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# Landscape of Green Finance in India

## Approach and Methodology

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# 1. INTRODUCTION

India needs adequate, timely, and directed investments to achieve its climate goals.

An estimation of the possible sources of finance is a prerequisite for encouraging investment in climate mitigation and adaptation. A systematic assessment of green investment can help understand whether India is on track in achieving its targets under its Nationally Determined Contribution (NDC). Such an assessment can provide insights to policymakers and regulators, enabling them to device policy measures and regulations to better align with national missions, schemes, and national/state action plans for climate change. It can also inform domestic and international private investors of the trends in India's climate action, the growth potential of different green sectors, and future pipeline possibilities for related activities; and it can serve as a tool—under the Katowice Climate Package and enhanced transparency framework—to track India's progress in achieving its climate targets. Lastly, it can also serve as a basis for cross-sectoral, inter-governmental, and Government-DFIs discussions on resource mobilization for climate action.

The Landscape of Green Finance in India (“India Landscape”) series aims to capture annual financial flows supporting emissions reduction and select climate adaptation-related activities. The India Landscape consolidates empirical data drawn from a wide range of primary and secondary sources. The study categorizes financial flows along their lifecycles— from public and private sources and intermediaries, through a variety of financial instruments, to sectors and subsectors of mitigation and adaptation-related select sectors and subsectors. To collect and streamline data from multiple sources, prepare a comprehensive database and subsequently analyze the data, we have adopted an operational definition of green finance. Moreover, we have developed a detailed methodology to identify climate-relevant financial transactions in order to avoid overlaps and ensure comparability across datasets to the extent possible.

This document outlines the approach and methodology of the study in terms of key definitions, accounting scope, data gaps and limitations, issues, and assumptions, as well as the breadth and depth of sectoral coverage.

## 2. DEFINITION

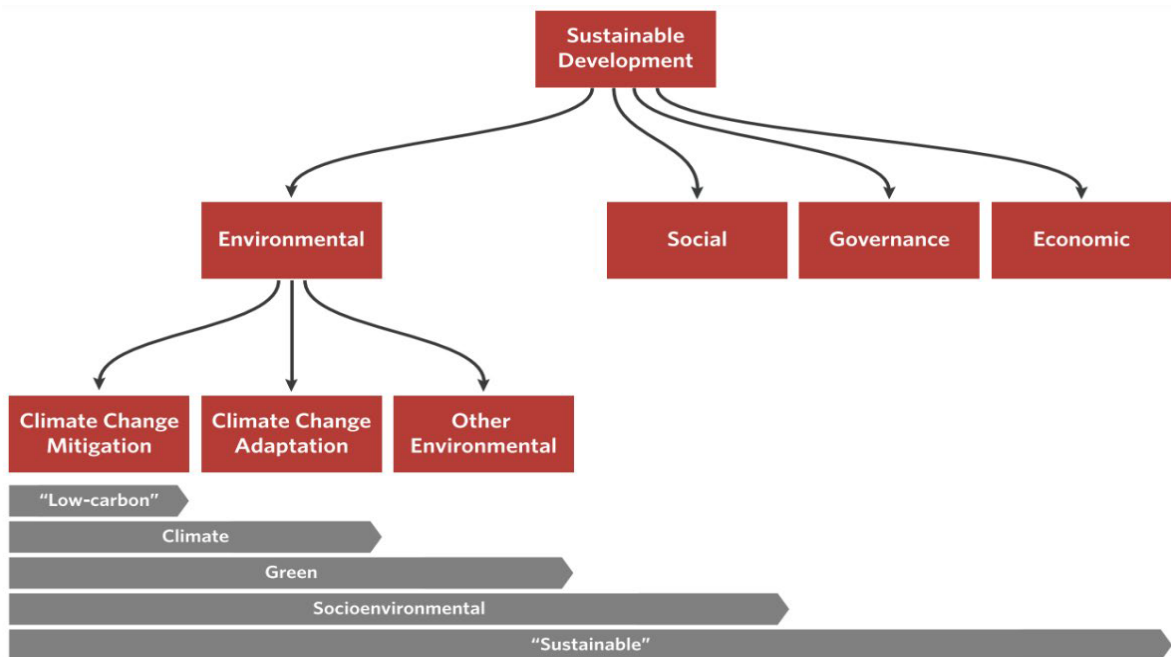
### 2.1 DEFINING GREEN FINANCE

In the absence of a clear definition, attribution of the term ‘green finance’ is likely to be subjective and may trigger dissonance if actions are seen to be unaligned with climate mitigation, adaptation, and pollution control. Not knowing what constitutes ‘green’ restricts proper tracking of capital flows into green sectors, which in turn causes inaccuracies in the assessment of capital flows and inadequacy of investments needed to meet India’s NDC targets.

A clear definition of the term green finance is a prerequisite for tracking capital flows to green sectors and avoiding inaccuracies in their assessment. To ensure consistency in tracking and comparability of data, we have aligned our taxonomy of green finance with that adopted by the India Landscape 2022 report.<sup>1</sup> This publication defines climate, green, and sustainable finance as follows:

- **Climate finance** refers to “local, national or transnational financing, drawn from public, private and alternative sources of financing, that seeks to support mitigation and adaptation actions that will address climate change.” (UNEP Enquiry 2016)
- **Green finance** includes climate finance as well as other environmental objectives that are necessary to support sustainability, and in particular, aspects such as biodiversity and resource conservation.
- **Sustainable finance** covers a broader set of the investment universe with the aim of building an inclusive, economically, socially, and environmentally sustainable world.

**Figure 1:** Difference between sustainable, green, and climate finance



Source: UNEP Enquiry, 2016

<sup>1</sup> <https://www.climatepolicyinitiative.org/publication/landscape-of-green-finance-in-india-2022/>

CPI's [Global Landscape of Climate Finance 2023](#), aligns its definition of climate finance with the United Nations Framework Convention on Climate Change (UNFCCC) Standing Committee on Finance, which states that "Climate finance aims at reducing emissions, and enhancing sinks of greenhouse gases and aims at reducing the vulnerability of, and maintaining and increasing the resilience of, human and ecological systems to negative climate change impacts." Broadly, green investment flows are often defined by their intervention areas related to GHG mitigation—such as renewable energy, energy efficiency, electric vehicles, etc.—and investments in adaptation—such as measures taken to address climate risks and impacts, including extreme events such as floods and cyclones and chronic events such as droughts, conservation of natural resources such as water and soil and preservation of ecosystems and built infrastructure.

Owing to multiple terminologies and a lack of global or national common consensus regarding the definition of green finance, our green finance mapping exercise is limited to primary capital flows directed to a subset of the green finance definition mentioned above. This study does not map pollution abatement activities, biodiversity, forestry, and other land use. While the study partially tracks adaptation finance, these investments represent a fraction of India's total adaptation finance flows and have, therefore, not been included in the total tracked green finance for FY 2020/21 and FY 2021/22.<sup>2</sup> The sectors included in this report are described in the following section.

## 2.2 DEFINING SOURCES AND INTERMEDIARIES

It is challenging to distinguish between sources of capital and intermediaries in most cases, especially when there are multiple levels of disbursements. In this study, we have considered all funds moving out of the Indian Exchequer (Union and State Government) and public sector undertakings (PSUs) as the source of domestic public funds. We have classified development finance institution (DFI) flows as:

- Multilateral, where public finance institutions have multiple countries as shareholders and finance flows internationally.
- Bilateral, where there is single country ownership of the public finance institution, and finance flows to India.
- National, where there is Indian ownership of the public finance institution, and finance is domestically directed.

For private sources of finance, we have considered corporate actors (project-level equity and balance sheet financing), project developers (project debt and equity and balance sheet financing), households and commercial finance institutions such as banks, non-banking financial companies (NBFCs), etc., and private equity, venture capital and infrastructure funds as the primary source of funds.

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<sup>2</sup> For adaptation, along with activities tracked in India Landscape Report 2022—disaster monitoring and emergency response system (disaster risk management in this report), flood and cyclone mitigation and drought management—the India Landscape Report 2024 tracks on-farm adaptation related activities in the agriculture sector.

**Table 1:** Sources of green finance

DOMESTIC	
PUBLIC	PRIVATE
<ul style="list-style-type: none"> <li>Direct budgetary allocations by central and state governments.</li> <li>Climate Funds (routed through the PSUs like NTPC Ltd., Energy Efficiency Services Ltd., Power Finance Corporation Ltd., REC Ltd., Bureau of Energy Efficiency, Solar Energy Corporation of India Ltd. (SECI), etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Commercial financial institutions</li> <li>Institutional investors: Insurance companies (asset management), pension funds, foundations and endowments</li> <li>Private equity, venture capital, and infrastructure funds</li> </ul>
INTERNATIONAL	
PUBLIC	PRIVATE
<ul style="list-style-type: none"> <li>Bilateral and multilateral DFIs</li> <li>Financial Institutions within the UNFCCC financial mechanism (Green Climate Fund, Global Environment Facility) and non-UNFCCC financial mechanisms (multilateral development banks and climate investment funds)</li> </ul>	<ul style="list-style-type: none"> <li>Foreign direct investment (FDI) data from the Department for Promotion of Industry and Internal Trade, Ministry of Commerce and Industry</li> <li>Philanthropic grants for climate action sourced from the OECD database</li> <li>Private equity and venture capital</li> </ul>

## 2.3 DEFINING PUBLIC AND PRIVATE

We have defined **Public** as government-owned/administered institutions such as bilateral or multilateral development finance institutions, climate funds, national and state government departments, line ministries, municipalities, central and state PSUs, etc.

