultra Super Critical (AUSC) technologies in coal-based power plants.

India has adopted several proactive steps to achieve climate goals. One of the most significant and first-of-its-kind policies adopted by India is the National Action Plan on Climate Change (NAPCC)⁵ in 2008. The plan proposes a national strategy for climate change adaptation and enhancing ecological sustainability of country's development path under eight National Missions including National Solar Mission, National Mission for Enhanced Energy Efficiency, National Mission on Sustainable Habitat, National Water Mission, National Mission for Sustaining the Himalayan Ecosystem, National Mission for a Green India, National Mission for Sustainable Agriculture and National Mission on Strategic Knowledge for Climate Change. Later, one more mission, namely, National Mission on Clean Coal Technology, was adopted. Further the INDC (Intended Nationally Determined Contribution) reflects the country's commitment

to ecologically sustainable development, rooted in civilizational values like respect for nature and inter-generational equity.

Moreover, India enforces the Energy Conservation Act, covering 15 energy-intensive industries and implementing the Energy Conservation Building Code. Thirty-four states in the country have launched the State Action Plans on Climate Change (SAPCCs), while civil society actively promotes climate awareness. Furthermore, India submitted its updated Nationally Determined Contribution (NDC) in August 2022 and March 2026 under the Paris Agreement. The commitments include promoting sustainable lifestyles through the Lifestyle for Environment (LIFE) initiative, adopting a cleaner growth path, reducing the emissions intensity of GDP by 45 per cent from 2005 levels by 2030, and achieving about 50 per cent⁶ cumulative installed power capacity from non-fossil fuel sources by 2030 with international support. Additional goals include creating a carbon sink of 2.5–3 billion tonnes of CO₂ equivalent through enhanced forest and tree cover, strengthening adaptation measures in vulnerable sectors, mobilizing financial resources, and advancing climate technology diffusion and R&D.

Further, in line with the country's commitment to clean energy, the National Green Hydrogen Mission was launched in 2023 to make India a global hub for production, usage, and export of green hydrogen, the next-generation energy solution. Under this mission projects have been awarded with an annual capacity of about 412,000 tonnes of green hydrogen production and 3,000 megawatts of electrolyser manufacturing capacity.⁷ This path to Net Zero in 2070 is intertwined with the path of economic growth and demographic changes.

India has been at the forefront of several international as well as domestic initiatives and programs such as Leadership for Industry Transition (LeadIT), One Sun One World One Grid (OSOWOG), Mission Innovation (MI), and the National Infrastructure Pipeline (NIP), highlighting India's focus to foster an interconnected and sector-driven approach towards tackling climate change. The OSOWOG initiative seeks to highlight the interconnected renewable energy grid security under the broader vision of a global green grid. The LeadIT, launched jointly with Sweden, highlights the importance of decarbonizing

hard-to-abate industries and ensuring a just and equitable low-carbon transition. On the domestic front, the NIP integrates climate resilience with India's infrastructure strategy, reinforcing the country's alignment with the G20 goal to triple renewable energy capacity by 2030. However, tripling renewable energy capacity requires external financing to meet the financing gap, including greater flows from advanced economies. In addition, financing by multilateral development banks (MDBs) and private the sector is critical.

India has also shouldered its global responsibility by creating a number of international institutions directed at climate action. Those include the International Solar Alliance (ISA), Coalition for Disaster Resilient Infrastructure (CDRI), Global Biofuel Alliance (GBA), International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE), and the Clean Energy Ministerial (CEM) with an aim to promote global cooperation, innovation, and resilience against climate change. The ISA is a treaty-based inter-governmental organization that aims at mobilizing solar energy deployment worldwide. Likewise, the CDRI is a global coalition led by India which seeks to enhance resilience in infrastructure systems through shared knowledge, financing, and policy support. In addition, the GBA, launched during India's G20 presidency, aims to foster international collaboration on sustainable biofuels and clean transport alternatives. In addition, India, through its membership in IPHE and CEM, contributes to setting global standards and facilitating research, capacity building, and technology exchange in hydrogen, fuel cells, and clean energy systems.

3. Sources and Instruments of Climate Finance

Financing is an important pillar of climate action, regardless of the level of development in countries across the world. Climate finance plays a pivotal role in driving the global transition toward a low-carbon and climate-resilient future and help meet the SDGs. In general, it refers to mobilization of funds for reduction of greenhouse gas emissions and helps countries adapt and mitigate the unavoidable impacts of global warming. Climate finance consists of three broad categories such as (i) Mitigation finance, (ii) Adaptation finance, and (iii) Loss & Damage financing.

Mitigation investments aim to reduce greenhouse gas emissions and fund renewable projects, whereas adaptation finance focuses on enhancing resilience to climate change effects.

On the other hand, Loss and Damage is beyond the scope of adaptation and broadly concerned with the unavoidable and irreversible impacts of the climate crisis, necessitating funding to help communities recover from economic and non-economic losses arising from extreme weather events, rising sea levels, and other forms of adverse climate impacts. Dual benefit investments cater to both mitigation and adaptation objectives such as no-till farming, agro-forestry that reduce emissions from agriculture (mitigation), enhance soil health, improve crop yields, and improve water management, making farms more resilient to drought and flood (adaptation).

