Landscape of Green Finance in India

Report
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CLIMATE POLICY INITIATIVE

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ABOUT CPI

CPI is an analysis and advisory organization with deep expertise in finance and policy. Our mission is to help governments, businesses, and financial institutions drive economic growth while addressing climate change. CPI has six o□ces around the world in Brazil, India, Indonesia, Kenya, the United Kingdom, and the United States.

ABOUT SHAKTI SUSTAINABLE ENERGY FOUNDATION

This initiative has been partially supported by Shakti Sustainable Energy Foundation. Shakti Sustainable Energy Foundation works to strengthen the energy security of India by aiding the design and implementation of policies that support renewable energy, energy e□ciency and sustainable transport solutions. For more details, please visit www.shaktifoundation.in.

SECTOR
Green Finance

REGION
India, South Asia

KEYWORDS
Landscape, Green Investments, Private Finance, Public Finance

RELATED CPI WORKS
Global Landscape of Climate Finance 2019

Uncovering the Private Climate Finance Landscape in Indonesia 2020

IDFC Green Finance Mapping Report 2019

Accelerating Green Finance in India: Definitions and Beyond

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FOREWORD

In India, economic growth, environmental protection, and social goals are inextricably linked. While policy makers rightly focus now on safely restarting segments of our economy amidst the COVID-19 crisis, several other threats lie in wait. Last year our capital city was already closing schools, flights, and handing out masks for a di□erent public health issue: air pollution, which had reached unprecedented and extremely harmful levels. Even more worrying is climate change, which extends long-term and only gets worse with time. Increasing storms, heat waves, and floods will impact India harder than almost any other nation, with up to 4.5% of our GDP annually at risk according to a report by McKinsey Global Institute.

These issues are daunting ones in a country that is struggling already to lift millions out of poverty. The good news, however, is that there are solutions available today. Clean power, low-carbon transport, energy e□cient buildings, and climate-smart agriculture are areas that can create clean, healthy, and safe jobs for millions, leading the way to a greener future.

This report is groundbreaking as it is the first time we have a benchmark of economic and financial progress toward a green future. While there is increasing data on air pollution, emissions, and green job creation in India, there is little to no comprehensive information available on whether or not the financial sector is keeping pace with India's green economic development goals, or which sectors are being financed adequately or under-served. This information is desperately needed by policy and investment leaders working to scale up investments for sustainable and transformational impact.

We thank the team at Climate Policy Initiative for taking on this project in such a robust and structured way. The findings are clear: While India has made terrific progress in growing its green sector, particularly in renewable energy, much more needs to be done to create transformational change. We very much hope that this study allows for that next step.

Krishan Dhawan

Former CEO,

Shakti Sustainable Energy Foundation

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Asia Director,

Climate Policy Initiative

CONTENTS

1. EXECUTIVE SUMMARY

In September 2019, India announced its target to reach 450 GW of renewable energy generation capacity by 2030, making it one of the most ambitious targets in the world. India's Nationally Determined Contribution (NDC) estimates that the country will require ~INR 187 thousand crores (USD 2.5 trillion) from 2015 to 2030, or roughly INR 12 thousand crores (USD 170 billion) per year for climate action. While India's energy sector is one of the fastest growing in the world and has been attracting substantial investments, meeting the country's climate goals will require proportionate, transformative investment increases at sectoral level.

Strong financial support and timely policy interventions from the Government of India have played a crucial role in accelerating the growth of the country's renewable energy sector. But given current rates of penetration and the overall health of the sector combined with slowdown created by the COVID-19 pandemic, the government will have to find new and alternative ways to finance the transition and incentivize private sector participation to scale up investments for a sustainable and transformational impact. International finance is also likely to come with "green strings" attached. Therefore, identifying and analyzing key sources of finance, the instruments used for mobilizing and disbursing funds, and their ultimate beneficiaries become critical for diagnosis, planning and monitoring green investments in the country.

The Landscape of Green Finance in India is a one-of-a-kind study undertaken by Climate Policy Initiative that presents the most comprehensive information on green investment flows in the country in FY 2017-FY 2018. The study tracks both public and private sources of capital and builds a framework to track the flow of finance from source to end beneficiaries. This report helps understand the nature and volume of green financial flows in the country and identifies the methodological challenges and data gaps in conducting a robust tracking exercise.

KEY FINDINGS

Green finance flows in India total INR 111 thousand crores[1] (USD 17 billion) for FY 2017[2] and INR 137 thousand crores (USD 21 billion) for FY 2018. The average stands at INR 124 thousand crores (USD 19 billion)[3] per annum, while the total tracked green finance for the years 2016-2018 amounts to INR 248 thousand crores (USD 38 billion).

1 All figures are represented in INR Crores. One Crore equals 10,000,000.
2 All tracked years are financial years (April 01-March 31).
3 Throughout this report, unless otherwise stated, the average end-of-year exchange rate of INR 65/USD. has been used to convert United States dollars (USD) to Indian Rupees (INR) and vice-versa.

Figure ES1: Breakdown of investment by source

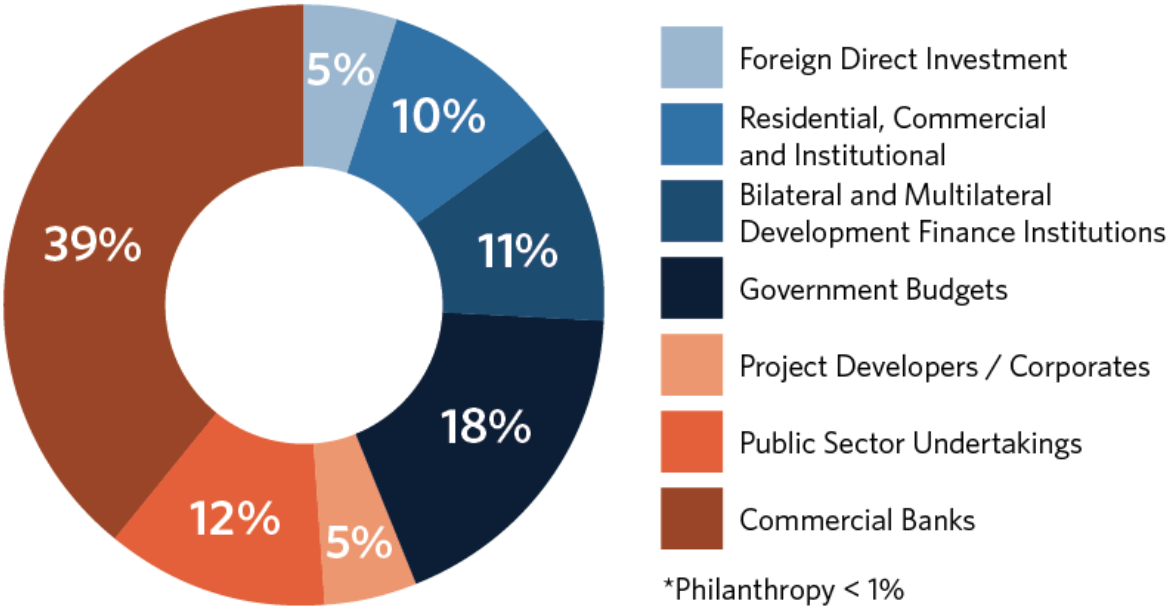
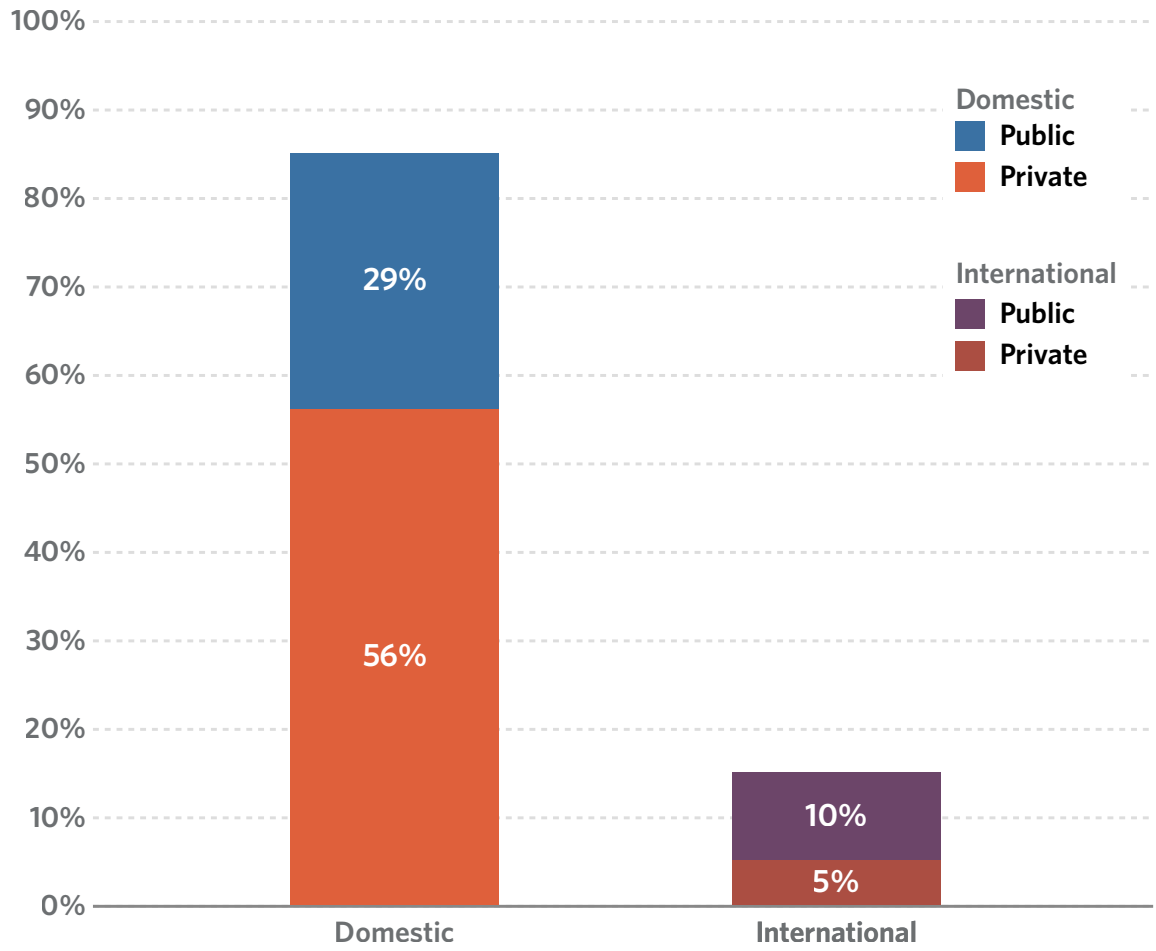


Figure ES2: Breakdown of source of finance by origin and channel of delivery



DOMESTIC SOURCES OF FINANCE

During the years 2016-2017 and 2017-2018, domestic private investors contributed the largest share (63% and 51%) of about INR 139 thousand crores through debt and equity respectively. Commercial financial institutions accounted for 40% of these funds[4]. Nearly all the funds were directed towards renewable energy development in the country.

Public finance was disbursed either by the central government's line ministries and state departments (37%) or by dedicated public sector undertakings (PSUs) (63%). The bulk of public finance was directed towards the power generation sector (70%) followed by energy e□ciency and power transmission (20%), and sustainable transportation (10%).

Expenditure on climate mitigation activities undertaken by dedicated PSUs more than doubled in FY 2018 from FY 2017, while the budgetary allocations increased by 36%. This can largely be attributed to the several initiatives and schemes introduced by the government of India.

PSUs are important channels for the disbursement of funds for the central and state governments, bond markets, and international development agencies. They also operate as a critical source of green finance themselves. Therefore, to avoid double counting, this study only tracks the actual annual expenditures reported by these PSUs in their annual financial statements[5].

INTERNATIONAL SOURCES OF FINANCE

The share of international public finance in tracked green finance remained nearly the same during both FY 2017 and FY 2018 at 10% (INR 12 thousand crores). O□cial development assistance (ODA)[6] and other o□cial flows (OOF)[7] were disproportionately split between bilateral and multilateral agencies (75% and 25% respectively).

The majority of bilateral funds (56%) went into the sustainable transportation sector, as loans for infrastructure development of metro rail projects. Delhi and Mumbai metro rail projects received the lion's share of these funds (45% and 25% respectively). On the other hand, multilateral funds were targeted at the development of solar parks and rooftop projects (40%) in the country.

The study tracks two sources of international private finance, namely, foreign direct investment (FDI) and philanthropy during FY 2017 and FY 2018. The funds allocated through these sources were disbursed via equity and grant instruments respectively.

Foreign Direct Investment in the renewable energy sector crossed the USD 1 billion mark in 2018. The FDI (INR 12 thousand crores) for both years was allocated almost exclusively to the clean energy sector and was almost equally split between solar and wind energy projects due to the presence of advanced markets. While FDI inflows into the clean energy sector have

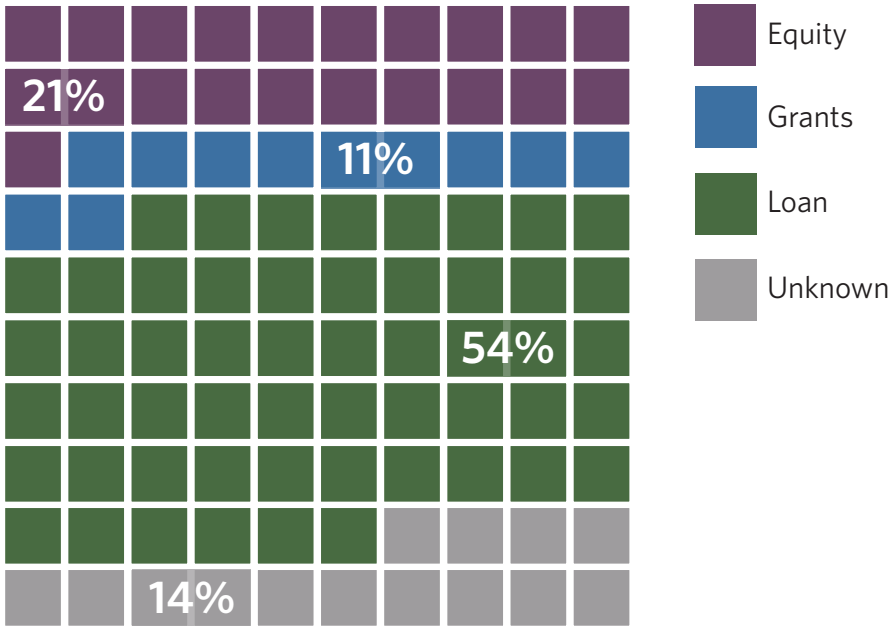
4 While we recognize that certain percentage of the commercial debt may have originated internationally via External Commercial Borrowings and Non-sovereign debt, lack of any data on the subject has necessitated the classification under domestic finance. Refer to the methodology for details.
5 See methodology documents for more details.
6 OECD defines O□cial development assistance (ODA) as government aid designed to promote the economic development and welfare of developing countries.
Source: https://data.oecd.org/drf/other-o□cial-flows-oof.htm#:~:text=Other%20o□cial%20flows%20(OOF)%20are,development%20assistance%20(ODA)%20criteria.
7 OECD defines Other o□cial flows (OOF) as o□cial sector transactions that do not meet o□cial development assistance (ODA) criteria.

been steadily increasing (Mercom, 2020), they still account for only 1% of the total FDI flows into the economy.