We have defined **Private** as institutions not owned by the government—such as commercial, financial institutions, privately-owned special purpose vehicles, non-governmental organizations, independent domestic and international institutional investors, households, corporations, private equity, venture capital, infrastructure funds, etc.

**Table 2:** Classification of sources of finance into public and private

Entity	Suggested classification
Climate funds	Public
Commercial financial institutions (providers of private debt capital like commercial and investment banks)	Private
Corporate actors (non-energy corporations)	Private
Government budgets	Public
Households	Private
Institutional investors (insurance companies, pension funds, foundations, and endowments)	Private
NGOs, philanthropic Institutions	Private
Private equity, venture capital, infrastructure funds	Private
Project developers (entities designing, commissioning, operating, and maintaining emissions reduction projects)	Private
Central and state PSUs	Public
Public financial institutions - Bilateral	Public
Public financial institutions - Multilateral	Public
Public financial institutions - National	Public

Financing has been labeled as **Domestic**, where funds flow from the account of the Government of India (both at the national and subnational tiers) or if they are raised by public and/or private entities (including residential, commercial, and institutional) within the territorial jurisdiction of India. Any fund raised outside India by issuing bonds, through external commercial borrowings, foreign equity, or by using any other financial instrument like concessional debt and grants is classified as **International** financing.

## 2.4 DEFINING DISBURSEMENT AND END USE

For the purpose of this study, we have defined disbursement as the actual finance flows from the sources and intermediaries to the end-recipient/s. Sources of finance include Union and State Government budgets, PSUs, private and state-owned commercial financial institutions, FDI, corporations, bilateral and multilateral development finance institutions, residential, commercial, and institutional investors, private equity, venture capital and infrastructure funds, and philanthropy.

Finance can flow through public or private channels through a variety of financial instruments such as balance sheet financing (debt portion), balance sheet financing (equity portion), government budgetary expenditure, grants, low-cost project debt, project-level equity, and project-level market rate debt.

The end uses of these funds are defined according to the type of activities being financed. This includes mitigation activities in clean energy, energy efficiency, clean transportation sectors and adaptation activities in disaster risk management, flood and cyclone mitigation, drought management, and on-farm agriculture (see **Table 3**). We have further disaggregated each of these sectoral investments into a number of subsectors.

**Table 3:** Disaggregation of investments into sectors and subsectors

Sectors	Subsector
Clean Energy	<ul style="list-style-type: none"> <li>▪ Biofuel</li> <li>▪ Biogas Energy</li> <li>▪ Biomass and Waste</li> <li>▪ Energy Storage</li> <li>▪ Hydro Energy</li> <li>▪ Renewable Energy – Multiple</li> <li>▪ Research and Development</li> <li>▪ Rooftop Solar PV</li> <li>▪ Solar PV</li> <li>▪ Solar Thermal</li> <li>▪ Wind – Onshore</li> <li>▪ Wind - Offshore</li> </ul>
Clean Transportation	<ul style="list-style-type: none"> <li>▪ Bicycle Sharing</li> <li>▪ Dedicated Freight Corridor</li> <li>▪ Electric Vehicle (including Charging Infrastructure)</li> <li>▪ Electronic Trolley Bus</li> <li>▪ Mass Rapid Transit System (MRTS)</li> <li>▪ Public Transportation</li> <li>▪ Research and Development</li> </ul>

Sectors	Subsector
<b>Energy Efficiency</b>	<ul style="list-style-type: none"> <li>▪ Energy Conservation</li> <li>▪ Energy-efficient Appliances</li> <li>▪ Energy-efficient Equipment</li> <li>▪ Green Buildings</li> <li>▪ Green Energy Corridor</li> <li>▪ Process Efficiency</li> <li>▪ Research and Development</li> <li>▪ Smart Grids</li> <li>▪ Transmission and Distribution</li> </ul>
<b>Climate Adaptation</b>	<ul style="list-style-type: none"> <li>▪ Disaster Risk Management (previously Disaster, Monitoring, and Emergency Response Systems)</li> <li>▪ Flood and Cyclone Mitigation</li> <li>▪ Drought Management</li> <li>▪ Agriculture (on-farm adaptation-related activities)</li> </ul>

## 2.5 DEFINING SECTORAL COVERAGE

We have aligned the sectoral view and taxonomy with the India Landscape 2022 report.<sup>3</sup>

Accordingly, we have classified the tracked green finance investments into the following sectors:

**Table 4:** Sectoral coverage of the Landscape of Green Finance 2024

Clean energy
<ul style="list-style-type: none"> <li>▪ Wind - construction and operation of facilities</li> <li>▪ Solar/Rooftop Solar PV - construction and operation of solar power plant</li> <li>▪ Solar Thermal - construction and operation of systems like solar water heaters, solar heating systems, solar cooling system</li> <li>▪ Hydro-construction and operation of facilities</li> <li>▪ Tidal - construction and operation of facilities</li> <li>▪ Geothermal - construction and operation of facilities</li> <li>▪ Biomass Energy/Biogas - construction and operation of facilities</li> <li>▪ Research and Development for renewable energy equipment - R&amp;D for the creation of new and improved RE products and technologies</li> </ul>
Energy efficiency
<ul style="list-style-type: none"> <li>▪ Smart Grids - Setting up of smart grid infrastructure (will support both conventional and renewable power)</li> <li>▪ Green Energy Corridors - Setting up transmission and distribution network</li> <li>▪ Process efficiency due to employment of products, services, and technologies that are considered energy efficient - Specific plants where these energy efficiency measures are employed in manufacturing and asset operations</li> <li>▪ Green Buildings - Structure as well as application of processes that are green, sustainable, and resource-efficient throughout the lifecycle of the building from design, construction, operation and maintenance, renovation, etc.</li> <li>▪ Renovation, upgradation, and modernization of existing building stock - Performance upgrades of existing building stock only (including commercial and residential buildings)</li> <li>▪ Research and Development for energy efficiency products - R&amp;D for the creation of new and improved energy efficiency products and technologies</li> <li>▪ Manufacturing of energy-efficient appliances - Manufacturer of the product/technology and its key components. Examples can be seen in lighting appliances, building materials, fans, motors, transformers, pumps, compressors, and consumer durables like air conditioners, ceiling fans, washing machines, etc, that comply with certain Standards and Labels</li> </ul>
Clean transportation
<ul style="list-style-type: none"> <li>▪ Low-emission Vehicles - Ownership of the asset. Examples of low-emission public transport include urban rail transit, Bus and Mass Rapid Transit systems, and electric vehicles (trains, trams, buses). Examples of private and freight vehicles include cars, buses, and other vehicles.</li> <li>▪ Charging Infrastructure (public and private) - While home and work can be considered private investments, parking and battery electric vehicle (BEV) charging investments can be regarded as public.</li> </ul>

<sup>3</sup> <https://www.climatepolicyinitiative.org/publication/landscape-of-green-finance-in-india-2022/>



## 2.6 DEFINING FINANCIAL INSTRUMENTS

We have captured grants, low-cost (including concessional) and market-term debt, project-level equity, and balance sheet financing (i.e., a direct debt or equity investment by a company or financial institution, making a gearing ratio assumption of 70:30 for debt and equity). While we acknowledge the importance of risk management instruments like guarantees and insurance and have included them in our consolidated database, we have, nevertheless, excluded them from the total tracked green finance coverage for mitigation sectors at this stage. This is primarily due to the difficulty in tracking the disbursement of funds from the guarantor/insurer. We have, however, included crop insurance under on-farm adaptation-related interventions from central and state government as these represent disbursement of funds. Furthermore, we have not covered transactions through any instrument designed to cover full or partial financial losses arising out of a non-repayment of debt in this phase of the study. Table 5 lists the various financial instruments used in our analysis.

**Table 5:** List of financial instruments used in this study

Data source	Source instrument	Study instrument
Union and State Government Budget	<ul style="list-style-type: none"> <li>Grants-in-Aid</li> <li>Inter-Account Transfer</li> <li>Internal and Extra Budgetary Resources</li> <li>Investments</li> <li>Loans and Advances</li> <li>Other Expenditure</li> <li>Project Expenditure</li> <li>Subsidies</li> </ul>	<ul style="list-style-type: none"> <li>Government Budgetary Expenditure</li> </ul>
BloombergNEF and IJ Global	<ul style="list-style-type: none"> <li>Balance Sheet Financing</li> <li>Term Loan</li> </ul>	<ul style="list-style-type: none"> <li>Balance sheet financing (Debt portion)</li> <li>Balance sheet financing (Equity portion)</li> <li>Low-cost project debt</li> <li>Project-level equity</li> <li>Project-level market rate debt</li> </ul>
OECD CRS	<ul style="list-style-type: none"> <li>Official Development Assistance (ODA)</li> <li>Other Official Flows (OOF)</li> <li>Private Development Finance</li> </ul>	<ul style="list-style-type: none"> <li>Grant</li> <li>Low-cost project debt</li> <li>Project-level equity</li> </ul>
Foreign Direct Investment	<ul style="list-style-type: none"> <li>Project Equity</li> </ul>	<ul style="list-style-type: none"> <li>Balance sheet financing (Equity portion)</li> </ul>
PSU Annual Financial Statements	<ul style="list-style-type: none"> <li>Balance Sheet Financing</li> <li>Project Debt</li> <li>Administrative Expenditure</li> </ul>	<ul style="list-style-type: none"> <li>Balance sheet financing (Equity portion)</li> <li>Grant</li> <li>Low-cost project debt</li> <li>Unknown</li> </ul>
Vahan Dashboard	<ul style="list-style-type: none"> <li>Balance Sheet Financing</li> </ul>	<ul style="list-style-type: none"> <li>Balance sheet financing (Equity portion)</li> <li>Balance sheet financing (Debt portion)</li> </ul>
Green Building Data (collected through primary research)	<ul style="list-style-type: none"> <li>Balance Sheet Financing</li> <li>Debt</li> <li>Equity</li> </ul>	<ul style="list-style-type: none"> <li>Balance sheet financing (Equity portion)</li> <li>Balance sheet financing (Debt portion)</li> </ul>

### 3. DATA COLLECTION AND SCOPE OF ACCOUNTING

Following an extensive data scoping exercise, we have cleaned the datasets and removed any possible double counting. Where finance flows are detailed at the project level, we have checked the data manually for consistency of information about sources, geographies, instruments, and sectors. Wherever possible, we have corrected data gaps and inconsistencies through supplementary research and engagement with our review group of experts. For each of the data sources referred to in this study, the level of data granularity is indicated in Table 6.