Major sources of financing for climate action are concessional loans, grants, green bonds, equity, guarantees and blended finance mechanisms. There has been a notable rise in financial flows to climate adaptation and mitigation efforts in different countries of the world. Despite climate finance flows more than doubling between 2018 and 2022 from USD 674 billion to USD 1.46 trillion, there is an urgent need to upscale it to USD 7.4 trillion on average per annum through 2030 under the 1.5°C scenario, an estimate that encompasses investments across energy systems, transport, buildings, industry, agriculture and adaptation. Estimates indicate that currently climate finance accounts for one per cent of global GDP, while the advanced countries might have to allocate approximately 6.5 per cent of their GDP to the Emerging and Developing Economies (EDMEs) by 2030. Moreover, the unmet USD 100 billion annual pledges from developed countries along with limited availability of concessional finance highlights the growing asymmetry in access to global climate finance, particularly for the developing countries, Least Developed Countries (LDCs), Small Island Developing States (SIDSs), and small & vulnerable economies.

At COP29 India asserted the importance of the Principles of Common But Differentiated Responsibilities and Respective Capacities (CBDR-RC) and reiterated that the developed countries need to commit USD 1.3 trillion every year till 2030 through grants, concessional finance, and

non-debt-inducing support that cater to the evolving needs and priorities of the developing countries without subjecting them to growth-inhibiting conditionalities. Keeping this emphasis intact, India advocated scaling up of new, additional and concessional climate finance at the recently concluded COP30 in Belem, Brazil.⁸ Moreover, India is the only country in G20 that has achieved its Paris Agreement targets ahead of its schedule.⁹

India mostly relies upon the multilateral and bilateral aid agencies, multilateral private firms, national sources (government budget), and private investment to support climate action in the country. The flow of climate finance is either through the government budget via the national or sub-national route, through “off-budget” routes, or privately funded. Climate action in India is mostly financed through domestic resources mainly the public sector.¹⁰ For instance, in 2021-22 India mobilized an annual average of approximately USD 50 billion in green finance.¹¹ Domestic financial institutions and residential, commercial and institutional investors were key players in supporting climate objectives.

Government budgets and private financial institutions are at the forefront as far as domestic mobilisation of climate finance is concerned. The dominance of balance sheet financing underscores the limited depth of concessional and project-based mechanisms. At the same time, sectoral allocations align with national priorities of renewable energy expansion, efficiency improvements, and transport decarbonization. Strengthening international contributions, expanding concessional instruments, and deepening capital markets are essential to scale up finance and meet long-term climate goals.

The choice of instruments for climate action in India indicates a strong reliance on balance-sheet financing, primarily through debt and equity, with government budgetary expenditure providing essential support for domestic climate initiatives. Other instruments, such as project level financing including low-cost debt, market rate debt, and concessional flows remain limited but important for enabling climate investment. The country has witnessed the rise of green finance as green bonds and loans account for 83 per cent of total aligned volume. India ranks as the fourth largest emerging market source of aligned Global, Sustainability and

Social bonds (GSS+) with the cumulative issuance of USD 55.9 billion by December 2024 from USD 21.4 billion, marking a rise of 186 per cent.

Moreover, since January 2023, the Government of India has issued eight sovereign green bond tranches totalling approximately USD 5.7 billion. Such commitments are not just limited to the central government but also to local governments. For example, the INR 1 billion Climate Bonds issue by the Vadodara Municipal Corporation is a solid case of mobilisation of climate finance at the local government level.¹² To mobilise resources for green infrastructure, the Government of India announced the issuance of Sovereign Green Bonds as a part of its overall market borrowings. To implement the same, the Department of Economic Affairs, Ministry of Finance, envisaged a framework for sovereign green bonds that sets forth the obligations of the Government of India as a green bond issuer. The proceeds raised from these Sovereign Green Bonds are used to finance and/or refinance expenditures for green projects. The categories and typologies of the projects for which sovereign green bonds shall be applicable are renewable energy, energy efficiency, clean transportation, climate adaptation, sustainable water and waste management, pollution prevention and control, green buildings, sustainable management of living natural resources and land use, and terrestrial and aquatic biodiversity conservation. As of 31st March 2025, the Government of India has cumulatively issued sovereign green bonds amounting to INR 57,697.40 crore (Approximately USD 6.95 billion).

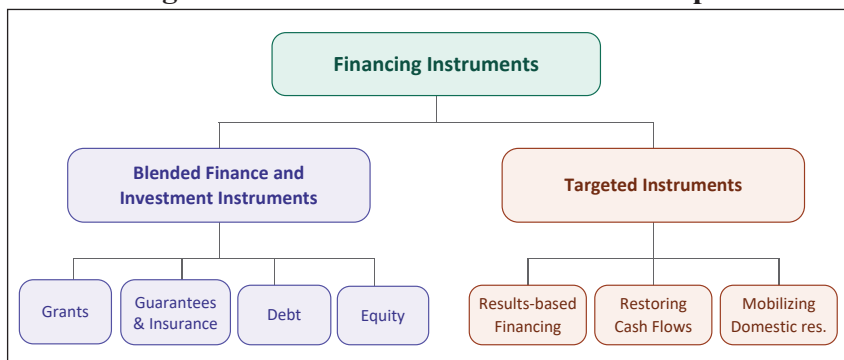
The Reserve Bank of India (RBI) has undertaken several initiatives such as collaboration with the Central Banks and Supervisors Network for Greening the Financial System (NGFS) to build capacity in terms of international best practices and risk management in the financial sector, formation of Sustainable Finance Group (SFG) to lead regulatory initiatives, framework to encourage regulated entities (REs) to offer green deposits to customers, protect depositors' interest address greenwashing risks and substantiate the flow of credit to green activities/projects to several sectors such as renewable energy sector, energy efficiency, clean transportation, etc. Recently, financial regulators such as the Securities