INSTRUMENTS

The study reveals that while the public and private actors provided finance via a range of instruments, simple straight debt was the predominant instrument. Of all the finance tracked, the primary instrument used to channel money from state budgets was in the form of grants-in-aid and budgetary allocations (90%) for direct mitigation activities like procurement, installation, construction, renovation and maintenance of facilities, indirect activities like research and development, and administrative expenditure. The government also invested sizeable amounts through several dedicated PSUs. These PSUs, in turn, not only utilized the grants for supporting essential indirect activities such as research and development, and capacity building (53%), but also leveraged these funds in the market directly to finance projects through debt (40%)

Figure ES3: Breakdown by sources



SECTORS AND SUB-SECTORS

In line with global trends, the power generation sector remains the primary recipient of the tracked green finance in 2017 and 2018, representing nearly 80% of the annual flows. The industry's maturity enables deeper investment potential in the sub sectors, specifically into solar PV and onshore wind power, which constitute over 80% of the total finance flowing into the power generation sector. While data coverage and reporting may be more comprehensive for renewables as opposed to the other mitigation sectors, we are constantly improving our data collection methodologies to cover these data gaps and use proxies and surrogate data to make the dataset more robust, primarily in the private sector.

Average annual finance directed to **sustainable transportation** projects increased by 43% in FY 2018 from FY 2017. This was chiefly driven by capital expenditure on mass rapid transit

systems (MRTS) projects by the central and state governments and the sale of electric 3-wheelers by the private residential and commercial segments. While the years in question, FY 2017 and FY 2018 were not notable years for financing of sustainable transportation, the upward trend suggests a promising future.

Energy efficiency and power transmission which comprise investments in built infrastructure, retrofits, renovation and modernization (R&M), smart grids, and green energy corridors, totaled INR 20 thousand crores over the two years. Green energy corridors projects captured the major share of these investments at about 47% followed by smart grids under the NSGM mission at 14%. Both were driven by funding from domestic and international public actors. PSUs including Energy E□ciency Services Limited (EESL), Bureau of Energy E□ciency (BEE) and the National Thermal Power Corporation (NTPC) Limited constituted the major sources of finance at 34%, central and state budget investments came a close second at 33% of the total tracked finance. **A large share of public financial institutions in energy efficiency and power transmission financing can partly be attributed to limited data availability with regard to private investments into R&M and retrofitting. We are in the process of refining our methodology to capture private investments in the sector more exhaustively.**

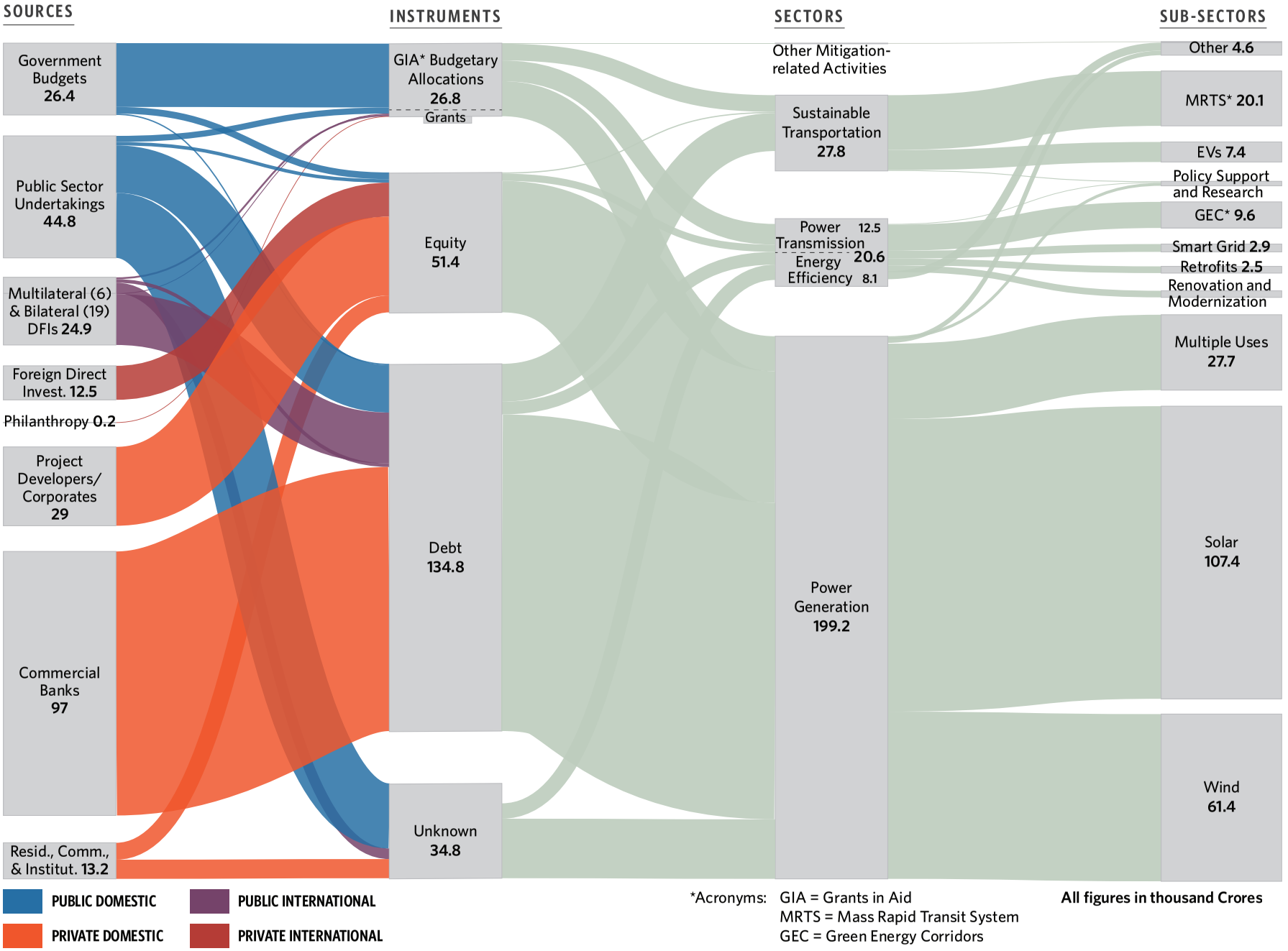
Reading the Sankey

The Sankey diagram shows the path of finance flows along their life cycle.

1. **Sources (which type of organizations are sources of capital for green finance)**. This includes government budgets, public sector undertakings, bilateral and multilateral development finance institutions, foreign direct investment, philanthropic grants, project developers and corporates, commercial banks, and residential, commercial and institutional investments.
2. **Instruments (what mix of financial instruments are used).** This includes grants, equity, and debt instruments. Those investments that could not be mapped to a financial instrument have been classified as flows through 'Unknown' instrument.
3. **Uses (what types of activities are financed).** This includes the use of finance for climate change mitigation across various sectors, namely – power generation (clean energy), energy e□ciency (including green buildings) and power transmission, sustainable transportation, and other mitigation-related activities.
4. **Sub-sectors (what is the finance used for).** This includes the flow of finance to the specific activities and sub-sectors. For representation, certain activities such as built infrastructure and other mitigation-related activities have been clubbed into the category 'Others'. Similarly, the 'Multiple Uses' activity shows investments that could not necessarily be separated into investments within the identified sub-sectors.

LANDSCAPE OF GREEN FINANCE, FISCAL YEARS 2016-2018

INR 248 THOUSAND CRORES TOTAL TRACKED GREEN FINANCE



*Acronyms: GIA = Grants in Aid
MRTS = Mass Rapid Transit System
GEC = Green Energy Corridors

All figures in thousand Crores

CONCLUDING OBSERVATIONS

One of the objectives of the study was to identify the barriers and opportunities in measuring green finance flows in India. This study allowed us to pinpoint the following challenges:

1. Non-availability of data on the disbursement of funds at multiple levels within the value chain.
2. Non-standardised reporting of data due to the lack of a harmonized green finance taxonomy in the country.
3. Large variations in granularity, format, and categorization of data at the state-level.
4. Data confidentiality issues arising from the absence of climate-related financial disclosure policy in the country.

Consistent guidance and emphasis on data tracking for green finance would go a long way in helping understand the extent of green finance investments in India. Although there are indications of an overall upward trend, India's tracked green investments in the three sectors i.e., power generation, energy e□ciency and power transmission, and sustainable transportation, fall far short of the requirements laid down by several national and international studies. A business as usual scenario of investments may not be enough to bridge the ever-increasing finance gap in these low carbon sectors. By most conservative estimates, the current tracked finance in India represents only 10% of the total requirement across sectors. This study helped us identify a few opportunities to scale up green finance in India:

- **India needs an integrated domestic measurement, reporting and verification (MRV) system** to streamline green finance attributes, identify financial constraints and enhance transparency. A comprehensive climate budget tagging framework should be developed to track climate-related expenditures in national budget systems to take advantage of already mainstreamed climate action through policy formulation, and help further mainstreaming.
- **PSUs play an important role in mobilizing and increasing green capital flows. The creation of dedicated PSUs has been a catalyst.** Further utilizing this as a policy approach with enhanced responsibility for each PSU should be encouraged, but by explicitly adjusting the mandates and leveraging upon expertise and reach to enhance private sector participation.

2. INTRODUCTION

The Landscape of Green Finance in India 2018 aims to analyze green finance investments in India by tracking the annual finance flows supporting emission reduction or climate change mitigation activities, throughout their value chain. It identifies the sources and intermediaries of finance at both domestic and international levels and the financial instruments used in these transactions. It also identifies the purpose or recipient of the finance, i.e., the sectors and subsectors of the economy to which the finance flows. This study outlines the significance of carrying out the tracking exercise and methods to improve future tracking practices in the country.

2.1 RATIONALE AND OBJECTIVE

Although significant finances have been directed towards climate change mitigation-related economic activities over the past few years in India, understanding the quantum of such flows remains a challenge. This is primarily due to the absence of reasonable and comprehensive data. Without such data, it is di□cult to identify gaps, measure progress, and optimize the deployment of resources to e□ectively unlock investments at a transformational scale.

India's nationally determined contributions (NDC) suggests that the country needs USD 2.5 trillion (at 2014-2015 prices) translated to a requirement of roughly USD 170 billion per year which amounts to around 8% of India's GDP in 2014-2015 (UNFCCC, 2015). A systematic assessment to track current levels of investments would be the first step to gauge whether India is on track to achieve its set goals. Secondly, e□ective, comprehensive and nation-wide reporting of green finance flows will go a long way towards building trust with national and international investors. It can help mobilize new resources, identify new avenues to step-up climate expenditure and leverage private financial markets. Third, tracking green finance flows will help improve transparency and accountability in the governance of domestic public finance dedicated towards climate-related activities. Internationally, it can serve as an important reporting tool under the Katowice climate package and enhanced transparency framework (ETF) to track progress in implementing and achieving the NDCs.

Fourth, identifying the value chain of green investments can serve as a basis for cross-sectoral, inter-governmental and government-donor discussions on resource mobilization for climate action. It can also help mainstream climate objectives into national and sectoral planning and budgetary processes. Tracking existing finance flows, directed towards high impact sectors, can help the government assess the success of its current policies and governance initiatives to meet climate change mitigation and sustainable development goals.

Lastly, in the aftermath of the COVID-19 pandemic, it is imperative for the government to ensure that scarce funds are directed towards creating long-term, sustainable impact. In the latest edition of the Global Economic Prospect, the World Bank has projected a contraction of India's economy by 3.2% in the fiscal year 2020-21, when the impact of COVID-19 will largely materialize (World Bank, 2020). India's clean energy sector has been at the forefront of the country's fight against climate change, but it is also facing liquidity constraints and supply chain disruptions due to COVID-19. Managing this sector whilst addressing the growth needs of an emerging economy needs to be at the top of planning agendas.

The table below summarizes the objectives, outputs and outcomes of the study.

Table 1. Objectives, outputs and outcomes

Objective	Output	Outcome
• Quantify estimates of the total amount of green finance in the Indian economy in 2016-2018 • Identify data gaps and inconsistencies in reporting and accessing green finance in the public and private domains	• A comprehensive report that establishes a baseline for annual financial flows within the country • The Sankey diagram to visualize data from primary and secondary sources • A roadmap to create an online MRV portal in subsequent phases	• Increased understanding and transparency of the quantum and nature of public and private mitigation investments at the national and sub-national levels • Identification of data gaps in the green finance value chain to suggest improvements in the public and private MRV systems

2.2 SCOPE AND METHODOLOGY

The Landscape categorizes flows along their lifecycles, from public and private sources and intermediaries, through a variety of financial instruments, to recipients and the final uses of funds. Climate finance studies[8] conducted in the past have presented the architecture of green finance in India and have attempted to outline the sources of finance along with the volume of public and private commitments towards climate change-related activities. This study goes a step further by collecting actual spending and green investment data from the central and state governments, PSUs in the power and renewable energy sector, FDI, commercial banks, bilateral and multilateral developmental finance institutions, corporate project developers and philanthropies through as many as 1,700 primary transactions. Although the landscape is retrospective with regards to the years taken into consideration (FY 2017 and FY 2018), it is forward looking in its outlook and observations.

2.2.1 DEFINITION

Due to the lack of a common definition of green finance in India, the taxonomy for the study has been aligned with the findings of the 'Green Finance Taxonomy Landscape Paper' developed by CPI and cKinetics with the support of Shakti Sustainable Energy Foundation and the CPI published study 'Accelerating Green Finance in India: Definitions and Beyond' (CPI, 2020). **These publications define 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."
- ***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 to build an inclusive, economically, socially, and environmentally sustainable world.