**Table 6:** Level of data granularity

Category	Source	Data source	Level of granularity
Domestic	Public	Government Budgets	Aggregated (Disaggregated by states/UTs and sectors)
		PSU Annual Reports	Aggregated (Project-level in some cases)
		CERC/SERC Tariff Orders	Aggregated
	Private	BloombergNEF	Project-level
		IJ Global	Project-level
		Green Buildings	Project-level
		Electric Vehicles	OEM/Vehicle category-level
		Energy-efficient Appliances	Appliance category-level
		Process Efficiency	PAT Scheme cycle-wise
		Bridge to India	Aggregated/Rooftop Solar Capacity Installed
Tracxn	Company-level		
International	Public	OECD CRS (ODA & OOF)	Project-level
	Private	DPIIT, Ministry of Commerce and Industry (FDI Data)	Project-level
		OECD CRS (Philanthropy)	Project-level
		Tracxn	Company-level

#### 3.1 ACCOUNTING BY DATA SOURCES

##### 3.1.1 UNION AND STATE GOVERNMENT BUDGETS

In this study, we have classified all funds moving out of the Indian exchequer (central and state government treasury) as sources of domestic public funds. Accordingly, we analyzed the Annual Budget of the following central ministries and all the states and union territories of India<sup>4</sup> and collected data corresponding to the relevant project codes. Furthermore, instead of 'budget estimates' or 'revised estimates', we analyzed the 'actuals' for both the financial years being considered for this study (FY 2020-21 and FY 2021-22).

<sup>4</sup> In 2019, the state of Jammu and Kashmir was bifurcated into two union territories - Union Territory of Jammu and Kashmir, and Union Territory of Ladakh vide The Jammu and Kashmir Reorganisation Act, 2019 of the Government of India (<https://cdnbbsr.s3waas.gov.in/s3ec01a2d10d355cdebc879e4fc6ecc6f6/uploads/2023/03/2023031045.pdf>)

We referred to the detailed demand for grants of the following line ministries in the Union Budget 2020-21 and 2021-22 (Actuals).

1. Ministry of New and Renewable Energy (<https://mnre.gov.in/>)
2. Ministry of Environment, Forests and Climate Change (<https://moef.gov.in/>)
3. Ministry of Power (<https://powermin.nic.in/>)
4. Ministry of Heavy Industries and Public Enterprises (<https://dhi.nic.in/>)
5. Ministry of Housing and Urban Affairs (<http://mohua.gov.in/>)
6. Ministry of Agriculture (<https://agricoop.nic.in/en>)
7. Ministry of Jal Shakti (<http://jalshakti-dowr.gov.in/>)
8. Ministry of Home Affairs (<https://www.mha.gov.in/>)
9. Ministry of Railways (<https://indianrailways.gov.in/>)
10. Ministry of Earth Sciences (<https://www.moes.gov.in/>)

We have carried out an analysis of the annual budgets of all 28 states and eight Union Territories of India. The state of Jammu and Kashmir was reorganized into the Union Territory of Jammu and Kashmir and the Union Territory of Ladakh via The Jammu and Kashmir Reorganization Act, 2019, dated 9 August 2019. The Union Territory of Dadra and Nagar Haveli and the Union Territory of Daman and Diu were merged to form the Union Territory of Dadra and Nagar Haveli and Daman, and Diu vide [The Dadra and Nagar Haveli and Daman and Diu \(Merger of Union Territories\) Act, 2019](#) dated 9 December 2019.

The state budgets included the following:

- |                       |                    |                               |
|-----------------------|--------------------|-------------------------------|
| 01. Andhra Pradesh    | 13. Kerala         | 25. Telangana                 |
| 02. Arunachal Pradesh | 14. Madhya Pradesh | 26. Tripura                   |
| 03. Assam             | 15. Maharashtra    | 27. Uttar Pradesh             |
| 04. Bihar             | 16. Manipur        | 28. Uttarakhand               |
| 05. Chhattisgarh      | 17. Meghalaya      | 29. West Bengal               |
| 06. Goa               | 18. Mizoram        | 30. Andaman & Nicobar Islands |
| 07. Gujarat           | 19. Nagaland       | 31. Chandigarh                |
| 08. Haryana           | 20. Odisha         | 32. Dadra & Nagar Haveli      |
| 09. Himachal Pradesh  | 21. Punjab         | 33. Daman and Diu             |
| 10. Jammu and Kashmir | 22. Rajasthan      | 34. Delhi                     |
| 11. Jharkhand         | 23. Sikkim         | 35. Lakshadweep Islands       |
| 12. Karnataka         | 24. Tamil Nadu     | 36. Puducherry                |

From each state budget statement, we identified the following project codes and included the corresponding outlays in our tracked green finance (climate-related activities)<sup>5</sup>:

- 2045 Other Taxes and Duties on Commodities and Services
- 2053 District Administration
- 2216 Housing
- 2217 Urban Development
- 2552 North Eastern Areas
- 2801 Power
- 2810 New and Renewable Energy
- 3055 Road Transport
- 3075 Other Transport Services
- 3425 Other Scientific Research
- 3435 Ecology and Environment
- 4217 Capital Outlay on Urban Development
- 4552 Capital Outlay on NEA
- 4801 Capital Outlay on Power Projects
- 4810 Capital Outlay on New and Renewable Energy
- 5055 Capital Outlay on Road Transport
- 5075 Capital Outlay on Other Transport Services
- 6217 Loans for Urban Development
- 6801 Loans for Power Projects
- 7055 Loans for Road Transport

The total transfer of financial resources from the Union Government to the states consists of those determined by the Finance Commission (FC) in its recommendations (which include states' share in central taxes and other grants) and the plan and non-plan grants (which include the funds for Centrally Sponsored Schemes). It is to be noted here that the government did away with the Plan and Non-Plan Classification of government expenditure from FY 2017-18.<sup>6</sup>

The constitutionally determined transfers from the Union Government to state governments are explained as follows:

1. At present, the sharable/divisible pool of central tax revenue comprises the total revenue collected from central taxes less the amount collected from cess, surcharge, and taxes of Union Territories, and an amount equivalent to the cost of collection of central taxes. The 15th

<sup>5</sup> List of Major and Minor Heads of Account of Union and States, Controller General of Accounts, Department of Expenditure, Ministry of Finance (<http://cga.nic.in/DownloadPDF.aspx?filenameid=1537>)

<sup>6</sup> Plan - Non Plan Classification was done away with from Fiscal 2017-18, Press Information Bureau, Government of India, February 29, 2016 (<https://pib.gov.in/newsite/PrintRelease.aspx?relid=136996>)

FC recommended a transfer of 41% of the shareable/divisible pool of central tax revenue to states with regard to vertical distribution<sup>7</sup>. In recommending horizontal distribution, it used broad parameters of population as per 2011 census (15% weight), demographic changes in population (12.5% weight), forest and ecology (10 % weight), area (15% weight), income distance (45% weight) and tax & fiscal efforts (2.5% weight).

2. The “Post-Devolution Revenue Deficit Grant<sup>8</sup>”, determined by the 15th FC was awarded to states as per their projected fiscal positions.
3. The third component, “Local Bodies Grant” is determined under Article 275 (1) of the Constitution and consists of grants to both urban and rural local bodies.
4. The fourth component “Disaster Management Grants” was set up in line with the provisions of the Disaster Management Act. The 15th FC recommended setting up Mitigation Funds at both the national and state levels, with the fund to be used for local level and community-based interventions that reduce risks and promote environment friendly settlements and livelihood practices.

In addition to this, the Centre determines the grants to the states as a part of fund allocation for Centrally Sponsored Schemes. In most cases, the Union Government and the states fund these schemes at a 60:40 ratio. In some cases, the funding ratio could be 80:20. In the case of northeastern states, 90% of the funds come from the central government. These funds are disbursed through central and state nodal agencies under different government schemes/projects. The financial instruments deployed are central and state subsidies, project-level debt and equity, government budgetary grants, guarantees, viability gap funding, capacity development and technical assistance, etc.

### 3.1.2 ORGANIZATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD) CREDITOR REPORTING SYSTEM

In this study, the international public green finance flows covered are limited to the primary capital flows directed from bilateral and multilateral development finance institutions towards the direct and indirect mitigation (and adaptation) efforts in India. To determine what constitutes climate-related investment by international public actors, we have referred to the methodology provided by the members of the OECD’s Development Assistance Committee (DAC), Rio Markers<sup>9</sup> for Climate. The relevant dataset is publicly available through the Creditor Reporting System (CRS) database.<sup>10</sup>

We have tracked the Official Development Assistance (ODA), Other Official Flows (OOF), and philanthropic investments through the bilateral and multilateral climate-related development finance, and gross disbursements reported to the OECD-DAC-CRS system for 2020 and 2021.