and Exchange Board of India (SEBI) and the Reserve Bank of India (RBI) have advanced ESG, green finance, and disclosure norms to support decarbonization. One such measure towards aligning capital markets with green finance is the introduction of the Business Responsibility and Sustainability Report (BRSR) framework which mandates the top 1,000 listed companies to disclose on ESG metrics. Furthermore, for achieving Net Zero ambitions by 2070, India is leveraging blended finance mechanisms to de-risk and accelerate private investment as a step towards climate action.¹³

While the government at the centre and the states & union territories are exploring different sources and instruments for enhancing the level of financing for climate action, the gap between the scale of resources required and the actual flows continues to widen. Innovative financing mechanisms like blended finance are being viewed as effective instruments for efficient mobilisation of funds for climate action, especially unlocking the private capital. Estimates for India's annual requirement for climate-related investments turn out to be around USD 170 billion until 2030, primarily to meet its NDC across sectors such as renewable energy, transport, energy efficiency, and adaptation. In essence, India's climate finance flows are primarily financed through domestic sources, and international flows, are highly inadequate with a mitigation bias.

In order to bridge the widening financing gap and facilitate greater resource flows toward climate-friendly technologies and activities, the importance of climate finance taxonomy was highlighted in the Union Budget 2024–25.¹⁴ The taxonomy has been designed in line with the broader ambition of Viksit Bharat @ 2047, while supporting mitigation and adaptation measures, enabling the transition of hard-to-abate sectors, and preventing greenwashing. As a classification system, it defines what qualifies as green, sustainable, or climate-aligned economic activities and investments. This system aims to enhance investor confidence while aiming for interoperability with global taxonomies like the EU Taxonomy and the ASEAN Taxonomy.

Figure 1: Financial Instruments Landscape



Source: Drawn by authors

A wide variety of instruments fall under the umbrella of innovative development finance. These may involve applying traditional financial tools in development contexts (as part of ODA or ODF as defined by the OECD), adapting existing mechanisms such as climate insurance or debt-to-health swaps, or designing entirely new approaches such as results-based or conditional financing to achieve specific objectives. Such instruments and approaches can be classified based on three dimensions: source of financing, purpose of financing, and intended recipients. Some of those innovative tools include (i) Performance-based climate resilience grants, (ii) Resilience credit, (iii) Debt-for-adaptation swaps, (iv) Payment for ecosystem services, (v) Work for taxes, (vi) Resilience bonds, among others. As shown in Figure 1, innovative financing instruments can be divided into two categories, i.e., blended finance and innovative capital & targeted instruments. Furthermore, blended finance and innovative capital can be divided into four major categories, i.e., Grants, Guarantees & Insurance, Debt, and Equity. Additionally, targeted instruments consist of three major categories, i.e., result-based financing, restoring cash flows, and mobilizing domestic resources.

Furthermore, blended finance, which is conceptualised as the strategic use of concessional public and philanthropic capital to mobilise private/commercial capital towards projects with positive climate and development outcomes, has gained traction in recent times. Its importance

in the Indian context lies in addressing the risk-return asymmetry of climate-aligned projects, which often involve high upfront costs, long gestation periods, and uncertain revenue streams. As observed in literature, private capital left to market logic tends to shy away from such investments, especially in developing economies where institutional and market risks are apparently higher. By offering risk mitigation through instruments such as credit guarantees, subordinated debt, first-loss provisions, and other such instruments, blended finance can lower the perceived risks for private investors, thereby crowding in larger volumes of commercial capital.

Blended finance is growing in India with a market of USD 1.30 billion in 2022 and is expected to reach USD 2.64 billion by 2027.¹⁵ The market achieved a leverage ratio of 5.06x with a cumulative market size of USD 5.06 billion, with 40 per cent of transactions involving guarantees. In mature sectors such as renewable energy, microfinance, concessional, and subordinated loans have the highest leverage ratio of 5-6x, whereas guarantees and risk insurance have a leverage ratio of 2.5-3x. Additionally, result-based financing delivered a leverage of approximately 2.2x. Despite the high leverage ratio of blended finance instruments, the overall volume of investments and the average transaction size remain below the global level.

The collaboration between the Power Finance Corporation (PFC) and the Government of Goa to support the state's climate ambitions through a sub-national Blended Finance Facility to be set up with the World Bank is a good case of blended finance. Under this partnership, PFC will deploy innovative blended finance to fund renewable energy, green hydrogen, EVs, waste-to-wealth, and nature-based solutions. On the other hand, the Government of Goa will build a pipeline of projects, enable policy support, and foster stakeholder collaboration. This initiative, a first of its kind in India, aims to attract private investment in climate projects and advance the country's Net Zero goals.