8 Centre for Budget and Governance Accountability and Vasudha Foundation tracks government financing and GHG emissions respectively. https://www.cbgaindia.org/publications/budget-track/ and http://www.ghgplatform-india.org/

The scope of the tracking exercise undertaken in this study is confined to a subset of the green finance definition described above. This study does not map pollution abatement activities, biodiversity, agriculture, forestry and other land use (AFOLU) and adaptation finance. The sectoral scope of the study is covered in more detail in the following section.

2.2.2 SECTORAL COVERAGE AND INSTRUMENTS

The sectoral view aligns with the findings of CPI's study on green finance taxonomy mentioned earlier. India's national commitment to reduce carbon intensity in its GDP focuses on certain key areas, i.e., clean energy, energy e□ciency, clean transportation, climate-resilient and low carbon cities, and an increase in forest cover (MoEFCC, 2015). India's clean energy expansion relies on renewable energy as well as other energy generation activities which o□er incremental environmental benefits such as co-generation.

Table 2 lists the activities considered in this tracking exercise:

Table 2. Sectoral scope of the landscape

Power Generation
1) Wind - Construction and operation of the facility
2) Solar - Rooftop, utility, utility scale concentrated solar power; Thermal application
3) Hydro and Tidal - Construction and operation of the facility
4) Geothermal - Construction and operation of the facility
5) Biomass Energy - Construction and operation of the facility
Energy Efficiency and Power Transmission
1) Process e□ciency due to employment of products, services and technologies that are considered energy e□cient
2) Renovation & Modernization (R&M) of thermal power technologies
3) Green built infrastructure - new green establishments, renovation, upgrade and modernization of existing building stock
4) Smart Grid projects implemented under the National Smart Grid Mission
5) Green energy corridor projects
Sustainable Transportation
1) Vehicles - Examples of low emission private transport including two, three and four wheelers, and public transportation such as electric buses
2) Charging Infrastructure (public and private) - While, home & work can be considered private investments, parking and BEV charging investments can be considered public.
3) Mass rapid transit system (MRTS) including metro rail projects.

The study has clubbed together the investments in improving energy e□ciency and power transmission because of the possible overlaps in coverage as in the case of smart grids. A lack of granularity on the use of proceeds restricts the segregation of investments in specific subsectors for green energy corridors and smart grids in this phase. CPI plans to improve the segregation of investments in the subsequent editions.

This study includes primary investments at the project level to capture new money targeting green outcomes. It also seeks to capture a non-double-counted estimate of financial flows.

Therefore, finance provided through certain financial instruments such as guarantees or insurance, green bonds (**Annexure I**), government revenue support schemes, and fiscal incentives, or investments in manufacturing or equipment sales have not been counted to avoid double counting against project investments costs. The landscape captures data for each of these sectors from the following sources and studies the following financial instruments to track investments:

Table 3. Sources and instruments

		Source	Source Instrument	Landscape Instrument
Domestic	Public	Government Budgets	Budgetary Grants-in-aid	Budgetary expenditure
			Budgetary and Recurring expenses	
			State and Union Government loans (concessional and Market Rate)	Debt
			State or Central Equity	Equity
		PSU Annual Financial Statements	Project debt / Downstream grants	Debt / Grants
			Balance Sheet financing	Equity
			Administrative expenditure	Unknown
	Private	BNEF	Balance sheet financing	Equity
			Project debt	Debt
		Electric vehicles sales	Unknown	Debt
			Budgetary Grants	
International	Public	OECD	Other O□cial Flows (OOF)	Grants
			O□cial Development Assistance (ODA)	Debt / Grants
	Private	FDI	Project Equity	Equity
		Philanthropy	Grants	Grants

2.3 DATA GAPS AND LIMITATIONS

The tracking exercise faced several issues related to the availability, quality and robustness of investment data on both the public and private sectors.

The following section describes some of the challenges encountered during data collection:

1. Non-availability and trackability of disbursements: A focus on disbursements over commitments a□ects the magnitude of flows because large, committed amounts are often disbursed over several years. Consistent data on disbursements is often lacking across international public finance actors but is usually available through national budget and expenditure systems. Extracting this information can be challenging due to the lack of an e□ective measurement, reporting and verification (MRV) system in India. The existing Public Financial Management System[9] in its current form does not provide granular information about flow of finance and end use. To overcome this challenge, the team had to resort to the use of legally available mechanisms such as the Right to Information Act, 2005, which was cumbersome and only partially e□ective.

2. Di□culty in green tagging of budget entries: The lack of availability of a harmonized green finance taxonomy in the country, and non-standardized reporting of data makes green tagging of domestic entries arbitrary and vulnerable to the user's discretion. Projects often have di□erent names or codes in the budget documents when compared with policy documents. This problem is exacerbated due to the time lag in the availability of data on budget actuals that makes it di□cult to establish causality with other sectoral developments. The objective and typology of the study had to be revised alongside the project to build a coherent analysis.[10]

3. Large variations in granularity, format and categorization of data at the state-level: It is necessary to assess and analyze di□erent divisions of government expenditure (recurrent, investment expenditure or transfer payments) and revenue. This required intense engagement with various stakeholders as di□erent ministries and departments are responsible for managing budgetary data. Further, the format and granularity of state budgets varied considerably and was often not user-friendly.

4. Data privacy issues: Problems arising from the absence of climate-related financial disclosure policies in the country made it di□cult to gain access to data, especially in the private sector. For many companies, climate-aligned investments were largely indistinguishable from 'business as usual' expenditures. The data on private sector investments in energy e□ciency through schemes such as Perform, Achieve and Trade (PAT) were not accessible from the Bureau of Energy E□ciency (BEE), and publicly available data lacked the granularity required for the study at this stage. Additionally, the absence of a centralized dataset on green lending by commercial banks was particularly challenging to account for private debt.

Despite an overall increase in sustainability reporting in India, the relevant information on private investments is still limited in the public domain. To overcome some of these challenges, certain assumptions were made while analyzing the available data. The

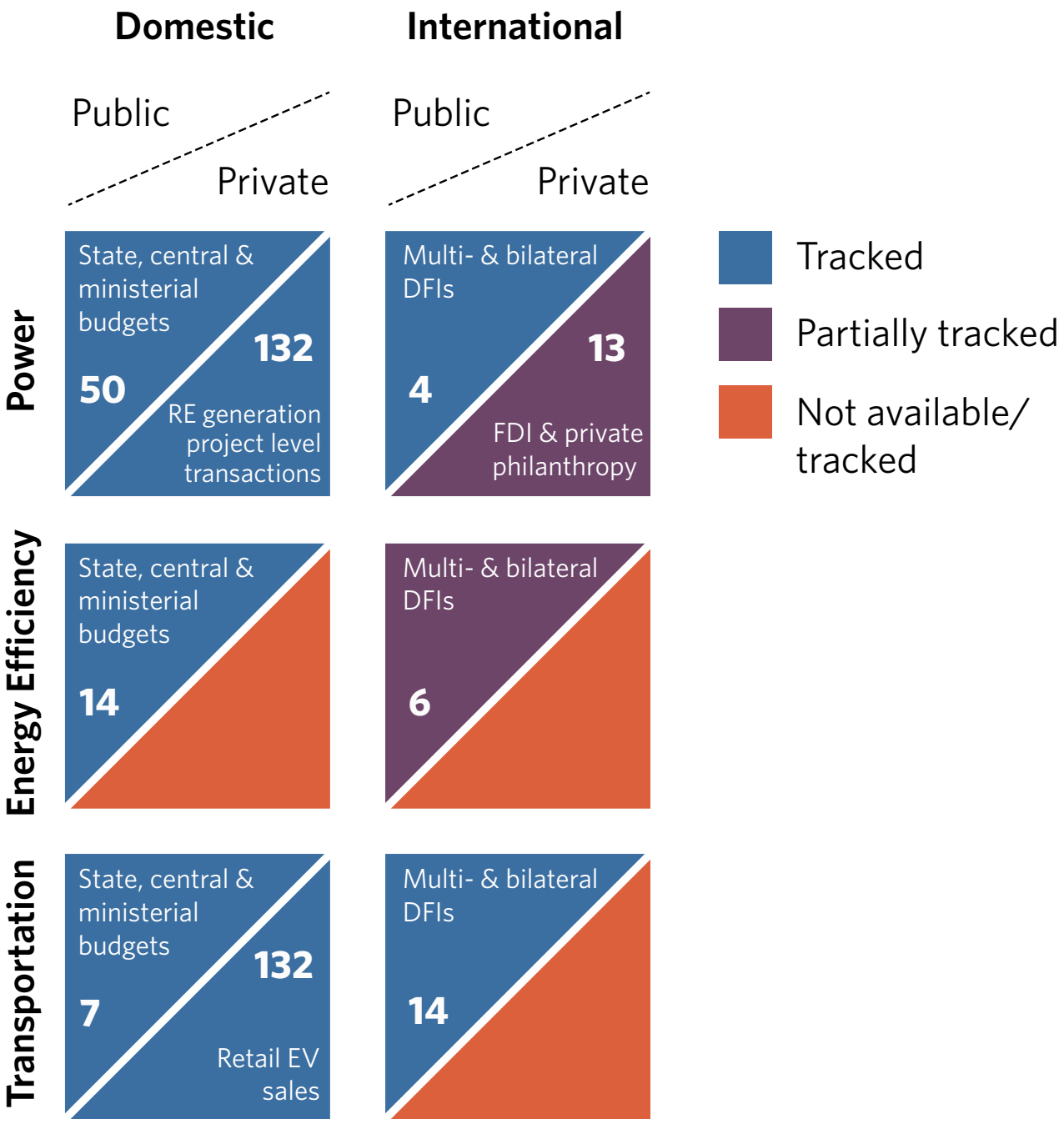
9 **Public Financial Management System** is a financial management platform for all plan schemes. It is a database of all recipient agencies. It integrates with the core banking solutions of banks that handle plan funds, integrates with state treasuries and enables e□cient and e□ective fund flow tracking to the lowest levels of implementation for govternment plan schemes. It is implemented by the O□ce of the Controller General of Accounts (CGA), Ministry of Finance. (https://pfms.nic.in/NewDefaultHome.aspx)

10 See Methodology

assumptions are based on the definitions outlined in the methodology document appended with this report. To establish the credibility of these assumptions and maximize accuracy, roundtables were convened with stakeholders from the relevant sectors. They were briefed on the technical aspects thrice over the course of the one-year program. A review group comprising experts and policymakers was created and the members were briefed on the progress of the study at regular intervals. The observations made by the review group have been duly incorporated into this report.

Figure 1 classifies the total green investments that were tracked, partially tracked and not tracked in this study.

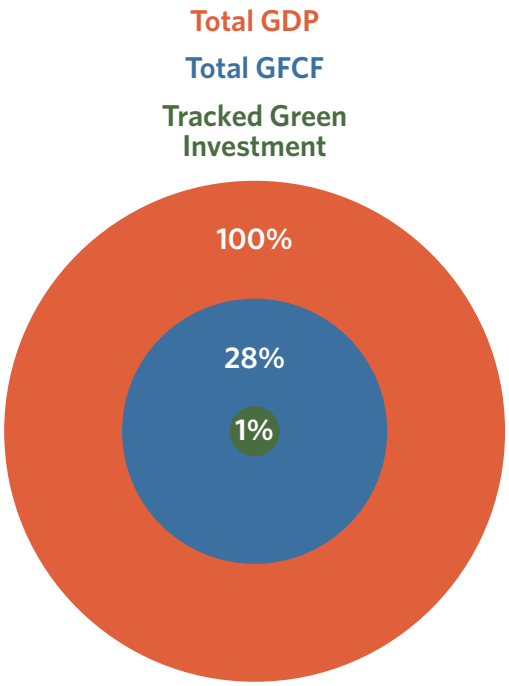
Figure 1: Tracked, partially tracked and not tracked. All numbers in INR 1000 crores



3. OVERALL FINDINGS

The green finance tracked between FY 2017 and FY 2018 totaled INR 248 thousand crores (USD 38 billion). The annual tracked investment increased from INR 111 thousand crores to INR 137 thousand crores between the two years.

Figure 2: Tracked green investments as percentage of GDP



Notably, the GDP of India grew at an average rate of 7.2% between 2016-2017 and 2017-2018[11] and the tracked investments suggest an increase of 24%. While the data is insu□cient to develop a relationship between the two variables, it indicates that green investments have the potential to drive the economic growth of the country. From 2015 to 2018, energy investments in India grew at the fastest rate in the world. Renewable energy spending, for the first time, exceeded the investments in fossil-fuel based power generation as strong solar PV and onshore wind power more than compensated for the decrease in new coal plant installations (IEA, 2019) (IEA, 2020)[12].

It is interesting to note that the total Gross Fixed Capital Formation (GFCF) to GDP ratio between the two years averaged at 28% (World Bank) compared to the world median of ~23%. The tracked green investments averaged ~1% of the national GDP (Figure 2) compared with the world average of 0.5 to 0.6% with the most optimistic calculations .

11 WEI (2019) estimates of USD 20 billion RE investments in India in 2018 as compared to approximately 10 US$ billion in coal power are in line with the findings of this study.

12 As per the National Electricity Plan 2018, India required a total of Rs 221 thousand crores for new capacity addition of which Rs 115 thousand crores (47%) were required for renewable energy generation projects in the year 2017-2018. http://www.cea.nic.in/reports/committee/nep/nep_jan_2018.pdf

It is interesting to note that the total Gross Fixed Capital Formation (GFCF[13]) to GDP ratio[14] between the two years averaged at 28% (World Bank)[15] compared to the world median of ~23%. The tracked green investments averaged ~1% of the national GDP (Figure 2) compared with the world average of 0.5 to 0.6% with the most optimistic calculations[16].

3.1 SOURCES

The total green finance tracked in this study includes both public and private finance flows, provided by both Indian entities and international organizations.

DOMESTIC FINANCING

In the years in question, 85% of finance was raised domestically and amounted to approximately INR 100 thousand crores[17]. This indicates the strong domestic preference of investors.

During the two years, FY 2017 and FY 2018, domestic private finance actors contributed the largest share of about INR 139 thousand crores through debt and equity (Figure 3). Domestic private finance sources include commercial financial institutions, project developers, corporates and households as well as commercial and institutional establishments. Commercial financial institutions accounted for about 40% of these funds. Almost all of this finance was directed towards renewable energy development in the country, split between solar (64%) and wind (36%) energy projects.

The domestic public green finance expenditure by the government and its agencies totaled INR 71 thousand crores (29% of the tracked green finance) for the two years (Figure 4). The domestic public finance actors include central and state line ministries and eight major PSUs under the power, environment and renewable energy ministries[18]. The bulk of this finance was directed towards renewable energy development in the country (70%), followed by energy e□ciency and power transmission improvement (20%), and sustainable transportation (10%). The total government expenditure was estimated at INR 1,978 thousand crores (USD 289 billion) and INR 2,147 thousand crores (USD 317 billion) for FY 2017 and FY 2018 respectively. It is interesting to note that the ratio of climate-related expenditure to the total government expenditure increased from a mere 0.6% to 0.7%.