7 It is at the same level of 42% of the divisible pool as recommended by the 14th FC. However, due to the changed status of the erstwhile State of Jammu and Kashmir into the new Union Territories of Ladakh and Jammu and Kashmir, the required adjustment of about 1% has been made. The Report of the Fifteenth Finance Commission (FC), Press Information Bureau, Govt. of India, February 1, 2021 (<https://pib.gov.in/pressreleasepage.aspx?prid=1693868>)

8 Post-Devolution Revenue Deficit Grant is a grant given to states under the “Distribution of Revenues” Order to help them deal with their burgeoning revenue deficit.

9 Organization for Economic Co-operation and Development (OECD) 2016. “OECD DAC Rio Markers for Climate: Handbook” Paris, OECD. Available at: [http://www.oecd.org/dac/environmentdevelopment/Revised%20climate%20marker%20handbook\\_FINAL.pdf](http://www.oecd.org/dac/environmentdevelopment/Revised%20climate%20marker%20handbook_FINAL.pdf)

10 Organization for Economic Co-operation and Development (OECD). 2022. “Climate Related Development Finance at the activity level”. Paris: OECD’s Development Assistance Committee (DAC). Available at: <http://www.oecd.org/dac/stats/climatechange.htmhttps://stats.oecd.org/Index.aspx?datasetcode=CRS1#>

The data is available for the calendar year starting from January and ending in December. In our study, however, we have made use of the Indian financial year, which starts in April and ends in March. Since the OECD data is not disaggregated by month, we have made an exception and considered the data as is for our analysis. In other words, we have not adjusted the data for financial year accounting.

The OECD CRS includes reporting from bilateral and multilateral development finance institutions, government agencies, and philanthropies. The finance is qualified by marking 'Principal' or 'Significant' mitigation and adaptation objectives and is counted fully or partially towards mitigation and adaptation finance for relevant sectors and subsectors as per the scope of the study. The OECD sectors included in the mitigation data are General Environment Protection, Energy generation, Renewable sources, Energy distribution, Energy Policy, and Transport & Storage. Similarly, the OECD sectors included in the adaptation data are General Environment Protection, Other Social Infrastructure and Services, Agriculture,, Humanitarian Aid, Other Multisectors, etc. The relevant subsectors are assigned based on the project descriptions. We identified all the relevant transactions and mapped them with corresponding sectors and subsectors. To avoid duplicity (double counting) with other sources of finance, we omitted all the transactions where the government or a PSU like the Indian Renewable Energy Development Agency (IREDA) is a beneficiary of the funds.

### 3.1.3 BLOOMBERG NEW ENERGY FINANCE AND IJ GLOBAL DATABASES

Bloomberg New Energy Finance (BNEF) and IJ Global provide project-wise transaction-level data. However, in most cases, the transaction value is not captured. In this study, we have used a proxy methodology to estimate them based on the capacity addition (MW) for a given project. We have used the sector-wise capital cost norm per MW as suggested by state-wise electricity regulatory commissions (SERC) tariff orders across states in India.

The gearing ratio is the ratio of a project's long-term debt to the total capital invested. Wherever given, we have directly used the gearing ratio to calculate the transaction value and break it down into the corresponding debt and equity components. In all other cases, we have assumed a debt-to-equity ratio of 70:30 to compute the project transaction value.

## FOREIGN DIRECT INVESTMENT

The Department for Promotion of Industry and Internal Trade (DPIIT),<sup>11</sup> Ministry of Commerce and Industry, Government of India, formulates FDI policy and promotion, approval, and facilitation in the country. It defines FDI as investment by an entity/person resident outside of India in the capital of an Indian company under Schedule 1 of Foreign Exchange Management<sup>12</sup> (Transfer or Issue of Security by a Person Resident Outside India) Regulations, 2000). In the renewable energy sector, up to 100% of FDI is permitted under the Automatic Route, and no prior government approval is required.

A foreign business entity can enter India via a number of routes, subject to general conditions mentioned in the FDI Policy.<sup>13</sup>

11 The Department for Promotion of Industry and Internal Trade (DPIIT), formerly Department of Industrial Policy and Promotion (DIPP) is a central government department under the Ministry of Commerce and Industry, Govt. of India (<https://dipp.gov.in/>)

12 Foreign Exchange Management (Transfer or Issue of Security by a Person Resident Outside India) Regulations, 2000, Reserve Bank of India ([https://www.rbi.org.in/Scripts/BS\\_FemaNotifications.aspx?Id=174](https://www.rbi.org.in/Scripts/BS_FemaNotifications.aspx?Id=174))

13 Consolidated FDI Policy, Effective from October 15, 2020, DPIIT, Ministry of Commerce and Industry, Govt. of India (<https://dpiit.gov.in/sites/>)

1. As an Indian company:
  - By setting up a wholly-owned subsidiary.
  - Joint venture with an Indian entity/person.
2. Operate as a foreign company and be registered with the Registrar of Companies, Ministry of Corporate Affairs.

In this study, we have accessed the annual data published by DPIIT on sector-wise FDI in India. We have operated with the assumption that 100% of the FDI inflow in the two years was eventually disbursed to the relevant projects within this time period.

### 3.1.4 PUBLIC SECTOR UNDERTAKINGS

PSUs are government-owned corporations in which the majority (51% or more) of the paid-up share capital is held by the central government or by any state government or partly by the central government and partly by one or more state governments. They play a pivotal role in creating a positive outlook necessary to promote investment in, demand for, and supply of renewable energy, adoption of sustainable technologies and energy-efficient, and development of infrastructure for clean transportation through a range of policy and financial instruments. These entities often act as the medium or channel of delivery for external and domestic funds, but in order to eliminate any double counting, we have placed PSUs as a source of funds and not as an intermediary in the value chain.

In this study, we have considered the investments undertaken by the following PSUs in the fiscal years 2020-21 and 2021-22 for analysis as they form the most significant part of the energy sector:

- **Bureau of Energy Efficiency (BEE)** - The Government of India set up BEE in 2002 under the provisions of the Energy Conservation Act, 2001. The BEE assists in developing policies and strategies with a thrust on self-regulation and market principles within the overall framework of the Energy Conservation Act of 2001, with the primary objective of reducing the energy intensity of the Indian economy. This is to be achieved with the active participation of all stakeholders, resulting in accelerated and sustained adoption of energy efficiency in all sectors. (<https://beeindia.gov.in/>)
- **Coal India Limited (CIL)** - CIL is a state-owned coal mining and refinery company headquartered in Kolkata, West Bengal, India. It is the largest coal-producing company in the world and a Maharatna PSU.<sup>14</sup> The company contributes to around 83% of the coal production in India. In pursuance of initiatives towards the development of clean coal technology and alternate use of coal, CIL is undertaking research and exploring the possibilities for setting up coal-based methanol plants. (<http://beta.coalindia.in/>)
- **Energy Efficiency Services Limited (EESL)** - EESL is promoted by the Ministry of Power, Government of India, as a joint venture of four reputed public-sector undertakings— National Thermal Power Corporation (NTPC) Limited, Power Finance Corporation Limited., REC Limited, and Power Grid Corporation of India Limited. It is a super-energy service

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[default/files/FDI-PolicyCircular-2020-29October2020\\_0.pdf](default/files/FDI-PolicyCircular-2020-29October2020_0.pdf)

<sup>14</sup> Central Public Sector Enterprises in India are categorised into three distinct groups – Maharatna, Navratna, and Miniratna - based on their performance, operational autonomy, and strategic importance. Maharatna companies have the highest level of autonomy and financial freedom. Navratna come in the next category and have greater autonomy and financial freedom compared to Miniratna companies.

company that enables consumers, industries, and governments to effectively manage their energy needs through energy-efficient technologies. It is implementing the world's largest non-subsidized energy efficiency portfolio across sectors like lighting, buildings, e-mobility, smart metering, and agriculture. (<https://eeslindia.org/>)

- **Indian Renewable Energy Development Agency (IREDA)** - IREDA is a Mini Ratna (Category - I) Government of India Enterprise under the administrative control of the Ministry of New and Renewable Energy (MNRE). It is a public limited government company established as a Non-Banking Financial Institution in 1987 engaged in promoting, developing, and extending financial assistance for setting up projects relating to new and renewable sources of energy and energy efficiency/conservation with the motto: "ENERGY FOR EVER." (<https://www.ireda.in/>)
  - **National Hydroelectric Power Corporation Limited (NHPC)** - NHPC Limited is the largest organization for hydropower development in India. Its objective is to plan, promote, and organize an integrated and efficient development of power in all its aspects through Conventional and Non-conventional Sources in India and Abroad, including planning, investigation, research, design, and preparation of preliminary, feasibility and definite project reports, construction, generation, operation and maintenance of power stations and projects, transmission, distribution, trading and sale of power generated at stations in accordance with the national economic policy and objectives laid down by the central government from time to time and release of water and other needs to the state government as per the agreed parameters. (<http://www.nhpcindia.com/home.aspx>)
  - **National Thermal Power Corporation (NTPC) Limited** - NTPC Ltd. is India's largest energy conglomerate, promoted by the Government of India, that became a Maharatna company in May 2010. It has established itself as the dominant power major with a presence in the entire value chain of the power generation business. From fossil fuels, it has forayed into generating electricity via hydro, nuclear, and renewable energy sources. To strengthen its core business, the corporation has diversified into the fields of consultancy, power trading, training of power professionals, rural electrification, ash utilization, and coal mining as well. (<https://www.ntpc.co.in/>)
- Neyveli Lignite Corporation India Limited (NLC)** - NLC is an Indian government corporation in the fossil fuel mining sector in India and thermal power generation under the ownership of the Ministry of Coal, Government of India. Lately, it has diversified into renewable energy production and installed a solar power plant to produce electricity from photovoltaic (PV) cells and electricity from windmills. ([https://www.nlcindia.in/new\\_website/index.htm](https://www.nlcindia.in/new_website/index.htm))
- **Power Finance Corporation (PFC) Limited** - Incorporated on July 16th, 1986, PFC is a Schedule-A Navratna Central Public Sector Enterprise (CPSE) and is a leading Non-Banking Financial Corporation in the Country. It is designated as a "Nodal Agency" for the development of Integrated Power Development Scheme and Ultra Mega Power Projects and "Bid Process Coordinator" for Independent Transmission Projects. (<https://www.pfcindia.com/>)
  - **Rural Electrification Corporation (REC) Limited** - REC Limited is a public Infrastructure Finance Company in India's power sector. It is a Navratna PSU and finances and promotes rural electrification projects across India. The company provides loans to central/state sector power utilities in the country, state electricity boards, rural electric cooperatives, and private power developers. (<https://www.recindia.nic.in/>)