Similar examples from India illustrate how blended finance structures are being deployed across sectors. For instance, Multilateral Development Banks (MDBs) have partnered with financial institutions in India to

design risk-sharing facilities that encourage lending for renewable energy and energy efficiency projects. One such project was the agreement between the Government of India, Solar Energy Corporation of India Ltd. (SECI), and the World Bank for a USD 150 million IBRD loan, a USD 28 million Clean Technology Fund (CTF) loan and, a USD 22 million CTF grant.¹⁶ This innovative financing scheme reduced risks for the private investors and catalysed domestic bank participation. Likewise, credit enhancement mechanisms have played a pivotal role in scaling up investments in solar and wind power, while concessional capital has been utilised to pilot financing models for small and medium enterprises seeking to adopt energy-efficient technologies.

Like other verticals of development finance, climate finance faces similar challenges of diversifying the funding sources and instruments. Since NDCs provide a roadmap for Net Zero commitments for countries, the onus shifts to unlocking more finances from different sources, mostly from the private sector and through innovative mechanisms. Besides raising the level of climate finance from the private sector and innovative sources, the dependence on public finances and concessional financing is unlikely to be lower. Further, the quantum and speed of mobilisation of private investments and financing through innovative means have been below the desired level and pace. A fall in Official Development Assistance (ODA) by the traditional donors (OECD-DAC countries) in recent years further adds to the mounting financing needs and amplifies the strain on the national exchequers as public funds have competing uses.

According to the estimates by the United Nations, developing countries will require between USD 160 to USD 340 billion¹⁷ annually for adaptation finance by 2030. These may involve applying traditional financial tools within development contexts (as part of ODA or ODF as defined by the OECD), adapting existing mechanisms such as climate insurance or debt-to-health swaps, or designing entirely new approaches like results-based or conditional financing to achieve specific objectives. Such instruments and approaches can be classified based on three dimensions: source of financing, purpose of financing, and intended recipients. Some of those innovative tools include Performance-based

climate resilience grants, Resilience credit, Debt-for-adaption swaps, Payment for ecosystem services, Work for taxes, Resilience bonds, among others.

Engaging the private sector is increasingly recognized as a cornerstone in the global response to climate change. While private enterprises and investment entities such as banks, equity funds, and non-bank financial institutions are significant contributors to greenhouse gas emissions, they also possess the capital, expertise, and influence needed to enable large-scale transformative action. Strong collaboration with the private sector, particularly in developing economies, can accelerate the deployment of sustainable technologies, support the creation of an estimated 24 million green jobs, and help shift markets toward low-carbon growth. As such, mobilizing private sector participation is vital for meeting the ambitious goals outlined in the Paris Agreement and in countries' NDCs.

MDBs play a central role in development finance by offering financial resources, technical expertise, and risk-mitigation tools to advance sustainable development in emerging and developing economies. With a long history of experimenting with innovative financing, MDBs provide a range of instruments to both sovereign and private sector actors. On the public sector side, they deliver financing and technical assistance that helps create enabling investment environments including through regulatory reforms.

Beyond their direct contributions, MDBs act as catalysts to unlock additional resources, both private capital and domestic revenues, aiming to scale up development finance from “billions to trillions” in support of the SDGs. Increasingly, they function as platforms for mobilizing private investment through blended and innovative finance mechanisms. For example, institutions such as the Inter-American Development Bank (IADB) have established specialized vehicles like blended finance facilities and guarantee programs to de-risk investments in areas including renewable energy and social infrastructure.

Climate finance by the MDBs to low- and middle-income countries exceeded USD 74 billion in 2023. The largest allocation was made through investment loans, which accounted for approximately 63 per

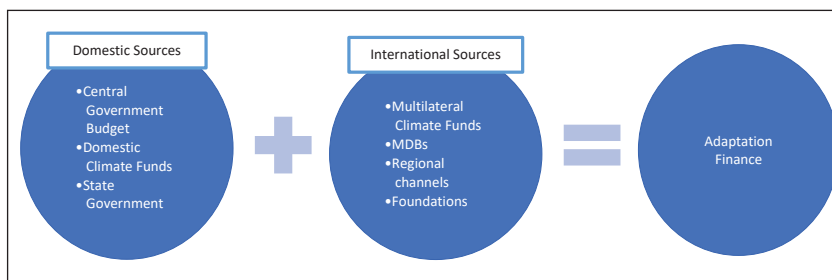
cent of the total. Policy-based financing was utilized for about 14 per cent of the funds, while grants and guarantees comprised 7 per cent and 6 per cent respectively. Smaller proportions were assigned to results-based financing, lines of credit, equity, and other instruments, each comprising between 1 per cent and 6 per cent of the aggregate distribution.

Further, MDBs have expanded their climate action toolkit to developing countries by offering a wide range of financial and advisory mechanisms. Besides lending operations, MDBs play an important role in directing concessional and grant-based funds towards climate action. A significant part of funding is channelled towards funds such as the Global Environment Fund (GEF), the Global Climate Fund (GFC) and others to enable access to mitigation and adaptation finance by the developing countries.