PSUs such as the Indian Renewable Energy Development Authority (IREDA) and the Solar Energy Corporation of India (SECI) have been instrumental in directing public capital to implement a number of mitigation-related schemes. SECI was formulated to implement the Jawaharlal Nehru National Solar Mission (JNNSM) and its targets of installing 100 GW by 2022. The target will predominantly comprise 40 GW Rooftop and 60 GW through large

13 Gross Fixed Capital Formation (GFCF), which is also referred to as "investment", is defined as the acquisition of produced assets, including the production of such assets by producers for their own use, minus disposals.
14 GDP ratio is expressed as the ratio of total investment in current local currency to GDP in current local currency. Investment or gross capital formation is measured by the total value of the gross fixed capital formation and changes in inventories and acquisitions less disposals of valuables for a unit or sector.
15 https://data.worldbank.org/indicator/NE.GDI.FTOT.ZS?end=2019&locations=IN&start=2015
16 Calculated from the total green finance tracked by the global landscape of climate finance 2017-2018 which tracks commitments opposed to disbursements. It indicated that the real ratio would be less than 0.5%.
17 While we recognize that certain percentage of the domestic financing may have originated internationally via External Commercial Borrowings and Non-sovereign debt, lack of any data on the subject has necessitated the classification as such. Refer to the methodology for details.
18 Please see methodology documents for more details

and medium scale grid connected solar power projects. IREDA was established as an NBFC to provide financial support to developers by sanctioning loans against the securitization of future cash flows of existing projects that can be used for business expansion in the renewable energy and energy e□ciency sectors[19]. Other PSUs including NTPC Limited have been working proactively towards disclosing their triple bottom line performance[20].

Detailed case studies of three major PSUs and their sustainable investments are presented in Annexure II.

Figure 3: Breakdown of investment by source

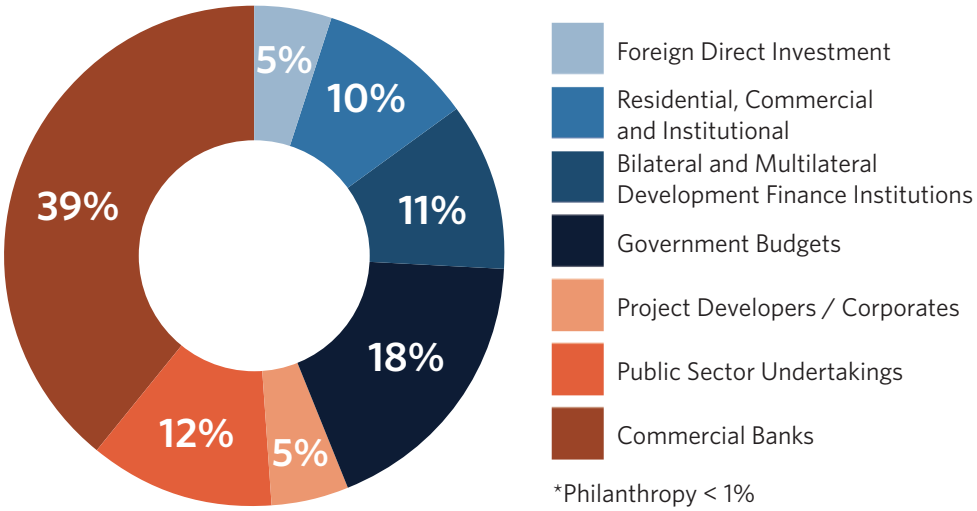
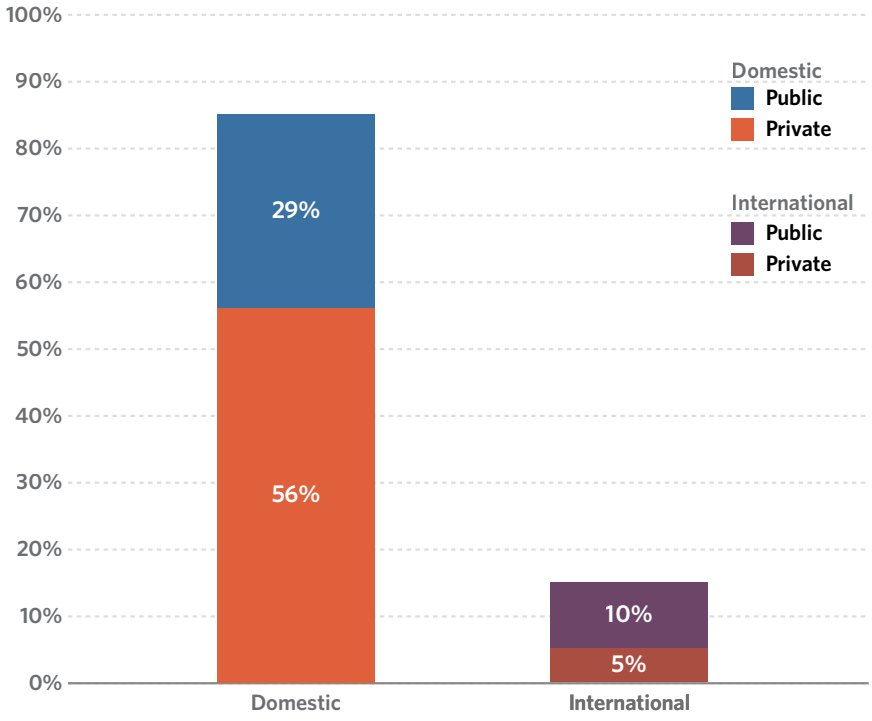


Figure 4: Breakdown of source of finance by origin and channel of delivery



19 https://www.ireda.in/schemes

20 The triple bottom line measures the financial, social, and environmental performance of a company over time.

What is driving this trend?

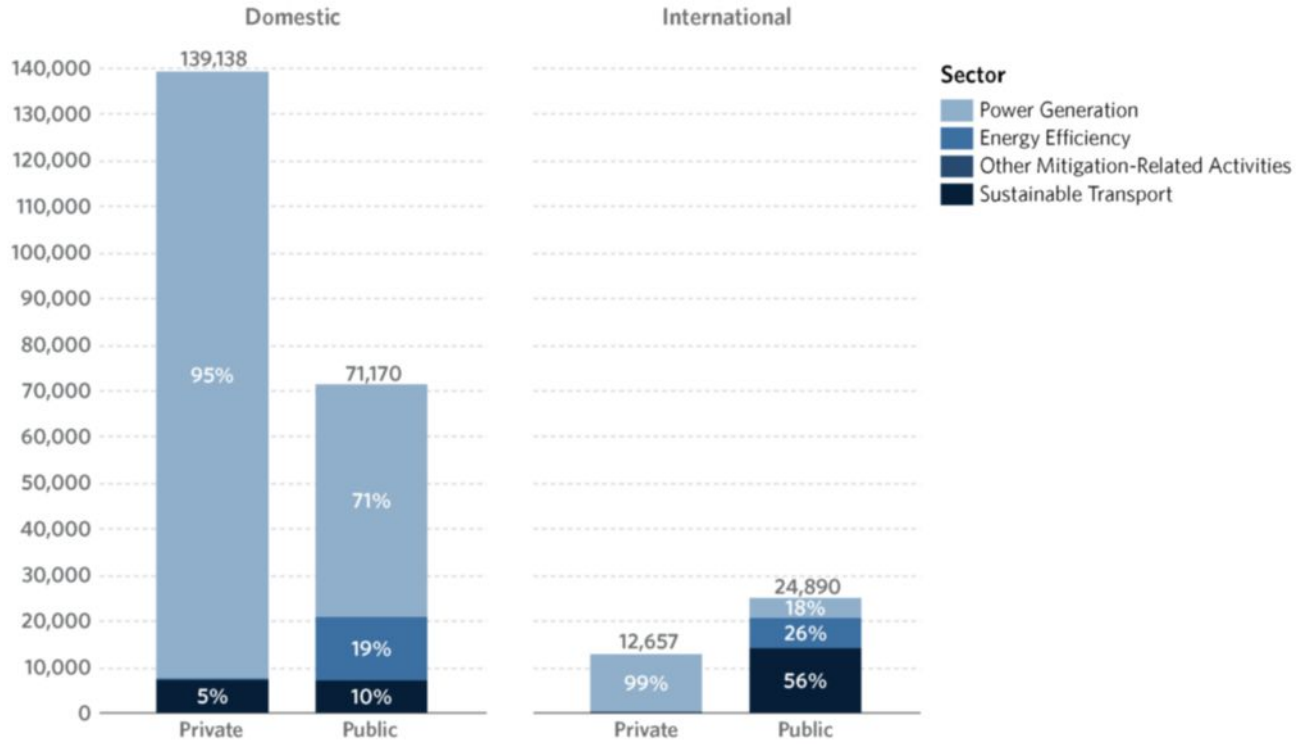
After signing the Paris Agreement in 2015, the government announced the ambitious target of 175 GW of RE capacity which was later revised to 225 GW by 2030. Multiple factors have contributed to the increase in green investments in India during the two financial years 2017 and 2018. Internationally, multilateral development banks ramped up their green finance commitments for developing countries and emerging economies post 2015. However, the most significant spending increase was witnessed in the domestic sector. Most of the capital that was deployed in the studied sectors was raised within the country. A favorable policy environment coupled with technological advancements and concomitant reductions in tari□s contributed to a substantial increase in the country's RE capacity. A detailed list of schemes and policies is presented in Annexure IV.

INTERNATIONAL FINANCING

Due to the unavailability of data, the study has tracked FDI only for the renewable energy sector. India permits up to 100% FDI in the renewable energy generation and distribution sector under the "automatic route" without prior government approval. Subsequently, the renewable sector has seen increased foreign capital in the past few years, which increased from INR 4,785 crores (USD 730 million) in 2016-2017 to INR 7,720 crores (USD 1.2 billion) in 2017-2018, a jump of more than 60%. However, owing to a similar and simultaneous increase in domestic financing, the share of international public finance in the tracked green finance remained almost the same during both 2016-2017 and 2017-2018 at 10% (INR 12 thousand crores).

The share of international public finance in the tracked green finance remained almost the same in both FY 2017 and FY 2018 at 10% (INR 12 thousand crores).

Figure 5: Breakdown of source of finance by sector



Source: CPI analysis

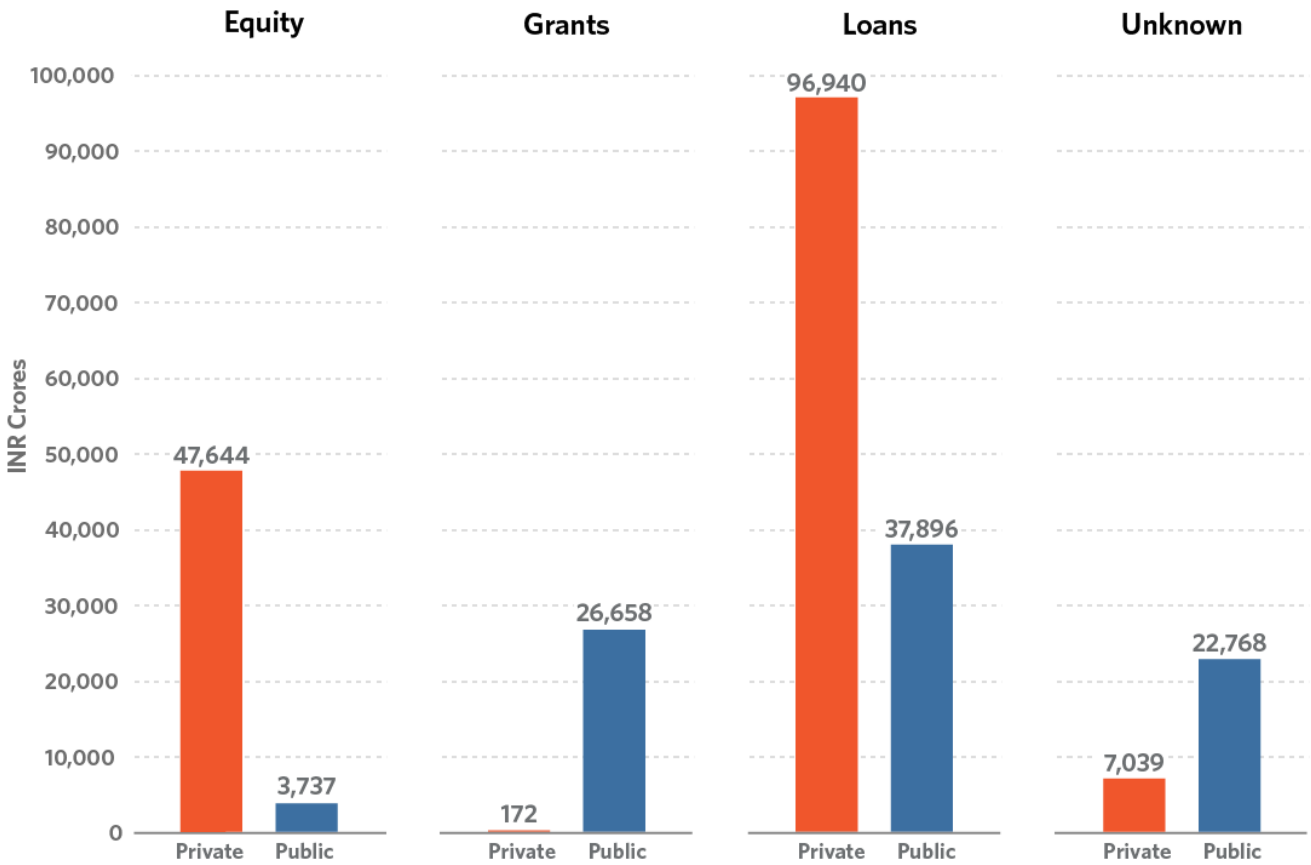
The study tracked bilateral o□cial development assistance (ODA) and other o□cial flows (OOF) from bilateral and multilateral development financial institutions. 55% of these flows went into the development of mass rapid transportation (MRT), which comprised mainly metro rail projects across the country (Figure 5). Power and energy e□ciency received 21% and 23% each. However, the large investments in MRT as fixed capital can be counted as one-time expenditure. All the tracked private finance for energy e□ciency went into green built infrastructure as other sub-sectors could not be mapped via proxies or surrogates.

3.2 INSTRUMENTS

Debt, through project or corporate finance, was the largest financial instrument used to channel green finance, at an average of INR 70 thousand crores per year during 2016-2017. It accounted for 54% of the total tracked green finance.