- **Satluj Jal Vidyut Nigam Limited (SJVN)** – SJVN Limited, a Mini Ratna, Category-I and Schedule 'A' CPSE under the administrative control of the Ministry of Power, Government of India, was incorporated on May 24, 1988, as a joint venture of the Government of India and the Government of Himachal Pradesh. SJVN aims to be a 5,000 MW company by 2023, a 12,000 MW company by 2030, and a 25000 MW company by 2040. (<https://sjvn.nic.in/>)
- **Solar Energy Corporation of India (SECI)** – SECI is a Central Public Sector Undertaking (CPSU) under the administrative control of the Ministry of New and Renewable Energy (MNRE). The company is responsible for the implementation of a number of schemes of MNRE, the major ones being the viability gap funding (VGF) schemes for large-scale grid-connected projects under Jawaharlal Nehru National Solar Mission (JNNSM), solar park scheme, and grid-connected solar rooftop scheme, along with a host of other specialized schemes such as defense scheme, canal-top scheme, Indo-Pak border scheme, etc. In addition, SECI has ventured into solar project development on a turnkey basis for several PSUs. The company also has a power trading license and is active in this domain through the trading of solar power from projects set up under the schemes being implemented by it. (<https://seci.co.in/>).

For both years, we have studied the consolidated financial statements—balance sheet, profit and loss account, and cash flow statement—to identify investments undertaken by these PSUs in the clean energy, energy efficiency, and clean transportation sectors. We have collectively classified all administrative expenditures like the acquisition of property, plant and equipment, salaries and allowances, and other overhead investments through the “Unknown” financial instrument in our representation of tracked investments in the Sankey diagram. We have not included any non-cash expenses like depreciation, amortization, stock-based compensation, provision for bad debts, etc., in our analysis.

## 3.2 ACCOUNTING BY SECTORS

### 3.2.1 ELECTRIC VEHICLES

We have prepared a detailed database of different original equipment manufacturers (OEMs) by accessing data from the Vahan dashboard for the registration of electric vehicles.<sup>15</sup> This dashboard is owned by the Ministry of Road Transport and Highways of the GOI. Our database includes the list of OEMs for all segments of BEVs, 2-wheelers, 3-wheelers auto, golf carts, passenger 4-wheeled vehicles, light commercial vehicles, and buses. We have calculated the private investment in the clean transportation sector by identifying the average ex-showroom price of the vehicles and multiplying it with segment-wise annual sales for both years. Additionally, we have captured other budgetary outlay made by the government or DFI funds flowing into these sectors.

15 Vahan Dashboard. Accessible at: <https://vahan.parivahan.gov.in/vahan4dashboard/>

In terms of the financial instrument used for the deployment of funds, we have assumed that 30% of these investments are balance sheet financed (equity component), and 70% of the investments are balance sheet financed (debt component). The public demand incentives through the FAME scheme<sup>16</sup> have been included as grants to avoid double counting of public finance through the value chain of the sales of electric vehicles in India.<sup>17</sup>

### 3.2.2 GREEN BUILT INFRASTRUCTURE

A green building is one that, in its design, construction, or operation, uses less water, improves energy efficiency, conserves natural resources, recycles waste, and provides healthier spaces for occupants, as compared to a conventional building. These buildings can be commercial—e.g., offices, malls, hotels, retail establishments, educational institution buildings, hospitals—or residential private dwellings and multifamily residential buildings.

The development of a green building includes the application of processes that are sustainable and resource-efficient throughout the lifecycle of the building—from design, construction, operation and maintenance, renovation, etc. It also includes performance upgrades of existing building stock through energy conservation retrofits, appliance or equipment upgrades, and the use of alternative construction materials. We have collected data from the following institutions that provide ratings and green building certification to green buildings in India:

- **ASSOCHAM Green and Eco-friendly Movement (GEM)** – GEM aims to address the sustainability of a given development throughout its lifecycle from design through construction to operation. It is based on BEE ECBC 2017 and NBC 2016. Through this initiative, it awards ratings to residential, commercial, hotels, colleges, universities, schools, factory buildings, and related developments.
- **Excellence in Design for Greater Efficiencies (IFC-EDGE)** – EDGE, part of the International Finance Corporation (IFC), is an online platform, a green building standard and a certification system to steer construction in rapidly urbanizing economies onto a more low-carbon path. It can be used for buildings of all vintages, including new construction, existing buildings, and major retrofits.
- **Green Rating for Integrated Habitat Assessment (GRIHA) Council** – GRIHA is a rating tool that evaluates the environmental performance of a building holistically over its entire life cycle, thereby providing a definitive standard for what constitutes a ‘green building.’ It was developed by The Energy and Resources Institute and adopted as the national rating system for green buildings by the GOI in 2007.
- **Indian Green Building Council (IGBC)** – IGBC, part of the Confederation of Indian Industry, was formed in the year 2001. It offers a wide array of services, which include developing new green building rating programs, certification services, and green building training programs.
- **Leadership in Energy and Environmental Design (LEED)** – LEED provides a framework for healthy, highly efficient, and cost-saving green buildings. LEED certification is a globally recognized symbol of sustainability achievement and leadership. Green Business Certification

<sup>16</sup> FAME (Faster Adoption and Manufacturing of Electric and Hybrid Vehicles) India Scheme is a part of the [National Electric Mobility Mission Plan](#) under the Department of Heavy Industries, Ministry of Heavy Industries and Public Enterprises, Government of India.

<sup>17</sup> In alignment with the OECD (2013), finance qualifies as public if carried out by central, state or local governments and their agencies at their own risk and responsibility.

Inc. (GBCI) manages the certification process for all LEED rating systems in India.

- **WELL Certification** - WELL is the leading tool for advancing health and well-being in buildings globally. Projects pursuing WELL Certification can earn points based on performance outcomes for various policy, design, and operational strategies and can achieve one of four certification levels: Bronze, Silver, Gold, or Platinum.

In this study, we collected the total certified green building area by each of the above rating agencies. We have not included site areas that are not constructed or projects that are registered with the rating agency but have not been awarded a certification by 31 March 2022. Based on our cost assumptions, we have calculated the incremental greening cost per square meter. In terms of the financial instrument used for the deployment of funds, we have considered that 25% of these investments are balance sheet financed - equity component, and 75% of the investments are balance sheet financed - debt component.

### 3.2.3 SMART GRIDS

A smart grid is an electrical grid with automation, communication, and IT systems that can monitor power flows from points of generation to points of consumption (even down to the appliance level) and control the power flow or curtail the load to match generation in real-time or near real-time. Smart grids can be achieved by implementing efficient transmission and distribution systems, system operations, consumer integration, and renewable integration. Smart grid solutions help to monitor, measure, and control power flows in real-time, which can contribute to the identification of losses, and thereby, appropriate technical and managerial actions can be taken to arrest the losses.<sup>18</sup>

In this study, we have accessed data for smart grid projects in India from the India Smart Grid Forum (ISGF). ISGF is a public-private partnership of the Ministry of Power, GOI, that aims to accelerate the development of smart grid technologies in the Indian power sector. The mandate of ISGF is to advise the government on policies and programs for the promotion of Smart Grids in India, work with national and international agencies in standards development, and help utilities, regulators, and the industry in technology selection, training, and capacity building.

### 3.2.4 ENERGY-EFFICIENT APPLIANCES

For energy-efficient appliances, we have accessed data for the total number of mandatory and voluntary star-labelled appliances sold in India in 2020-21 and 2021-22 from the Bureau of Energy Efficiency (BEE). To compute the total finance flow corresponding to these appliances, we have considered a reference market price for each of the appliance categories and disaggregated it by its star rating. For the market reference price data, we reached out to BEE, and they provided information for several appliance categories.