4. Trends in Climate Finance in India

The distribution of climate finance has been skewed in favour of mitigation, globally as well as in India. Adaptation finance has improved globally in recent years, but still received less attention.¹⁸ As per the UNEP Adaptation Gap Report 2024, international public adaptation finance to developing countries has increased from USD 22 billion in 2021 to USD 27.5 billion in 2022, marking the largest increase since the Paris Agreement, in absolute as well as in relative terms. It indicates a positive trend, but much of this financing (62 per cent) is non-concessional loans. While it suggests the efficiency of market-based instruments for climate action, it may not be feasible for the LDCs, SIDS, and small and vulnerable economies. The role of grants for these categories of countries remains critical. The report further notes that over two-thirds of the adaptation finance gap is for those sectors which are typically financed by the public sector; hence there is a greater need for public investments and wise deployment of innovative mechanisms.

Figure 2: Sources of Adaptation Finance in India



Source: CPI (2024)

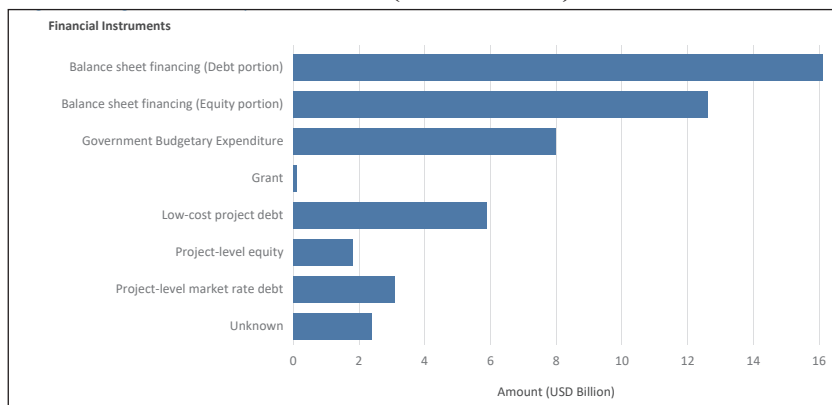
For India, as per 2019-2020 data, the ratio of adaptation to mitigation was roughly equal to 1:8, with funding for adaptation amounting to USD 5 billion per year compared to USD 37 billion for mitigation. Adaptation finance reached USD 15 billion in 2021-22, increasing by threefold from 2019-20. Within this funding, government budgetary allocations of INR 1,066 billion accounted for 99 per cent of total financing meant for adaptation projects. Meanwhile, low-cost project debt and equity portion comprised 0.2 per cent, and grants comprised 0.3 per cent of total adaptation financing.

Adaptation finance has grown substantially, nearly tripling in recent years reflecting India's proactive stance on managing climate risks. Further, the Government of India has taken several initiatives to step up the availability of adaptation finance. One such significant step is the National Adaptation Plan (NAP) that aligns with the SDGs and works to build climate resilience across all the regions and communities of the country. It prioritises strategies, policies and programmes, and highlights the implementation needs for the adaptation plans.

On the mitigation front, financing has grown significantly over the years, highlighting a strengthened national commitment to low-carbon development. A significant part of mitigation finance comes from domestic sources indicating strong internal capacity. Domestic mitigation finance is primarily led by private actors with major investments in

efficiency initiatives and clean energy projects. Among private sources, commercial financial institutions play the most prominent role. In terms of financial instruments, mitigation efforts rely mainly on debt and equity financing, supplemented by direct government funding.

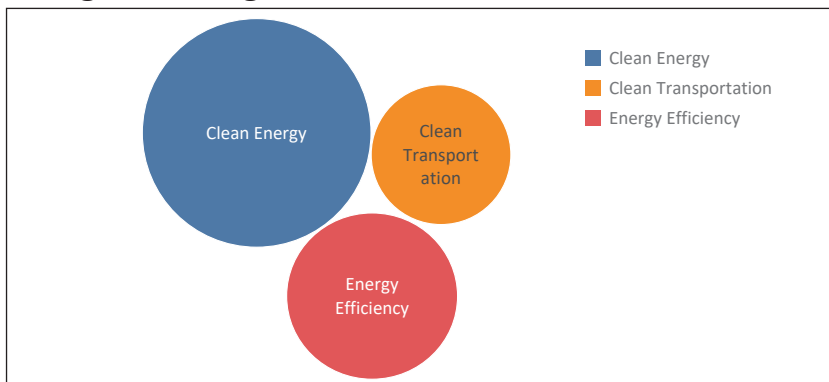
Figure 3: Instruments for Mitigation Finance in India, 2021-22 (USD Billion)



Source: CPI (2024)

As illustrated in Figure 3, the choice of instruments reveals a reliance on balance sheet financing, both in the form of debt (INR 1,195 billion) and equity (INR 938 billion). Government budgetary expenditure (INR 596 billion) plays a significant role, ensuring direct public support for climate initiatives. Project-level financing is present but less prominent, comprising low-cost debt (INR 435 billion), market-rate debt (INR 231 billion), and equity (INR 131 billion). Concessional flows remain negligible, with grants accounting for only INR 9 billion, while INR 178 billion of finance remains unclassified due to reporting gaps.

Figure 4: Mitigation Finance Sectors in India, 2021-22



Sources: CPI (2024)

On the demand side, climate finance is directed primarily towards clean energy (INR 1,768 billion), highlighting India's strong focus on expanding renewable capacity. At the same time, substantial investments flow into energy efficiency (INR 1,287 billion), reflecting efforts to reduce emissions intensity across sectors.¹⁹ Clean transportation (INR 657 billion) is emerging as a significant area of investment driven by the push towards electric mobility and low-carbon transport systems (Figure 4).