Debt, through project or corporate finance, was the largest financial instrument used to channel green finance, at an average of INR 70 thousand crores per year during 2016-2017 (Figure 6). It accounted for 54% of the total tracked green finance (Figure 7). More than 85% of this debt component was directed towards the power sector, ~ INR 60 thousand crores per year, with solar power accounting for ~50% of the share.

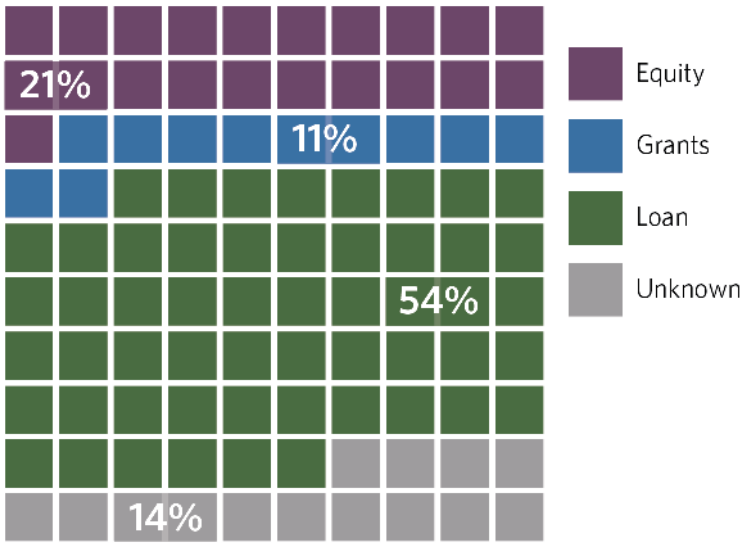
Figure 6: Breakdown of green finance by instrument (in INR Crores)



Over 72% of the total debt flowed through commercial banks (both public and private) while the development finance institutions (DFI) contributed about 15% across 2016-2018.

Understandably, renewables have been playing and will play a crucial role in achieving India's green growth goals. According to a 2017 IFC study, the country will need INR 3,360 thousand crores (USD 450 billion) to finance its 2030 clean energy targets. Assuming a typical gearing ratio of 0.7 (70-30 split between debt and equity), the debt funding requirements roughly translate to INR 235 thousand crores (USD 31 billion) annually. Even after adjusting for inflation and margin of error in mapping, there remain significant gaps in achieving transformational scales of financing and deflecting the country from its long-term growth trajectory.

Figure 7: Breakdown by sources



Equity investments usually take place through the balance sheet, or at the project level where investments are paid back from project cash flows. The study found that equity investments, at both the balance sheet and the project level added up to 21% of the total pie. More than 90% of these investments were in the form of private equity (developer or o□-taker) and were driven largely by rooftop and utility scale solar installations. It is, however, important to note that similar private equity investments in other sectors may be underrepresented due to the non-availability of data. Such investments in energy e□ciency and sustainable transportation can be better mapped once standardized tagging and disclosure practices are followed by the private sector.

Grants-in-aid, in the form of central and state budgetary allocations remained the largest channel for disbursements of funds for the flow of finance from ministries and state departments with over 48% of the grants directed towards the power sector and 28% and 23% towards energy e□ciency and the transportation sector, respectively.

Towards a more effective mix of instruments

In order to maintain the growth rate and steepen the growth curve, it is imperative that the capital deployed in existing projects is recycled. New sources of capital need not be included to meet the increased future investment requirements.

A CPI 2019 study, 'From Banks to Capital Markets: Alternative Investment Funds as a Potential Pathway for Refinancing Clean Energy Debt in India' proposes pathways to shift project debt to capital markets through:

1. The securitization of a diversified loan portfolio by financial institutions, or
2. Developers raising capital directly from the market, and using the proceeds to retire existing loans.

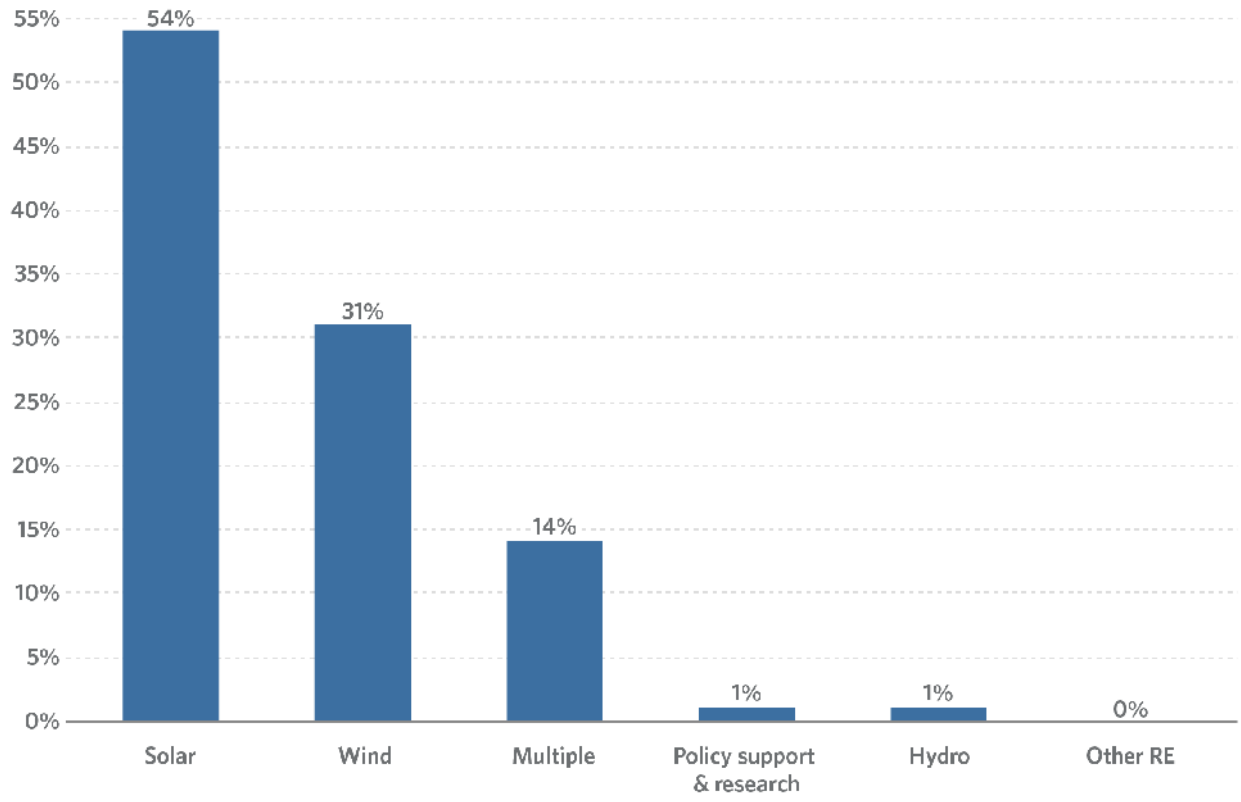
While capital markets in India are yet to achieve such sophistication, specific solutions such as greater default protection and the development of risk-transfer mechanisms can deepen bond markets in India.

3.3 SECTORS

3.3.1 POWER GENERATION

The power generation sector accounted for nearly INR 199 thousand crores over the two years tracked in this study. In 2017, total new renewable energy investments increased by 19% over 2016 levels and were driven largely by an increase in capacity additions in both solar and wind energy (Figure 8).

Figure 8: Breakdown of power investments by sub-sector.



The power generation sector has historically been the most competitive as it matured over time and enabled the absorption of significant investments when compared with other sectors. However, it must be noted that this bias towards the power generation sector may be exaggerated due to easier reporting and the availability of data.

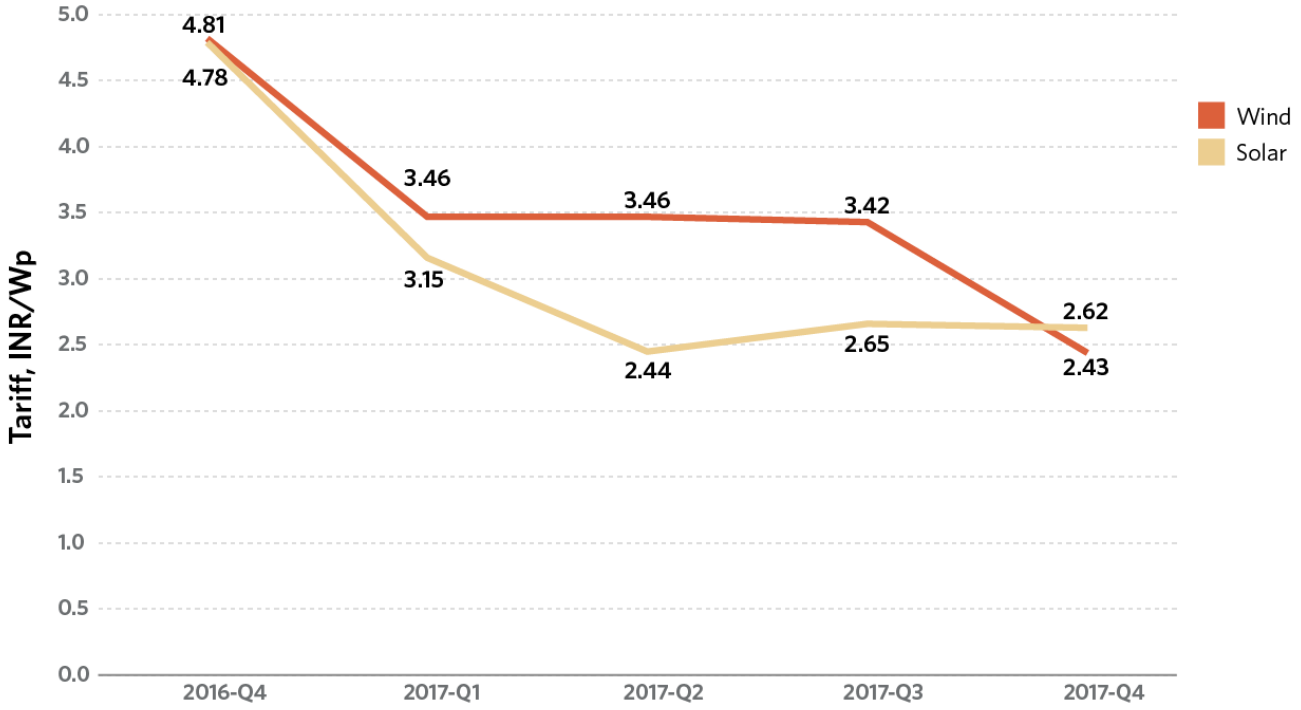
The total rooftop solar capacity reached 4 GW as of December 2018 with approximately 1 GW added in FY 2017 and over 1.5 GW added in FY 2018. Significant capacity additions indicate an increase in tracked investments despite the falling costs of solar and wind power (Figure 9). In 2016, the average renewable energy technology costs continued to decrease with the solar tari hitting a record low in the second quarter of 2017. Overall, policy interventions in the solar power sector such as solar park policy, and grid-connected rooftop solar plants in conjunction with a sharp decline in solar taris made investment in the sector highly attractive.

In FY 2017, wind energy projects aggregating a record 5,000 MW were installed, according to the Ministry of New and Renewable Energy (MNRE). The same year, nearly 2,000 MW of new wind energy projects were installed in India. This suggests a decline of 68% year-on-year[21]. The Government's target for setting up 60 GW of wind power by 2022 and the falling costs looked promising for wind power project developers. However, despite the head start, wind energy projects enjoyed prior to 2014, the utility scale solar PV caught up soon after, osetting the advantage the former enjoyed in terms of lower interest rate spreads compared to solar. Over the period 2014 to 2018, interest rate spreads for both wind and solar PV declined by 75-125 basis points (CEEW and IEA, 2019) (Figure 10).

The private sector invested over INR 40 thousand crores in solar power and INR 30 thousand crores in wind power. Of the total tracked investments in the solar sub-sector, 84% on average flowed through private channels with commercial banks taking the lead. The power sector was primarily financed by commercial debt (58%), both domestically and internationally sourced, followed by private equity. Interestingly, the tracked public spending in the power generation sector was driven by PSUs such as NTPC and IREDA. This is not surprising as these PSUs often act as a medium for the central government to finance green projects in the country. DFIs accounted for only for 8% of the total public spending in the sector.

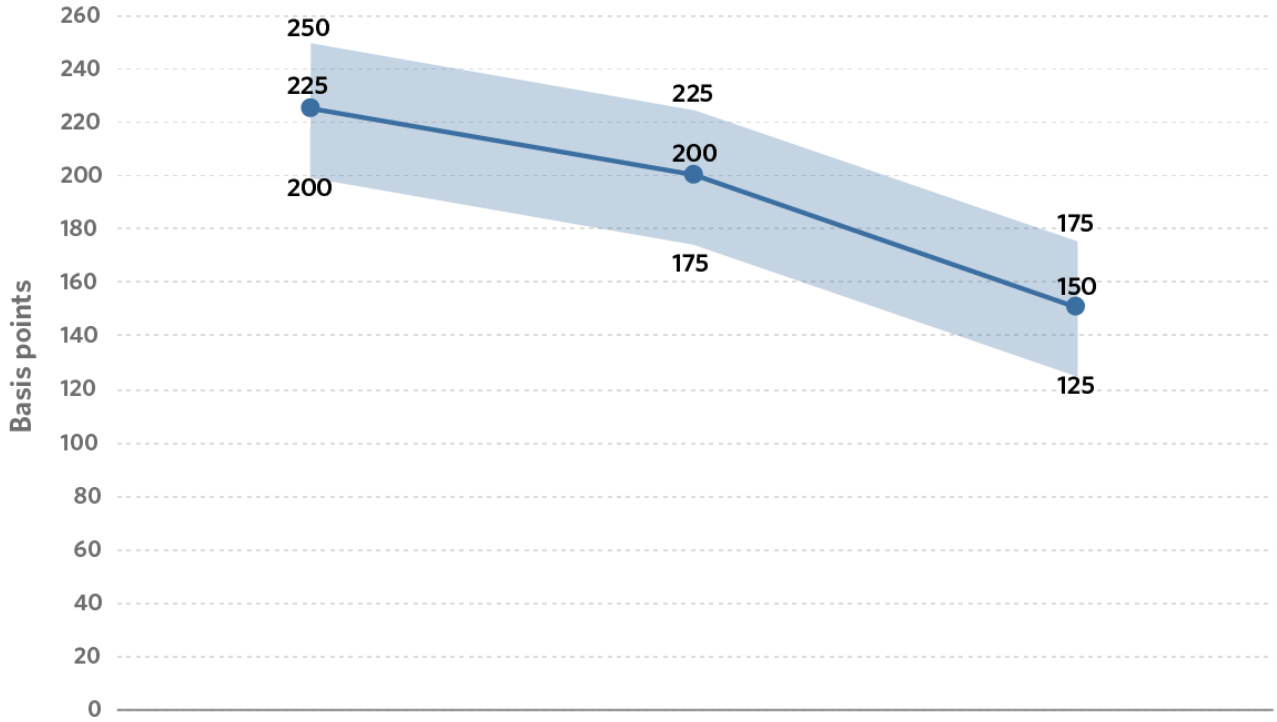
21 Solar Energy was the only power source in India to grow year-over-year in FY 2017-2018; Mercom India - https://mercomindia.com/solar-power-growth-yoy-2017-18/

Figure 9: Solar and wind tari□s at record lows.