<sup>18</sup> National Smart Grid Mission (NSGM), Ministry of Power, Government of India (<https://www.nsgm.gov.in/en>)

**Table 7:** List of energy-efficient appliances

Type of appliance
1. Distribution Transformer
2. Frost Free Refrigerator
3. Stationary Storage Type Electric Water Heater
4. Room Air Conditioner (Fixed Speed)
5. Room Air Conditioner (Variable Speed)
6. Color Television
7. Direct Cool Refrigerator
8. Tubular Fluorescent Lamps (TFL)
9. LED Lamps
10. Ceiling Fan
11. Monoset Pump
12. Pump Sets (Submersible and Open well Pumpsets)
13. Washing Machine (Semi/Top Load/ Front Load)
14. Computer
15. Chillers
16. Deep Freezer
17. Light Commercial AC

In terms of financing, we have assumed that 25% of the total investment is balance sheet financed (equity component). In other words, there is no debt taken by the owner of the appliance to finance her ownership. For the remaining 75%, we have assumed that 25% is balance sheet financed (equity component) and 75% is balance sheet financed (debt component). These assumptions are consistent with the loan-to-value ratios<sup>19</sup> used by financial institutions in India (banks and NBFCs) for electrical appliance loans.

### 3.2.5 ROOFTOP SOLAR

Due to the non-availability of reliable and accurate data on total primary investments in rooftop installations in India, we have used the total capacity addition (in MW) as a proxy for the capital invested. For this, we have accessed data from Bridge to India for the total capacity added - CAPEX and renewable energy service company (RESCO) models in the two years. The actual installed capacity data for both CAPEX and RESCO is consistent with our assumption of the total capacity being split 70% in CAPEX mode and 30% in RESCO mode. Next, to compute the total finance flow corresponding to rooftop solar installation, we have used the MNRE Benchmark costs for grid-connected rooftop solar photovoltaic systems and multiplied them by the total capacity installed.

In terms of financing structure, we have made the following key assumptions:

- 80% of all CAPEX funding would be through offtakers' own equity.
- 40% of all RESCO funding would be through developers' equity.
- 20% of all CAPEX and 60% of all RESCO funding would be through external debt.

<sup>19</sup> The loan-to-value ratio is a financial term used by lenders to express the ratio of a loan to the value of an asset purchased.

- Developer's equity would be a combination of own funds and equity raised from international and domestic investors.
- Debt capital would be a combination of debt raised from domestic and international lenders.

### 3.2.6 PROCESS EFFICIENCY

The Perform Achieve and Trade (PAT) Scheme is one of the initiatives under the National Mission for Enhanced Energy Efficiency, which was notified on 30 March 2012. PAT scheme is a market-based compliance mechanism to accelerate the implementation of cost-effective improvements in energy efficiency in large energy-intensive industries through certification of energy savings that could be traded. The genesis of the PAT mechanism flows out of the provision of the Energy Conservation Act of 2001 (amended in 2010).

The key goal of the PAT scheme is to mandate specific energy efficiency improvements for the most energy-intensive industries. The scheme builds on the large variation in energy intensities of different units in almost each notified sector, ranging from among the best in the world to some of the most inefficient units. The scheme envisages improvements in the energy intensity of each unit covered under it. The energy intensity reduction target mandated for each unit is dependent on its current efficiency with the reduction target being lower for the more efficient units and higher for the less efficient units.

In this study, we have accessed data for the investments reported by industry under different PAT cycles to improve the energy efficiency of their industrial processes. For the ongoing PAT cycles (and the ones undergoing audit process), we have made certain assumptions to calculate the total investment numbers and distributed these computed values proportionately between the years 2020-21 and 2021-22.

**Table 8:** Sectors included in different PAT cycles

PAT Cycle	Sectors included	Designated consumers
PAT Cycle I (2012-15)	Aluminium, Cement, Chlor-Alkali, Fertilizer, Iron & Steel, Pulp & Paper, Thermal Power Plant, and Textile	478
PAT Cycle II (2016-19)	Aluminium, Cement, Chlor-Alkali, Fertilizer, Iron & Steel, Pulp & Paper, Thermal Power Plant, Textile, DISCOMS, Railways, and Refineries	621
PAT Cycle III (2017-20)	Thermal Power Plants, Iron & Steel, Cement, Aluminium, Pulp & Paper, and Textile	116
PAT Cycle IV (2018-21)	Thermal Power Plants, Iron & Steel, Cement, Aluminium, Pulp & Paper, Textile, Petrochemicals, and Commercial Buildings (Hotels)	109
PAT Cycle V (2019-22)	Aluminium, Cement, Chlor-Alkali, Commercial Buildings (Hotels), Iron & Steel, Pulp & Paper, Textile, and Thermal Power Plant	110
PAT Cycle VI (2020-23)	Cement, Commercial buildings (Hotels), Iron and Steel, Petroleum Refinery, Pulp and Paper, and Textiles	135

We have assumed that 75% of the tracked process efficiency investments are balance sheet financed - debt component, and the remaining 25% are balance sheet financed - equity component. Based on our analysis, the years being considered for this study are covered under PAT Cycle II, PAT Cycle III, PAT Cycle IV, and PAT Cycle V.

### 3.2.7 ON-FARM ADAPTATION-RELATED ACTIVITIES IN AGRICULTURE

On-farm adaptation-related activities in the agriculture sector have been subcategorized, based on CPI's reports on Tracking and Mobilizing Private Sector Climate Adaptation Finance 2024<sup>20</sup> and the Landscape of Climate Finance in Africa 2024<sup>21</sup>, into the following:

**Table 9:** Subsectors for on-farm adaptation-related activities in agriculture

On-farm adaptation-related activities in agriculture
<ul style="list-style-type: none"> <li>▪ <b>Resilient cropping systems:</b> sustainable crops, rainfed area development, integrated farming systems, crop diversification, food grains production to improve food security, organic farming, plant protection inputs including bio-fertilizers, manure, and biopesticides.</li> <li>▪ <b>Efficient irrigation:</b> Micro irrigation, drip irrigation, irrigation water use efficiency.</li> <li>▪ <b>Agroforestry:</b> tree plantation on farmland.</li> <li>▪ <b>Soil and water conservation:</b> soil health and fertility management, soil and water conservation activities, soil reclamation, soil health card, erosion control.</li> <li>▪ <b>Crop insurance:</b> weather-based crop insurance.</li> <li>▪ <b>Research and capacity building:</b> soil and crop health surveys, testing, trials, demonstration, laboratories, weather and climate-related information services, agricultural extension services, farm mechanization, and seed certification.</li> </ul>

20 CPI 2024c. Tracking and Mobilizing Private Sector Climate Adaptation Finance. Available at: <https://www.climatepolicyinitiative.org/publication/tracking-and-mobilizing-private-sector-climate-adaptation-finance/#:~:text=Public%20actors%20dominate%20tracked%20adaptation,captured%20within%20CPI's%20tracking%20work>.

21 CPI 2024d. Landscape of Climate Finance in Africa 2024. Available at: <https://www.climatepolicyinitiative.org/publication/landscape-of-climate-finance-in-africa-2024/>

## SECTORAL COVERAGE

Line ministries:

- Ministry of Agriculture & Farmers Welfare (<https://agriwelfare.gov.in/>)
- Ministry of Jal Shakti (<https://jalshakti-dowr.gov.in/>)
- Ministry of Home Affairs (<https://www.mha.gov.in/>)

Project codes:

- 2401 crop husbandry
- 2402 soil and water conservation
- 2406 forestry and wildlife
- 2415 agricultural research and education
- 2435 other agricultural programmes
- 2511 hill areas
- 2515 other rural development programmes
- 2575 other special area programme
- 2702 minor irrigation
- 2705 command area development
- 3435 ecology and environment
- 4401 capital outlay on crop husbandry
- 4402 capital outlay on soil and water conservation
- 4406 capital outlay on forestry and wildlife
- 4415 capital outlay on agricultural research and education
- 4435 capital outlay on other agricultural programs
- 4552 capital outlay on northeastern areas
- 4702 capital outlay on minor irrigation
- 4705 capital outlay on command area development

The government's initiatives to enhance the climate resilience of the sector focus on on-farm interventions such as crop diversification, crop management, water use efficiency, soil regeneration, and weather-based insurance. This report partially tracks finance flows to adaptation-related activities in agriculture and has therefore begun with a focus on on-farm activities that are in line with the country's adaptation priorities in the sector. The government, in its various official documents, lists national agriculture adaptation strategies, policies, programs, and schemes. However, budget documents generally do not specify the expenditure for each component of these programs and schemes. Considering the report's conservative approach to tracking finance flows to climate-related activities, it recognizes that some components of these schemes are broader development-related interventions. The report, therefore,

categorizes the adaptation relevant amount for agricultural schemes, based on their adaptation-related subcomponents and objectives, especially in the country's context, into the following gradients<sup>22</sup> (see **Table 10**):

- **Absolute:** If the entirety of the scheme, including its subcomponents and objectives, is adaptation-relevant.
- **Lower bound:** If more than 50% of the subcomponents and objectives of government programs and schemes can be categorized as adaptation-related, 75% of their finance flows have been considered as adaptation finance flows.
- **Upper bound:** If less than half of the subcomponents and objectives of relevant government schemes and programs are adaptation-related, 25% of their finance flows have been considered as adaptation finance flows.

Activities at the subnational level that do not correspond to Central Government schemes have also been categorized similarly based on their descriptions in budget documents. The analysis does not include any generic developmental expenditure in the agricultural sector, such as in programs and schemes related to major, medium, and minor irrigation, command area development.

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<sup>22</sup> This methodology has been developed based on established methodologies such as the joint-MDB methodology's categorization of projects as 'principal' and 'significant' based on their climate objectives. This methodology is also followed by CPI's Global Landscape of Climate Finance Report.