4.1. Global Environment Facility (GEF)

GEF provides crucial financing to eligible countries to support initiatives aimed at addressing pressing environmental challenges. These include concerns related to biodiversity conservation, climate change mitigation and adaptation, management of international waters, land degradation, and dealing with chemicals and waste. Established in 1991, the GEF has invested over USD 22 billion in grants for projects and programs worldwide, while successfully mobilizing an additional USD 120 billion in co-financing.²⁰ This enables countries to lead their own sustainable development efforts while contributing to global environmental benefits.

India has been a member of GEF since its establishment and has played a dual role as both a donor and a recipient country. Notably, India hosted the inaugural GEF Assembly in 1998, demonstrating its

active commitment to the organization's mission. Over the years, India has contributed a total of USD 100 million to the GEF Trust Fund as a donor with a recent pledge of USD 18.75 million for the current GEF-8 funding cycle.²¹

Through its seventh replenishment phase, the Global Environment Facility (GEF) has allocated USD 925.7 million to support 118 projects in India. Approximately 80 per cent of this funding totalling USD 744 million has been directed towards national level initiatives, including preparatory grants and agency fees, while excluding cancelled or dropped activities. These national projects have successfully attracted an additional amount of USD 6.6 billion in co-financing, reflecting a strong leverage ratio of nearly nine dollars for every dollar granted; well above the global average of USD 5.50.

GEF has funded 118 projects in India through its seventh funding cycle, allocating a total of USD 925.7 million. Around 80 per cent of this amount, i.e., USD 744 million, has been dedicated to national projects covering grants for project preparation and associated agency fees, excluding any cancelled activities. These projects have successfully leveraged an additional USD 6.6 billion in co-financing, achieving a high ratio of almost USD 9 for every dollar of GEF funding, surpassing the global average of USD 5.50.²² Most of the funding comes from the GEF Trust Fund, with a smaller share supported by the Special Climate Change Fund for specific initiatives like climate-resilient coastal protection and sustainable livelihoods.

Climate change remains the focus, constituting more than half of the projects and funding, reflecting India's strong potential in generating significant global environmental benefits. The bulk of funding comes from the GEF Trust Fund, with a smaller portion provided by the Special Climate Change Fund backing projects such as climate-resilient coastal management and livelihoods adaptation. Climate change remains the primary focus area, accounting for over half of the projects and funding, underscoring India's significant potential to generate global environmental benefits. The GEF has also supported diverse environmental concerns, including biodiversity conservation and land restoration, thus fostering a comprehensive approach to sustainable development within the country.

4.2. Green Climate Fund (GCF)

The Green Climate Fund (GCF) was established in 2010 at the 16th Conference of the Parties (COP 16) to the United Nations Framework Convention on Climate Change (UNFCCC). Its mandate is to assist developing countries in transitioning to low-emission, climate-resilient growth by providing financial support through instruments such as grants, loans, guarantees, and equity. As the largest dedicated multilateral climate fund, the GCF plays a central role in advancing the goals of the Paris Agreement, particularly in mitigation and adaptation. It serves as the primary global financing mechanism to help developing nations reduce greenhouse gas emissions and strengthen their capacity to address climate change.

The Fund provides a variety of financing instruments to support both public and private sector initiatives that address climate change adaptation and mitigation. In line with its mandate, the Fund seeks to maintain a balanced allocation of resources with an equal focus on adaptation and mitigation. To further this goal, the GCF has established several funding and technical support windows designed to promote a programmatic approach and enable countries and partners to engage more strategically in implementing climate actions.

The GCF employs a diverse set of financial instruments to support climate action in developing countries. Those include grants which provide direct financing for projects and programmes; concessional loans through the Simplified Approval Process (SAP), which eases access for smaller-scale initiatives; and equity financing offering up to USD 1.5 million to support project preparation and proposal development. The Fund also deploys results-based payments to address financing gaps in high-impact areas by supporting targeted pilot programmes and requests for proposals. In addition, guarantees are used to expand access to climate finance by engaging new partners, countries, and technologies that may be underserved within the existing GCF network. Collectively, those instruments are designed to provide flexible, inclusive, and targeted support for both mitigation and adaptation efforts.

The GCF supports blended finance as a key mechanism to mobilize private capital and accelerate climate action in developing countries. In India and other emerging economies, this approach is particularly important for bridging the climate finance gap by 2030. The GCF advances blended finance through a four-pronged strategy: enabling transformational planning and programming, fostering climate innovation, de-risking investments to attract large-scale financing, and integrating climate considerations into investment decisions to align with sustainable development. To operationalize it, the Fund deploys a mix of concessional loans, equity, grants, and guarantees, which can be applied across different modalities and stages of the financing cycle. While debt and equity help close project-specific financing gaps, guarantees play a critical role in attracting new private sector capital, thereby amplifying the impact of climate investments.

One of the blended finance projects supported by GCF is the Line of Credit of USD 100 million (as part of a USD 250 million programme) for Solar Rooftop Segment for Commercial, Industrial, and Residential Housing Sectors in India. Implemented with NABARD as the accredited entity and Tata Capital as the executing partner, the programme provides long-term, affordable financing to expand rooftop solar capacity from 250 MW to 550–600 MW across commercial, industrial, and residential sectors.²³ Over its 25-year lifespan, the project is expected to cut emissions by 13–14 million tonnes of CO₂ while making rooftop solar a more viable and attractive option for meeting energy needs.