Source: Bridge to India, 2017; https://www.Pv-magazine-india.Com/2018/01/31/indias-solar-status-2017-w-charts-bridge-to-india/

Figure 10: Interest range - solar pv and wind. the blue line represents the midpoint and the light blue represents the range.



Source: 2019. Clean energy investment trends: Evolving risk perceptions for India's grid-connected renewable energy projects. New Delhi: CEEW & IEA.

Interestingly, it was in 2017, that total investment in renewable energy projects in India surpassed fossil fuels for the first time[22]. According to the IEA's world energy investment report, overall power sector investment fell by almost 10% in India, due to a significant reduction in spending on coal. But renewable energy investments reached a record high, driven by a higher than double solar PV investment, and record spending on wind projects. Spending on coal is further expected to drop as per the latest report published by the central electricity authority, which suggests halting any further capacity generation beyond the 50 GW coal fleet that is under construction (CEA, 2019).

Can we expect strong investments to continue in the power generation sector?

While the power generation sector accelerates ahead of other mitigation-related sectors, the total investments still have a lot of catching up to do to achieve India's clean energy targets. A paradoxical situation has now emerged. The record low solar power tari□s that drove investments in the sector in 2016 and 2017 now pose a threat to its growth. Increasingly, grid stability is becoming an issue as more renewables are injected into them.

Wind power, which spearheaded India's renewable energy growth until 2015, has also begun to lose its sheen, and particularly its share in capacity additions. In recent years, the sector has been plagued by weakening monsoons (ET, 2018), land availability issues, financial weaknesses of DISCOMs, with ensuing payment delays, and an increase in market risks. Regulatory challenges and policy flip-flops have also been cited as major barriers.

In addition to these challenges, financing issues also emerged partly due to the tagging of clean energy as a component of the power sector (ADB, 2018). Funding for the sector is often crowded out by loans disbursed to fossil fuel-based projects due to investor confidence, which, however, is still lacking in renewable energy projects. Attracting and incentivizing institutional investors, both foreign and domestic, may not only be a prerequisite to meet the country's targets but may also solve the issue of crowding out of funds. Renewable energy aligns better with the investment criteria of investors such as pension funds, insurance companies and foreign institutional investors (FIIs) than the fossil fuel sector. Renewable energy projects have been observed to exhibit lower cash flow variability and higher returns on capital employed (CPI, 2018). But fundamentally, payment delays by DISCOMs need to be addressed as a starting point.

3.3.2 SUSTAINABLE TRANSPORTATION

Between FY 2017 and FY 2018, low-carbon transport investments totaled INR 27.50 thousand crores led by MRTS projects by the public sector, and the sale of 3-wheeler electric vehicles (EVs or rickshaws) by households.

Between FY 2017 and FY 2018, low-carbon transport totaled INR 27.50 thousand crores led in equal measure by both domestic and international actors.

These investments were led in equal measure by both domestic and international actors (Figure 11. International bilateral funding was the biggest contributor to the development of metro rail projects, with their combined investment adding up to almost INR 13 thousand crores in debt. Delhi and Mumbai metro rail projects were the largest recipients of these funds (45% and 25% each). On the other hand, various ministries such as the Ministry of Housing and Urban A□airs, and the Ministry of Road Transport and Highways disbursed total budgetary grants of INR 895 crores for metro projects.

22 IEA: Renewables investment in India topped fossil fuels for the first time in 2017; Carbon brief - https://www.carbonbrief.org/iea-renewables-investment-in-india-topped-fossil-fuels-for-first-time-in-2017

Figure 11: EV sales over 2016-2018 (units)

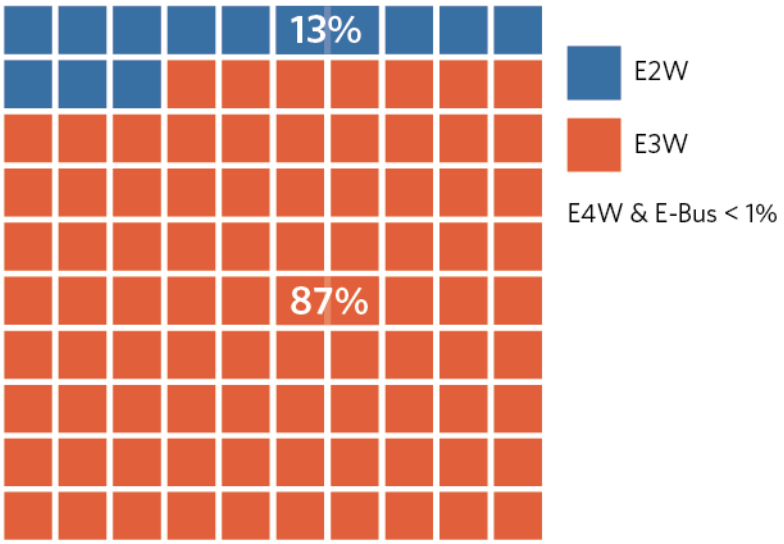
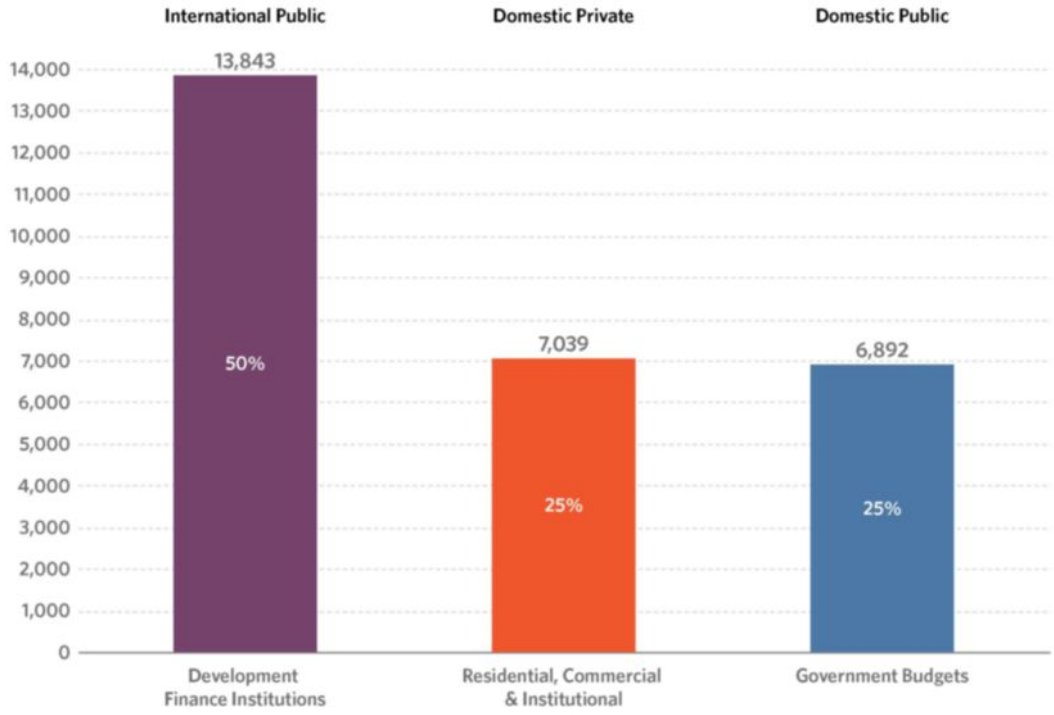


Figure 12: Investments in sustainable transportation in FY 2017 & 2018 (in INR crores)



A total of 6,00,000 EVs were sold in India between 2016 to 2018, translating to 1.2% of the total automobile sales in the country. Road EVs include a wide range of vehicles such as electric 2-wheelers, 3-wheelers (e-rickshaws), electric cars and electric buses. Although the sale of electric 2-wheelers doubled over these two years, the sale of electric 3-wheelers, commonly referred to as e-rickshaws, constituted 87% of total EV sales (Figure 12).

The individual household spending on EVs, a total of INR 7 thousand crores, calculated based on the sale of private EVs, increased by 20% year-on-year, which made up the largest portion of tracked private investment in low-carbon sustainable transport. One reason for the adoption of EVs could be the support provided to about 280 thousand hybrid and electric vehicles by way of demand incentives amounting to about INR 309 crores during the years

2016 to 2018 under the first phase of the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles in India (FAME-India) Scheme. This is the flagship scheme of the Department of Heavy Industries (DHI) announced in the Union Budget 2015-2016 as part of the National Electric Mobility Mission Plan (NEMMP) 2020 with an initial outlay of INR 795 crores.

What is driving this trend?

The private EV industry was in its nascent stages during the two years considered for this study, but it has shown significant growth (o its low baseline) since then due to the government's announcement of its plans to stop selling petrol or diesel cars in India by 2030 (Dhawan et. al, 2017). In the latter half of 2017, the Clean Energy Ministerial (CEM) announced the EV 30@30 campaign to target a minimum of 30% new electric vehicle sales by 2030. The FAME-I Scheme was also instrumental in promoting the use of electric buses in India. In accordance with these plans, the DHI issued an expression of interest (EoI) inviting proposals from a million plus cities and special category states for e-buses. Before 31st March 2018, as many as 8 Indian cities had managed to finalize their tendering processes to procure e-buses. The government has also announced an investment of INR 10 thousand crores under the FAME-II Scheme, over a period of three years, starting in 2019. The uptake of EVs, and especially e-buses, is expected to grow and contribute more to the low carbon mobility sector in India. The financial investments through the extension of the FAME-I Scheme till March 2019, and the FAME-II Scheme will be covered in the next phase of this study. Private EV ownership remains low in India.

3.3.3 ENERGY EFFICIENCY AND POWER TRANSMISSION

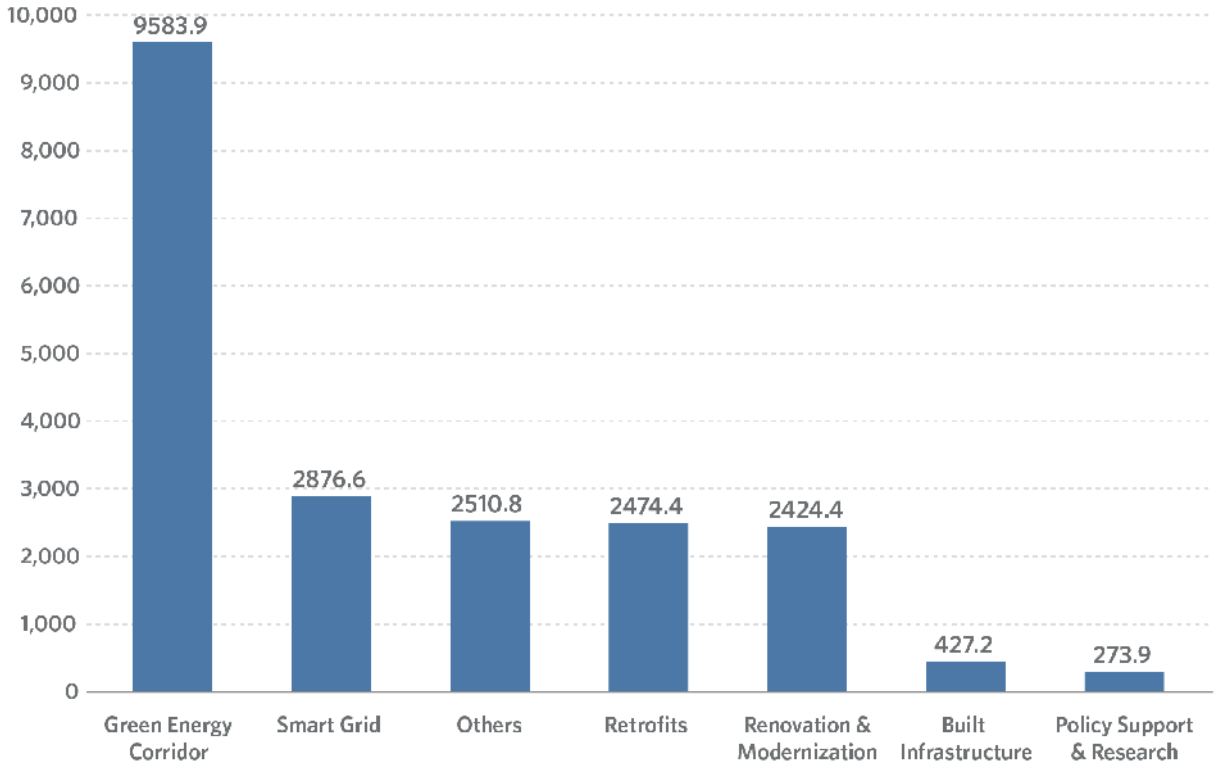
Between 2016 and 2018, the energy efficiency and power transmission sector investments totaled INR 20 thousand crores. Annually, this translated to about INR 8 thousand crores in FY 2017 and INR 12 thousand crores in FY 2018, an increase of nearly 50%.

The sector comprises investments in built infrastructure, retrofits, renovation and modernization, policy support and research, smart grids, and green energy corridors (Figure 13). The green energy corridors projects emerged as the largest contributor to the tracked investments in energy e ciency and power transmission, amounting to as much as 47% (INR 10 thousand crores) during the two years. The government is targeting the evacuation of 20,000 MW of large-scale renewable power, a huge capacity target, from power surplus states[23] and improving the grid infrastructure in the implementing states. The smart grid investments, another ambitious project of the government, totaled 14% (INR 3 thousand crores) of the tracked energy e ciency and power transmission investments in 2016-2018. The National Smart Grid Mission (NSGM), launched in March 2015, created an institutional mechanism for the planning, monitoring and implementation of policies and programs related to smart grid activities in the country. Some of the completed projects have begun to demonstrate technology to reduce aggregate technical and commercial losses, manage peak loads, and monitor and control distribution lines. Activities such as the construction of green buildings (refer to Annexure III), renovation and maintenance, and retrofitting of existing building stock to enhance energy e ciency, added up to about 39% of the tracked

23 The eight renewable-rich states are Tamil Nadu, Rajasthan, Karnataka, Andhra Pradesh, Maharashtra, Gujarat, Himachal Pradesh, and Madhya Pradesh. The project is being implemented in these states by the respective state transmission utilities (STUs).

investments. The government undertook these activities through the Ministry of Power and the Ministry of New and Renewable Energy.