**Table 10:** Key Central and State Government schemes and subcomponents, categorized by adaptation-related objectives (non-exhaustive)

Government schemes and subcomponents	Objectives	Categorization	Rationale
<b>Pradhan Mantri Fasal Bima Yojana/ Crop Insurance Scheme</b>	<ul style="list-style-type: none"> <li>▪ Providing financial support to farmers suffering crop loss/damage arising out of unforeseen events</li> <li>▪ Stabilizing the income of farmers to ensure their continuance in farming</li> <li>▪ Encouraging farmers to adopt innovative and modern agricultural practices</li> <li>▪ Ensuring the flow of credit to the agriculture sector, which will contribute to food security, crop diversification, and enhancing growth and competitiveness of the agriculture sector, besides protecting farmers from production risks.</li> </ul>	Absolute	Weather-based insurance is highly adaptation-relevant, especially in India, where the majority of farmlands are small and marginal, and agriculture is largely rainfed.
<b>Rashtriya Krishi Vikas Yojna</b>	<ul style="list-style-type: none"> <li>▪ To strengthen the farmers' efforts through the creation of required pre and post-harvest agri-infrastructure that increases access to quality inputs, storage, market facilities, etc., and enables farmers to make informed choices.</li> <li>▪ The scheme requires the drawing up of comprehensive agriculture development plans, including agro-climatic conditions, natural resources, and technology to ensure the more inclusive and integrated development of agriculture and allied sectors.</li> <li>▪ The revamped scheme includes activities such as organic farming and integrated pest management and crop diversification.</li> </ul>	Upper bound	While the scheme includes some on-farm adaptation-related components, it focuses on post-harvest activities and market linkages.
<b>National Food Security Mission</b>	<ul style="list-style-type: none"> <li>▪ Sustainable increase in the production of targeted crops through area expansion and productivity enhancement.</li> <li>▪ Restoration of soil fertility and productivity at the individual farm level.</li> <li>▪ Rise in farm-level net income.</li> </ul>	Upper bound	Food security is an adaptation measure, and maize and barley (food crops included in the scheme) are relatively more climate-resilient crops. However, the other activities do not have a clear linkage with adaptation measures.

Government schemes and subcomponents	Objectives	Categorization	Rationale
<p><b>National Project on Organic Farming</b></p>	<ul style="list-style-type: none"> <li>▪ Promote organic farming in the country by making available organic inputs, such as biofertilizers, biopesticides, as well as fruit and vegetable market waste compost and thereby generate better returns for the produce</li> <li>▪ Increase agricultural productivity while maintaining soil health and environmental safety</li> <li>▪ Reduce total dependence on chemical fertilizers and pesticides by increasing the availability and improving the quality of biofertilizers, biopesticides, and composts in the country</li> <li>▪ Convert organic waste into plant-nutrient resources</li> <li>▪ Prevent pollution and environmental degradation by proper conversion and utilization of organic waste</li> <li>▪ Establish bio fertilizers and bio pesticides production units</li> <li>▪ Set up fruit and vegetable waste compost unit</li> </ul>	<p>Lower bound</p>	<p>Majority of the objectives are adaptation relevant.</p>
<p><b>National Project on Soil Health and Fertility (National Mission on Sustainable Agriculture (NMSA))</b></p>	<ul style="list-style-type: none"> <li>▪ Make agriculture more productive, sustainable, remunerative, and climate resilient by promoting location-specific Integrated/Composite Farming Systems</li> <li>▪ Conserve natural resources through appropriate soil and moisture conservation measures</li> <li>▪ Adopt comprehensive soil health management practices based on soil fertility maps, soil test-based application of macro &amp; micronutrients, judicious use of fertilizers, etc.</li> <li>▪ Optimize utilization of water resources through efficient water management to expand coverage for achieving 'more crop per drop.'</li> <li>▪ To develop the capacity of farmers &amp; stakeholders, in conjunction with other ongoing Missions in the domain of climate change adaptation and mitigation measures</li> <li>▪ To pilot models in select blocks for improving the productivity of rainfed farming by mainstreaming rainfed technologies</li> <li>▪ Departmental/Ministerial coordination for accomplishing key deliverables of the National Mission for Sustainable Agriculture under the aegis of the National Action Plan on Climate Change.</li> </ul>	<p>Absolute</p>	<p>All objectives are adaptation-relevant.</p>

Government schemes and subcomponents	Objectives	Categorization	Rationale
<b>Rainfed Area Development and Climate Change (NMSA)</b>	<ul style="list-style-type: none"> <li>▪ Increase agricultural productivity of rainfed areas sustainably by adopting appropriate farming system-based approaches.</li> <li>▪ Minimize the adverse impact of possible crop failure due to drought, flood, or uneven rainfall distribution through the diversified and composite farming systems.</li> <li>▪ Restore confidence in rainfed agriculture by creating sustained employment opportunities through improved on-farm technologies and cultivation practices.</li> </ul>	Absolute	Prioritizes climate-resilient cropping practices. Focuses on Integrated Farming Systems for enhancing productivity and minimizing risks associated with climatic variability.
<b>Climate Change and Sustainable Agriculture: Monitoring, Modelling and Networking (NMSA)</b>	<ul style="list-style-type: none"> <li>▪ Provide creation and bidirectional (land/farmers to research/scientific establishments and vice versa) dissemination of climate change-related information and knowledge by way of piloting climate change adaptation/mitigation research/model projects in the domain of climate-smart, sustainable management practices and integrated farming system suitable to local agro-climatic conditions.</li> </ul>	Absolute	Fully adaptation relevant.
<b>National Project on Agro-Forestry (NMSA)</b>	<ul style="list-style-type: none"> <li>▪ Encourage and expand tree plantation in a complementary and integrated manner with crops and livestock.</li> <li>▪ Ensure availability of quality planting material like seeds, seedlings, clones, hybrids, improved varieties, etc.</li> <li>▪ Popularise various agroforestry practices/models suitable for different agroecological regions and land use conditions.</li> <li>▪ Create database, information, and knowledge support in the area of agroforestry.</li> <li>▪ Provide extension and capacity-building support to the agroforestry sector.</li> </ul>	Lower bound	Combats soil erosion and improves soil health.
<b>National Bamboo Mission (NMSA)</b>	<ul style="list-style-type: none"> <li>▪ Increase the area under bamboo plantation in non-forest government and private lands to supplement farm income and contribute towards resilience to climate change as well as availability of quality raw material requirement of industries.</li> </ul>	Lower bound	Bamboo cultivation leads to biodiversity conservation, crop diversification, and soil regeneration.
<b>Paramparagat Krishi Vikas Yojana (NMSA)</b>	<ul style="list-style-type: none"> <li>▪ Promotion of commercial organic production through certified organic farming.</li> <li>▪ Pesticide residue-free produce.</li> <li>▪ Raise farmers' incomes and create a potential market for traders.</li> <li>▪ It will motivate the farmers for natural resource mobilization for input production.</li> </ul>	Lower bound	All on-farm-related objectives are adaptation relevant.

Government schemes and subcomponents	Objectives	Categorization	Rationale
<b>PMKSY: Per Drop More Crop (Pradhan Mantri Krishi Sinchayee Yojana (PMKSY))</b>	<ul style="list-style-type: none"> <li>▪ Increase water use efficiency at the farm level through Micro Irrigation technologies, i.e., drip and sprinkler irrigation systems.</li> <li>▪ Water saving and reduced fertilizer usage through fertigation, labor expenses, other input costs, and overall income enhancement of farmers.</li> <li>▪ It also supports micro-level water harvesting, storage, management, etc. activities to supplement source creation for micro irrigation.</li> </ul>	Lower bound	Drip and sprinkler irrigation help in groundwater conservation, efficient water use, and supply of irrigation to rainfed farmlands.
<b>Watershed Development Component (PMKSY)</b>	<ul style="list-style-type: none"> <li>▪ It aims to improve the productive potential of rainfed/degraded land through integrated watershed management, to strengthen community-based local institutions for the promotion of livelihoods &amp; watershed sustainability, and to improve the efficiency of watershed projects through cross-learning and incentive mechanisms.</li> </ul>	Lower bound	Integrated watershed management provides coping mechanisms for climate stressors through flood prevention, drought mitigation, and planting for erosion control.
<b>Har Khet ko Paani: Repair, Renovation and Restoration (PMKSY)</b>	<ul style="list-style-type: none"> <li>▪ Source augmentation, distribution, groundwater development, lift irrigation, supplementing rainwater harvesting beyond Integrated Watershed Management Programme (IWMP) &amp; MGNREGA, repair, restoration, and renovation of traditional water bodies.</li> </ul>	Lower bound	Restoration of water bodies, groundwater recharge, improvement of catchment areas, and community-based sustainable management of water bodies are adaptation measures.
<b>Accelerated Irrigation Benefit Programme (PMKSY)</b>	<ul style="list-style-type: none"> <li>▪ Extension Renovation &amp; Modernization projects benefiting drought-prone/tribal areas and flood-prone areas are eligible for 90% grant assistance.</li> <li>▪ Major/medium projects in the Special Category States and projects in the undivided Karaput, Bolangir, and Kalahandi districts of Orissa are also eligible for 90% grant assistance.</li> <li>▪ Other major/medium projects are eligible for 25% grant assistance under AIBP.</li> <li>▪ Surface minor irrigation schemes fulfilling criteria specified in the guidelines of the Special Category States are eligible for 90% grant assistance, and surface minor irrigation schemes of the non-special category states fulfilling eligibility criteria and benefiting drought-prone/tribal areas are also eligible for 90% grant assistance.</li> </ul>	Upper bound	While the program also includes major and minor irrigation, this sub-component of PMKSY has been considered due to its focus on drought-prone areas and vulnerable communities.
<b>Har Khet ko Paani: Surface Minor Irrigation and Groundwater Development (PMKSY)</b>	<ul style="list-style-type: none"> <li>▪ The surface minor irrigation component focuses on the faster completion of ongoing major and medium Irrigation projects. It covers special areas, namely, drought- and flood-prone areas, as well as tribal areas and desert development. The groundwater development component provides groundwater irrigation facilities to women farmers and farmers from marginalized communities in areas other than those classified as over-exploited, critical, and semi-critical based on groundwater levels and quality.</li> </ul>	Upper bound	<p>Surface minor irrigation focuses on flood and drought-prone areas and vulnerable communities.</p> <p>Groundwater development focuses on marginalized communities and women farmers and includes area specifications based on groundwater levels.</p>