The initiative blends GCF's concessional resources with co-financing from Tata Capital and private investors, lowering borrowing costs and reducing risks to unlock larger private sector participation. Beyond project development, it also strengthens the broader clean energy ecosystem by engaging lenders, investors, and technology providers. NABARD channels GCF's financing in local currency and manages exchange risks, while Tata Capital ensures due diligence and technical oversight. As India's first large-scale rooftop solar credit line, the project demonstrates how blended finance can catalyse private investment, foster innovation, and create a scalable model for sustainable clean energy.

4.3. Clean Investment Funds (CIF)

The Climate Investment Funds (CIF), established in 2008, is a leading multilateral climate finance mechanism supporting climate action in more than 70 low- and middle-income countries. By providing highly concessional finance, CIF helps drive transformative investments in clean technology, energy access, climate resilience, nature-based solutions, and related areas.

In India, the CIF channels its support through the Clean Technology Fund (CTF), aligning with the country's ambitious shift toward low-carbon growth. With a USD 793 million CTF investment plan, the focus is on advancing more than 3 GW of new solar power generation capacity, along with necessary transmission infrastructure, helping to reduce reliance on coal and reshape the energy mix.²⁴ CTF's concessional financing plays a pivotal role by lowering the upfront costs of large-scale solar parks and reducing investment risks in rooftop solar photovoltaics, thereby unlocking their full market potential. Complementing this, over USD 800,000 was allocated through the CIF's Technical Assistance Facility (TAF) in 2020 and 2021 to strengthen climate finance readiness among financial institutions.

Recently, India has also been selected as one of the first four pilot countries under CIF's Accelerating Coal Transition (ACT) program. Through this initiative, the country stands to access up to USD 500 million in financing to support a just transition from coal towards sustainable energy pathways. CIF, with a total of 13 approved projects, collectively accounts for USD 670.31 million in CIF-approved funding, which is designed to catalyse transformative climate action in the country. Importantly, this investment is expected to leverage significant additional resources with projected co-financing amounting to USD 14.35 billion. Together, these funds are helping India accelerate its low-carbon transition, expand clean energy capacity, and foster sustainable development pathways.

4.4. Financing by New Development Bank

The New Development Bank (NDB) has been actively supporting green financing projects in India, aligning with the country's push

towards renewable energy and sustainable development. Recently, BRICS members agreed for an investment of nearly USD 40 billion in clean energy, energy efficiency, environmental protection, and water infrastructure.²⁵ Additionally, it was also unanimously decided to include the NDB's current goal of allocating 40 per cent of its financing to sustainable development initiatives in the final declaration of BRICS.²⁶ In 2023, climate finance approvals reached USD 268 million with USD 114 million dedicated to mitigation efforts and USD 154 million directed toward adaptation initiatives. Looking at the broader portfolio, total approvals stood at USD 5.7 billion, of which nearly USD 5 billion supported mitigation projects and USD 706 million focused on adaptation by the end of 2023.

As of December 31, 2023, India accounted for the highest value of project approvals, totalling USD 8,641 million. Within the New Development Bank's portfolio, investments dedicated to climate action amounted to USD 680 million, representing just 2.13 per cent of total approved projects.²⁷ Given the growing severity of climate challenges across member countries, the share requires upward revision to ensure a more effective response.

One of the recent approved projects by NDB is the SAEL 300 MW Renewable Energy Project in the area of energy and energy efficiency, approved in 2024. The project entails the development of a 300 MW solar photovoltaic plant in Andhra Pradesh, along with a 70 kV sub-station and a 13 km, 220 kV transmission line linking it to the grid. Currently, it has financing of USD 63 million by NDB and USD 127 million by other sources.²⁸

5. Innovative Financing: Select Case Studies

5.1 Indore Solar-Powered Water Projects: Green Bonds and Carbon Credits

Recognized as India's cleanest city, Indore has built a reputation for adopting forward-looking and sustainable urban practices. A notable example is the solar-powered water project spearheaded by the Indore Municipal Corporation (IMC). The initiative was designed to ease the

financial burden of transporting drinking water over nearly 80 kms from the Narmada River at Jalud village in Khargone district to meet the city's daily needs. By turning to renewable energy, Indore not only reduced its electricity costs but also strengthened long-term commitment to delivering safe and reliable water to the residents. Spread over 220 acres, the 60 MW renewable energy unit was set up at a cost of INR 308 crore. A major share of the funding, INR 244 crore, was secured through the green bonds issued by the Indore Municipal Corporation on the National Stock Exchange of India (NSE).

In February 2023, the IMC initiated the public issue of green municipal bonds. These bonds had a face value of INR1000 and were listed, rated, taxable, secured, and redeemable non-convertible bonds. Each bond has four INR 250 separately transferable and redeemable principal parts (STRPPs), which were designated as STRPP A, B, C, and D. Through this issue, the corporation hoped to raise a total of INR 244 crores. The total possible size was INR 244 crores, which included a base issue size of INR 122 crores and the option to retain oversubscription (the green shoe option) for an extra INR 122 crores. On these bonds, the IMC paid interest at a rate of 8.25 per cent per annum, due every six months. The STRPPs have a maturity period of three to nine years. The issue received an overwhelming response from investors, with bonds being oversubscribed by nearly six times, enabling IMC to raise INR 244 crores against its target. With total bids amounting to approximately INR 720 crores.