Figure 13: Breakdown of energy e□ciency and power transmission investments by sub-sectors



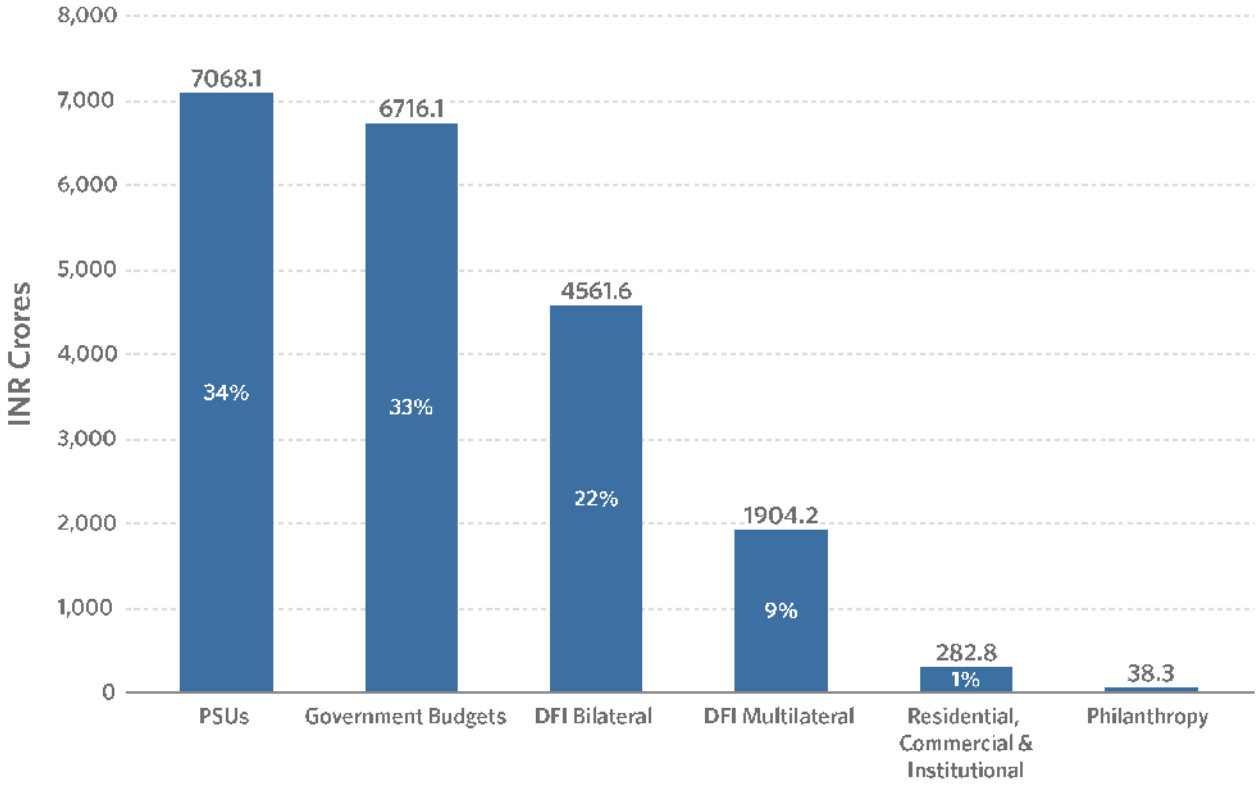
The PSU projects accounted for the largest share of the tracked energy e□ciency and power transmission investments, amounting to 34% or INR 7 thousand crores for 2016-2017. The Ministry of Power (MoP), through the Bureau of Energy E□ciency (BEE), is leading the energy e□ciency initiatives in the areas of household lighting, commercial buildings, standards and labelling of appliances. Its work also includes demand-side management in agriculture/ municipalities, small and medium enterprises and large industries including the initiation of the process for the development of energy consumption norms. Another public sector company Energy E□ciency Services Limited (EESL) undertook energy e□ciency programs such as the Unnat Jyoti by A□ordable LEDs for All (UJALA) for LED bulb distribution, and the Street Lighting National Programme (SLNP) to replace conventional streetlights with LEDs. EESL is also providing electric vehicles to government entities on a lease or outright purchase basis to replace the existing petrol and diesel vehicles under the National E-Mobility Program. A detailed case study is presented at Annexure II.

The government through its central and state budgetary allocations stood out as the second largest contributor to energy e□ciency and power transmission investments (Figure 14), following closely behind PSU investments at 34%. Government contributions amounted to a total of INR 7 thousand crores or 33% of the tracked investments in the sector. These investments primarily include the projects envisaged under the National Mission for Enhanced Energy E□ciency[24] (NMEEE). The remaining 33% comprised investments that

24 NMEEE is an integral part of the National Action Plan on Climate Change (NAPCC), Government of India. https://archivepmo.nic.in/drmanmohansingh/climate_change_english.pdf

were predominantly from bilateral and multilateral DFIs in smart grid and green energy corridor projects. It is, however, important to note that the investments undertaken by private institutional stakeholders could not be tracked in this phase of the study. These investments will be covered in detail in the next phase of this study.

Figure 14: Tracked energy e□ciency and power transmission investments by source



What is driving this trend?

Progress made by sector-dedicated PSUs such as the EESL, NTPC and BEE has been a gamechanger in increasing public investments in the energy e□ciency sub-sectors, albeit in largely government schemes and programs. Further, some of India's mandatory energy e□ciency policies such as the Perform, Achieve, and Trade (PAT) Scheme cover more than 20% of the energy use in India (IEA, 2018). This has resulted in significant e□ciency gains in the industry sector. Energy e□ciency initiatives like the UJALA, implemented by the EESL are expected to saved more than 3,700 crore kWh of energy consumption.

In the built infrastructure sector, cooling/heating and appliance ownership are expected to drive consumer demand in the future owing to a rise in living standards. Mandatory enforcement of energy performance standards in conjunction with higher awareness, and decreased costs of energy e□cient technology can enable greening of the energy demand in the country.

4. CONCLUDING OBSERVATIONS

The analysis of the landscape brings out several positive trends including, but not restricted to, an overall increase in the tracked green finance flows in 2016-2018 across all mitigation sectors. It also shows a surge in public finance flows due to the introduction and implementation of various government initiatives. Green finance investments appear to be responding to the policy environment, with the government making constant efforts to strengthen the investment promotion and facilitation framework in the country.

The tracked green finance falls far short of India's green finance needs. The tracked green finance for mitigation for FY 2017 and FY 2018, at an average INR 124 thousand crores (USD 19 billion) represents only about 10% of what the country actually requires.

There is a need for transformational upscaling of green finance across all low-carbon sectors.

India's NDCs suggest that the country needs USD 2.5 trillion (at 2014-2015 prices) from 2015 to 2030. This translates to a requirement of roughly USD 170 billion per year amounting to around 8% of India's GDP in 2014-2015 (UNFCCC, 2015). According to NITI Aayog, the cumulative costs of low carbon strategies are estimated to be around USD 834 billion at 2011 prices, over the two decades between 2010 and 2030 (NITI Aayog, 2017). Further, an IFC study suggests that there is an opportunity for USD 3.1 trillion climate-smart investments in key sectors between 2018 and 2030 to fully meet India's NDCs (IFC, 2017). The recent estimates by Vishwanathan & Garg (2020) present a cumulative assessment of USD 6-8 trillion between 2015-2030 to completely transform the energy systems in India for a deep decarbonization scenario. This is equivalent to USD 400-533 billion on a yearly basis. Such a huge spread in estimates causes uncertainty in the required policy action and necessitates the undertaking of a detailed tracking exercise to identify the current trail of investments. Most importantly, the landscape demonstrates that the current scope and extent of green finance is grossly insufficient to mitigate the effects of climate change in India and there is, therefore, a need for transformational scaling up of green finance in the county.

There is a requirement for a comprehensive climate budget tagging framework to track climate-related expenditures in national budget systems.

In this study, data related to the public funds for mitigation-related activities moving out of India's exchequer i.e., the central and state ministries, was collected from the budget (actuals) published by the Ministry of Finance. The relevant budget codes were identified manually based on the taxonomy developed[25].

25 Refer to the methodology document

However, a budget tool with dedicated codes standardized throughout the process will best facilitate the measurement, reporting and verification for national and international green finance to mainstream climate action through policy formulation. This exercise has taken precedence in countries such as Bangladesh, Nepal, Philippines and Indonesia in recent times. The Government of Bangladesh adopted a Climate Fiscal Framework (CFF) in 2014 which proposed a climate expenditure tracking framework (CETF) that would be applied to all line ministries' budget submissions. Bangladesh's Climate Public Expenditure & Institutional Review (CPEIR) consists of four components, including defining and classifying climate activities, weighing their climate relevance and designing the tagging procedure[26]. Building consensus on the green finance taxonomy proposed by CPI and cKinetics in 2019 could be a step forward in designing a broader climate budget tagging framework for India.

A budgeting exercise to mainstream action is not unprecedented in India. Indian government budgets have successfully adopted a powerful tool to understand the di□erential socio-economic impact of gender policies. Through a decade long process of awareness and capacity building at the national and state levels, the Indian government has made remarkable progress in implementing and reviewing the budgetary allocations for gender issues and presenting state-level gender budgeting statements. Climate Budgeting is another similar and significant step towards facilitating climate action and enabling informed policy choices to scale up investments in the future. India could benefit from an integrated domestic measurement, reporting and verification system to scale up green finance.

The climate budgeting framework will form the basis for a comprehensive MRV system for green finance in both the public and private sectors. India already adheres to global reporting obligations such as the biennial update report to the United Nations Framework Convention on Climate Change as a measure to improve transparency and accountability. Attempts to build an integrated domestic MRV system to assess greenhouse gas mitigation actions and their impact are already underway (CEEW, 2019). This is an important step towards leveraging existing capacities and identifying areas for priority action. However, a detailed, integrated MRV system that streamlines financial attributes is not yet available. Such a system would improve data gathering processes, data management systems, technical capacity and stakeholder management to identify financing constraints, gaps and e□ciency for every rupee spent.

A strong framework would help dedicated institutions assume a greater role in advancing the case for green investments.

To enable e□ective financing in renewable energy and energy e□ciency, and conservation projects in the country, the government set up IREDA in the year 1987. Today, India is fast emerging as a leader in clean energy, with the power and sustainable transportation sector making rapid strides[27]. Dedicated PSUs, in particular, have played an important role in enabling this progress. This study shows a noteworthy increase in investments in energy e□ciency projects since the establishment of dedicated enterprises such as EESL and the BEE (Annexure II).

26 Climate Budget Tagging (CBT) – What is CBT and how useful it is? https://www.climatefinancedevelopmente□ectiveness.org/sites/default/files/climateBudgetTagging.pdf

27 Here's how India became a global clean energy powerhouse; The European Sting, September 17, 2019. https://europeansting.com/2019/09/17/heres-how-india-became-a-global-clean-energy-powerhouse/

The Climate Change Finance Unit (CCFU) was established in 2011 under the Ministry of Finance as an analytics and support body dedicated to climate financing in India. Apart from providing strategic assistance to the ministry, the CCFU's responsibilities can be expanded to not only accommodate a more central coordinating role between various private and public financial institutions, but also to design a standardized green finance framework for India. The powers allocated to the CCFU and other such dedicated institutions are clearly constitutive of the potential for action.

The role of dedicated PSUs and departments can be enhanced through increased capacity building, knowledge creation and e□ective processes and instruments. This will enable them to play a much greater role in advancing the case for green investments.

4.1 NEXT STEPS FOR RESEARCH

The first objective of this study was to quantify the level of green finance in India. The second was to establish a mechanism for doing so, where the same could become a standalone portal for yearly tracking of such financial flows. The third objective was to identify gaps in the availability, quality and robustness of existing data on green financial flows.

Subsequent phases of this exercise shall include the following steps:

- Improving the data collection process through greater stakeholder engagement and devising ways to overcome the methodological challenges faced in this phase of the study for both public and private sources of financing.
- Building a framework for a climate budgeting exercise that is standardized across the state and national government budgets.
- Building an integrated, national MRV portal for green finance in India.

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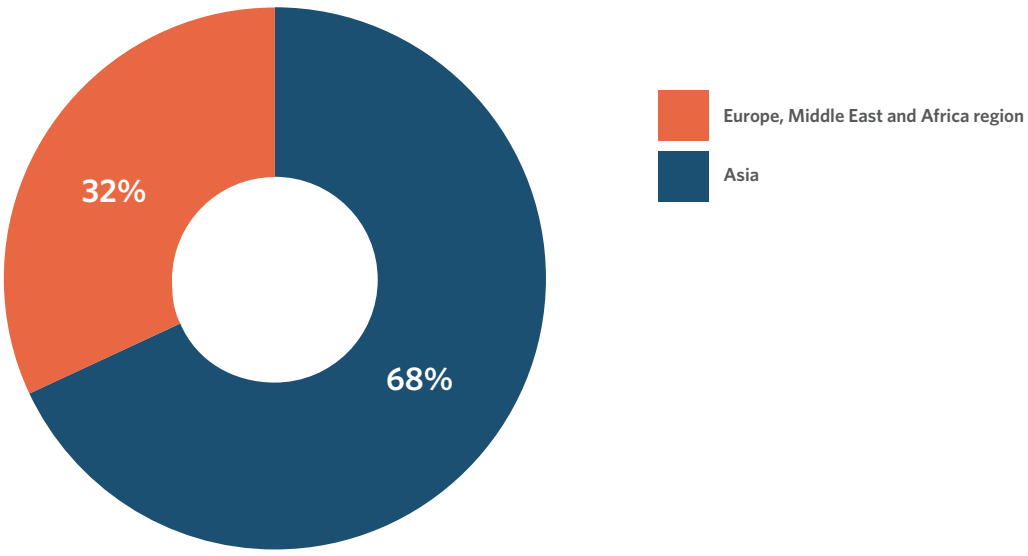
ANNEXURE I

GREEN BONDS MARKET IN INDIA 2016-2018

In July 2018, India stood at the 11th position globally with USD 6.6 billion in green bonds issuances. Public sector enterprises such as EXIM bank, IDBI, NTPC and private sector players such as Yes Bank, HDFC and CLP Wind farms spearheaded this growth in the green bonds market in India during 2015-2016. According the Climate Bonds Initiative, the public sector contributed 51% of all issuances, driven by IREDA and PFC. More than 80% of these issuances were directed towards the power sector followed by transportation (13%).