Government schemes and subcomponents	Objectives	Categorization	Rationale
<b>Soil Health Card</b>	<ul style="list-style-type: none"> <li>▪ Scheme rolls out a decentralized system of soil testing, which will help in developing a nationwide soil fertility map on a GIS platform that can easily be integrated with the real-time decision support systems being developed.</li> </ul>	Absolute	Fully adaptation relevant.
<b>National Mission on Horticulture/ Mission for Integrated Development of Horticulture</b>	<ul style="list-style-type: none"> <li>▪ Promotes holistic growth of the horticulture sector, including bamboo and coconut, through area-based regionally differentiated strategies, which include research, technology promotion, extension, post-harvest, management, processing, and marketing, in consonance with the comparative advantage of each State/region and its diverse agro-climatic features.</li> <li>▪ Encourages aggregation of farmers into farmer groups like Farmers interest groups/F armer producer organizations and Farmer producer companies to bring economy of scale and scope.</li> <li>▪ Enhances horticulture production, augments farmers, income, and strengthens nutritional security.</li> <li>▪ Improves productivity by way of quality germplasm, planting material, and water use efficiency through micro irrigation.</li> </ul>	Lower bound	Most objectives are adaptation-relevant, including crop diversification, rejuvenation of senile plantations, horticulture development based on diverse agro-climatic features, use of efficient irrigation, and capacity building.
<b>Sub-Mission on Agricultural Extension (National Mission for Agriculture Extension and Technology (NMAET))</b>	<ul style="list-style-type: none"> <li>▪ Focuses on awareness creation and enhanced use of appropriate technologies in agriculture &amp; allied sectors. Gains made in the past will be consolidated and strengthened through increased penetration of extension functionaries.</li> </ul>	Upper bound	Digital initiatives include the integration of weather forecasting and service delivery. However, most objectives are broader development initiatives.
<b>Sub-Mission on Agricultural Mechanization (NMAET)</b>	<ul style="list-style-type: none"> <li>▪ Mainly caters to the needs of the small and marginal farmers through institutional arrangements such as custom hiring, mechanization of selected villages, subsidy for procurement of machines &amp; equipment, etc.</li> </ul>	Upper bound	Mechanization helps improve crop productivity and enhance efficiency. However, most objectives are broader development initiatives.
<b>Sub-Mission on Seed and Planting Material (NMAET)</b>	<ul style="list-style-type: none"> <li>▪ The interventions cover the entire gamut of the seed chain, from nucleus seed to supply to farmers for sowing and to the major stakeholders in the seed chain. They also provide support for infrastructure to create an enabling environment for the development of the sector.</li> <li>▪ Focuses on strengthening the “Protection of Plant Varieties and Farmer” Rights Authority (PPV&amp;FRA) in order to put in place an effective system for the protection of plant varieties and rights of farmers and plant breeders and to encourage the development of new varieties of plants.</li> </ul>	Lower bound	Initiatives focus on access of farmers to better quality seeds, different seed varieties for varietal replacement, seed treatment for farm-saved seeds, and research and development, which are adaptation-relevant activities.

Government schemes and subcomponents	Objectives	Categorization	Rationale
<b>Sub-Mission on Plant Protection and Plant Quarantine (NMAET)</b>	<ul style="list-style-type: none"> <li>Envisages an increase in agricultural production by keeping the crop disease-free using scientific and environmentally friendly techniques through the promotion of integrated pest management. Strengthening and Modernization of Pest Management Approach aims at this vital aspect of plant protection and also covers regulatory requirements of pesticides.</li> </ul>	Lower bound	Focuses on plant protection through adaptation relevant measures such as integrated pest management, pesticide regulation, etc.
<b>Prakritik Kheti Khushhal Kisan Yojana, Government of Himachal Pradesh</b>	<ul style="list-style-type: none"> <li>Scheme for sustainable agriculture through non-chemical, low-cost, climate resilient, and environmentally friendly natural farming.</li> </ul>	Absolute	The scheme focuses on sustainable farming and soil and water conservation.
<b>Mukhyamantri Bagwani Bima Yojana (MBBY), Government of Haryana</b>	<ul style="list-style-type: none"> <li>State crop insurance scheme with subsidized premium amount to be paid by farmers to protect them from potential losses on account of weather with respect to these horticultural crops.</li> </ul>	Absolute	Weather-based crop insurance.
<b>Bangla Krishi Sech Yojana, Government of West Bengal</b>	<ul style="list-style-type: none"> <li>Aiding small and marginal farmers in setting up micro irrigation facilities with the object of enabling cultivation with lesser usage of water and curtailing the impact of drought and hence is meant for areas with lesser rainfall.</li> </ul>	Absolute	Micro irrigation is used to improve water use efficiency, combat drought, and enhance productivity.
<b>Organic Farming and Millets Programme, Government of Karnataka</b>	<ul style="list-style-type: none"> <li>Promotion of organic farming and increasing certified areas under organic farming</li> <li>Providing farmers with organic inputs, including vermicompost, liquid manures, green manure seeds, oilcake, bio-fertilizers, etc.</li> <li>Incentivizing millet production through procuring millets from farmers at rates 20-25% higher than the minimum support price</li> <li>Strengthening market linkages.</li> </ul>	Lower bound	Millets are relatively more climate resilient and require fewer resources.

## 4. GENERAL ASSUMPTIONS AND PRINCIPLES

### 4.1 GREEN BONDS

We have excluded the finance mobilized through the issuance of green bonds to avoid double counting at the end-use level. We have not used the data from post-issuance reports to track the primary investments as it is difficult to map the use of proceeds that are outlined for specific projects with the aggregated data we have for different sectors. In other words, such a mapping exercise would require the availability of disaggregated data at the project level. Due to the lack of a common reporting structure and the use of several national and international datasets, we could not identify the exact trail of fund flow.

### 4.2 EXCHANGE RATE

In this study, we have used the annual average exchange rate published by the Reserve Bank of India.<sup>23</sup> For 2020-21, we have used the exchange rate of INR 74.23/USD, and for 2021-22, we have used the exchange rate of INR 74.50/USD.

### 4.3 MULTIPLIERS

We have applied Rio Markers to the bilateral and multilateral ODA and non-export credit OOF finance flows reported by the OECD.<sup>24</sup> The Rio Markers apply to activities as a whole, and in marking the full value of development finance activities, the markers are considered descriptive rather than strictly quantitative but allow for an approximate quantification of development finance flows that target the Rio Convention objectives. We used the same 'climate mitigation' and 'climate adaptation' markers to inform our calculations for the OECD data. However, we have exercised careful discretion in identifying the most relevant projects from the database to avoid any over-estimation of finance flows.

### 4.4 GEARING RATIO

The distribution of the debt-to-equity ratio in a specific year can be impacted by factors such as the creditworthiness of the borrowers involved or the quantum of collateral involved. In this study, however, we have used the gearing ratio of 0.70 (70% debt and 30% equity) to compute project transaction value wherever it is not reported in the database.

<sup>23</sup> The Reserve Bank of India is India's central bank and regulatory body and is responsible for the issue and supply of the Indian rupee and the regulation of the Indian banking system. Table 139: Exchange Rate of the Indian Rupee vis-a-vis the SDR, US dollar, pound Sterling, d. m./ euro and Japanese yen (financial year – annual average and end-year rates), reserve Bank of India. ([https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/139T\\_13092024245FFE1BB8CB45C3A51183FB6ADA6DC8.PDF](https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/139T_13092024245FFE1BB8CB45C3A51183FB6ADA6DC8.PDF))

<sup>24</sup> Annexure 18: Rio Markers, Development Assistance Committee (DAC), OECD (<https://www.oecd.org/dac/environment-development/Annex%2018.%20Rio%20markers.pdf>)

## 4.5 EXCLUSIONS AND INCLUSIONS

We have excluded all secondary market transactions like refinancing of project assets, mergers and acquisitions, and purchase and sale of shares to eliminate double counting. In this study, we have included the administrative and personnel expenditures that accrue to various ministries, PSUs, and states to implement mitigation projects. While this may not necessarily qualify as directly contributing to “green,” it is impossible to isolate such values from the aggregated transaction data. We have, however, classified this tracked finance as funds flowing through an Unknown instrument.



## 5. GROUND TRUTHING AND DOUBLE COUNTING

When complete data, context, terminologies, or other metadata was not available, we made certain assumptions in our analysis. Our assumptions are based on industry specifications to the best extent of our knowledge and are informed by our multiple discussions with stakeholders from relevant sectors. To establish credibility and maximize the accuracy of our analysis, we held regular convenings and one-to-one interactions with stakeholders from relevant sectors.

We constituted an Advisory Committee of experts with representation from academia, industry, and the government. We briefed the Advisory Committee on our progress, organized regular convenings for a thorough review of our methodology and provided technical briefings thrice over the course of the one-year project. We have documented the feedback provided by each member on our data sources, analytical frameworks, and measurement methodology and duly incorporated these inputs into our study.

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