The Ministry of Housing and Urban Affairs, Government of India, has offered incentives to IMC as part of the Atal Mission for Rejuvenation and Urban Transformation 2.0 (AMRUT 2.0). The program was started with the intention of securing water and making cities self-reliant. The first 20 urban local bodies that issued municipal bonds during the mission period, on a "first come, first serve" basis, were eligible for incentives under AMRUT 2.0. This also applied to any subsequent bonds that met the Securities and Exchange Board of India's (SEBI) definition of green bonds. For every INR 100 crore in green bonds issued, an incentive of INR 10 crore was offered up to a maximum of INR 20 crore per urban local body.

5.2 Green Municipal Bond for Sustainable Water Infrastructure

By issuing a certified Green Municipal Bond to fund sustainable urban infrastructure, Vadodara Municipal Corporation (VMC) established a healthy precedent in India and in the Asian region. With the primary objective of constructing two sewage treatment plants with a combined capacity of 121 million litres per day²⁹ as well as an auxiliary pumping station, the bond proceeds were allocated towards liquid wastewater management. The program helped preserve limited freshwater resources by enabling the reuse of treated water for industrial uses in addition to enhancing the quality of local air and water. The project enhanced Vadodara's endeavours towards climate resilience and sustainable urban development by coordinating financial innovation with environmental requirements.

The primary goal of this financing model used for these projects was to raise INR 100 crore, or roughly USD 12 million, by issuing green municipal bonds. With explicit allotments for every level of government, this strategy used contributions from private investors in addition to central, state and urban local bodies as specified in the AMRUT 2.0 Scheme. The bonds guaranteed thorough reporting, third-party verification, and open management of proceeds by adhering to SEBI's green debt guidelines and international best practices. Investors found VMC highly credible due to its strong financial governance, which includes accrual-based accounting and prompt audits. To ensure investor confidence and regulatory compliance, all proceeds were tracked and publicly reported, and those were only used for qualified green projects through dedicated bank accounts. The issue received an overwhelming investor response, with bids reaching INR 14,600 crores and the bonds being oversubscribed by approximately 14.6 times against the target of INR 100 crores.

5.3 Climate Budgeting – Odisha & Chhattisgarh

All Indian states are required to allocate resources towards climate change through State Action Plans on Climate Change (SAPCCs). The case studies of Odisha and Chhattisgarh present a significant step

towards adaptation measures by integrating Climate Change Impact Appraisal (CCIA) methodologies in the budget allocation, illustrating the effectiveness of climate budgeting at the sub-national level through a sectoral lens. Those case studies serve as successful models for fostering peer learning and broader replication across states and even countries.

Odisha is one of the proactive states in developing and integrating its SAPCCs with climate budgeting. To build on this approach, the Government of Odisha undertook a climate budgeting exercise across 11 departments in the state. The process involved screening departmental budgets and analysing them in detail to assess its impact on climate change in terms of potential benefits and challenges.

Building on Odisha's successful integration of climate budgeting, Chhattisgarh adopted a similar approach with an additional goal of highlighting the ways of mobilizing additional funding to increase adaptation funding. The state focused on three climate sensitive departments and asked the officials to list the benefits of all programmes on 0-100 per cent scale on the basis of climate relevance and vulnerability.

6. Conclusion

Climate finance is the top-most development financing challenge faced by the emerging and developing economies worldwide. India, having committed to Net Zero by 2070, has demonstrated commendable and proportionate action in different sectors of the economy. The significant progress towards clean energy manifested in terms of creating additional installed capacity in renewable energy sectors, viz., solar energy, wind energy, on a continued basis over the past decade, is a reflection of that commitment. In addition, India has embarked on leveraging the civilisational and cultural values through the Lifestyle for Environment (LiFE) initiative for inculcating climate action at the grassroot level. Besides adaptation and mitigation efforts, the behavioural change induced through LiFE has created conditions in the country for sustained and durable progress in India's climate achievements.

Besides domestic initiatives, India has jointly established international initiatives like the International Solar Alliance (ISA), Coalition for Disaster Resilient Infrastructure (CDRI), and Global Biofuel Alliance

(GBA) for promoting sectoral coordination and collective endeavour at the global level. The role of BRICS in promoting and coordinating climate action at the global level, especially in voicing the developing country climate financing requirements, would be critical.

With respect to the financing of climate action, domestic resources have accounted for a bulk of climate finance in India. Further, the loan component is higher than the other components in the total climate finance portfolio. While public resources are expected to generate a ‘crowding in’ effect for mobilising climate finance in the country, the role of private investment through blended finance and other innovative means has been recognised at a wider policy level. In addition to national level financing initiatives, the innovations at the sub-national level in the form of issuance of municipal bonds including green bonds, indicate a healthy trend. In general, like any other developing country India advocates in favour of a greater flow of concessional finance and enhancing access to the international capital market to tackle the climate crisis and prepare the country towards Net Zero by 2070.

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