The Rural Electrification Corporation (REC) issued its first green bond in 2017, on the London International Securities Market (ISM). The USD denominated bond was dated ten years and raised USD 450 million to finance or refinance new and existing projects in the rural areas of India. While the list of nominated projects was not available publicly via secondary research, over 1.6 GW of capacity including solar, wind, biomass, water and waste management was to be financed via these issuances. The aim was to power most of India's rural pockets with accessible and a□ordable sources. The bonds were 3.9 times oversubscribed and attracted many international investors (Figure A).

Figure A1: Asian and EMEA investors made up 68% and 32% of the order book respectively

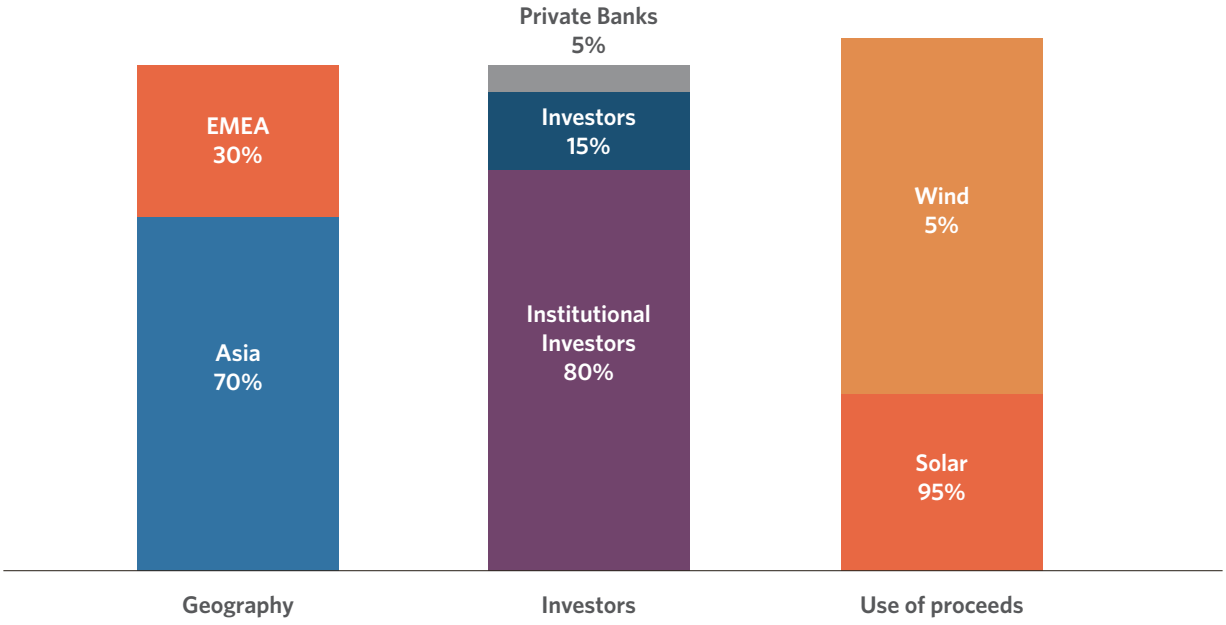


When NTPC issued its first ever INR denominated green bond in August 2016, it was a milestone achievement for the PSU. It was the first ever Indian instrument with features of both green and masala bond structures. It was also the first time a public sector undertaking would issue a five-year, corporate masala bond.

NTPC raised INR 2 thousand crore under its $4 billion medium term note program for capital expenditure. The issue was oversubscribed by 1.45 times by multiple international investors across both public and private sectors as listed in figure B.

The investors were categorized into asset managers, insurers and sovereign wealth funds, public banks, and private banks (see figure B).

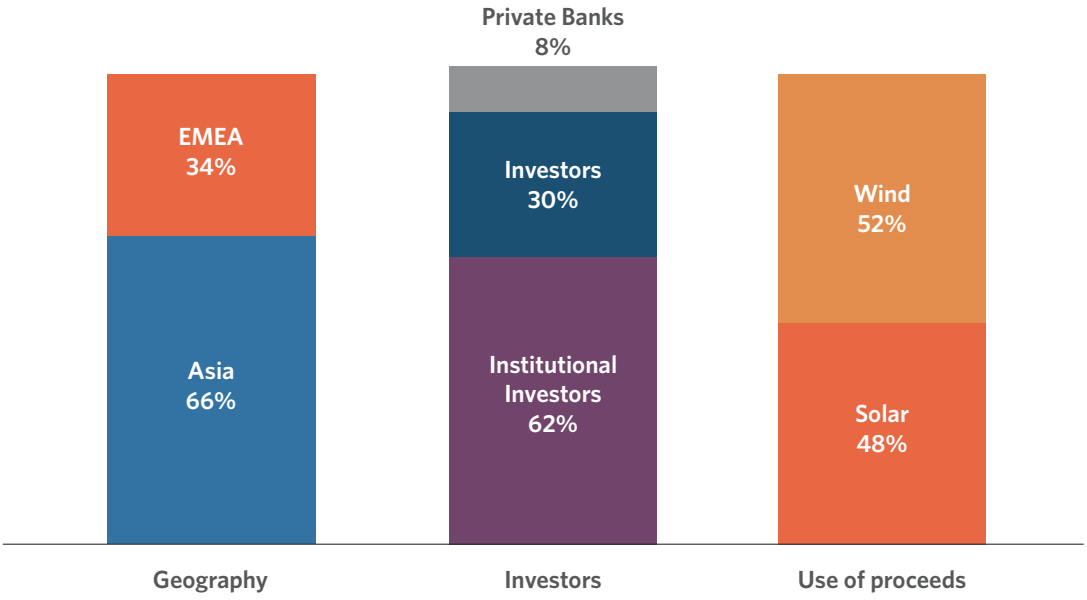
Figure A2: NTPC Green Masala Bonds issue details



The investors were categorized into asset managers, insurers and sovereign wealth funds, public banks, and private banks (see figure B).

Following NTPC, the Indian Renewable Development Authority (IREDA) issued a masala green bond worth INR 1.9 thousand Crore (USD 300 million) in 2017, on the London Stock Exchange. This issue was the first ever investment grade rated bond by a financial institution in India. The geographical and investor uptake as well as the use of proceeds have been outlined in the figure on the left.

Figure A3: IREDA Green Masala Bonds issue details



ANNEXURE II

CASE STUDY: BUREAU OF ENERGY EFFICIENCY

The Bureau of Energy E□ciency (BEE) was set up by the Government of India on 1st March 2002 to provide a policy framework and direction to national energy conservation activities within the overall framework of the Energy Conservation Act , 2001. It undertakes four state-of-the-art schemes under the National Mission for Enhanced Energy E□ciency (NMEEE):

Perform, Achieve and Trade (PAT) – a market-based mechanism to enhance the cost e□ectiveness of improvements in energy e□ciency in energy-intensive large industries and facilities, through the certification of energy savings that can be traded.

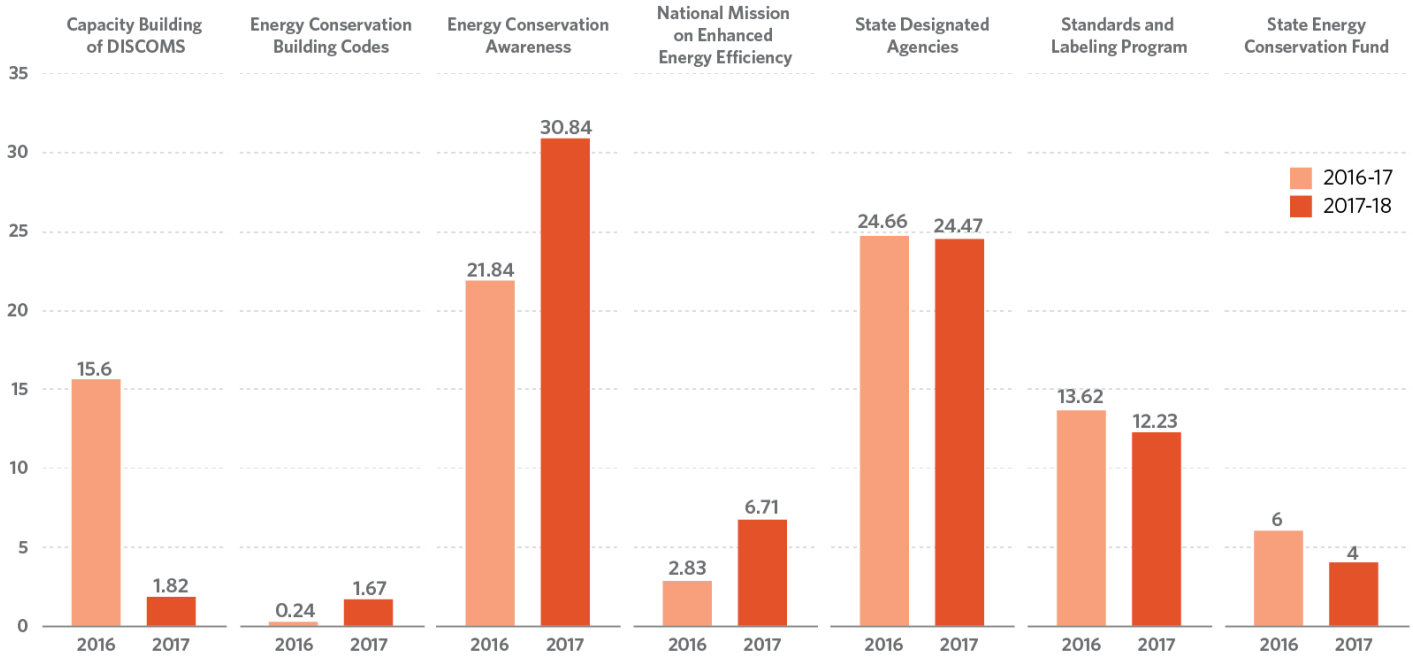
Market Transformation for Energy E□ciency (MTEE) - accelerating the shift to energy e□cient appliances in designated sectors through innovative measures to make products more a□ordable.

Energy E□ciency Financing Platform (EEFP) - creation of mechanisms that would help finance demand-side management programs in all sectors by capturing future energy savings.

Framework for Energy E□cient Economic Development (FEEED) - developing fiscal instruments to promote energy e□ciency.

In 2017, the BEE launched a new version of the Energy Conservation Building Code (ECBC). It defined the norms of energy performance for various building components to lower the building's energy requirement without a□ecting the function, comfort, health or productivity of the occupants. In the same year, it notified corporate average fuel e□ciency norms for passenger cars and heavy-duty vehicles. It also helps consumers make informed choices regarding the cost-saving potential of various energy consuming appliances through its flagship Standards and Labelling (S&L) Scheme. Between 2016-2018, BEE spent a total of INR 229 crores (tracked) on energy e□ciency projects

Figure B1: BEE investments (2016-18)



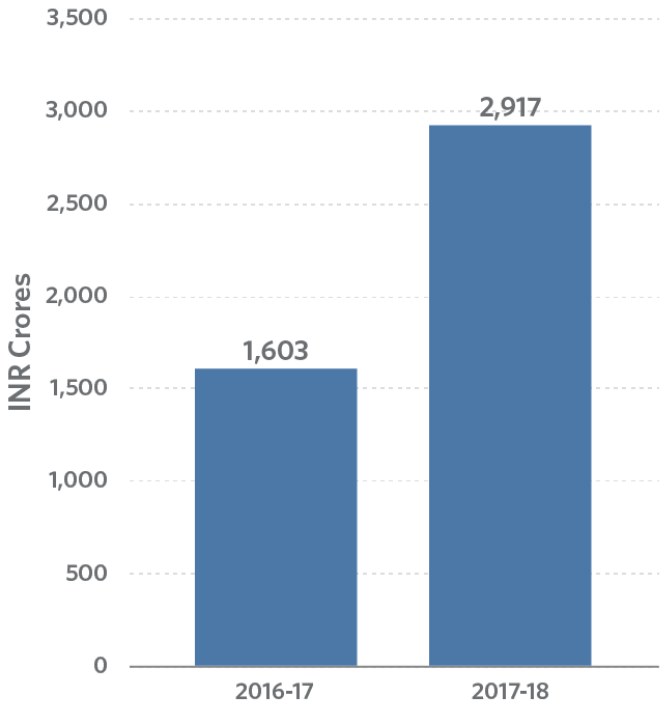
CASE STUDY: ENERGY EFFICIENCY SERVICES LIMITED (EESL)

Promoted by the Ministry of Power, the Government of India as a joint venture of four public sector undertakings - NTPC Ltd., Power Finance Corporation Ltd., REC Ltd., and Powergrid Corporation of India Ltd. It is a super energy service company (ESCO), which enables consumers, industries and governments to e□ectively manage their energy needs through energy e□cient technologies. EESL is implementing the world's largest non-subsidized energy e□ciency portfolio across sectors such as lighting, buildings, e-mobility, smart metering and agriculture with its Pay-As-You-Save (PAYS) model. This obviates the need for any upfront capital investment by the consumer. EESL's total investment is recovered through monetized energy savings over a scheduled project period.

As of March 31, 2018, under the Unnat Jyoti by A□ordable LEDs for All (UJALA) Program, EESL had already distributed over 29.46 crore LED bulbs, 16.57 lakh energy e□cient fans and 5.8 million LED tube lights, benefiting about 75 million consumers and resulting in estimated annual energy savings of about 38.75 billion units. Similarly, under the Street Lighting National Program (SLNP), EESL saved nearly 3.66 billion units of electricity by installing 5.5 million LED streetlights. EESL is also the implementing agency for the Atal Jyoti Yojana (AJAY) Scheme that aims to install solar streetlights in rural, semi-urban and urban areas that face inadequate power coverage, and the Smart Meter National Program (SMNP) that aims to leverage various functionalities of smart meters such as remote meter reading, and remote load limiter. It is also providing electric vehicles to government entities on lease or an outright purchase basis to replace the existing petrol and diesel vehicles under the National E-Mobility Program.

Between 2016-2018, EESL spent a total of INR 5 thousand crores (tracked) on energy e□ciency projects, an annual increase of 81.97%

Figure B2: EESL investments (2016-18).



CASE STUDY: NATIONAL THERMAL POWER CORPORATION (NTPC)

The National Thermal Power Corporation (NTPC) Limited is the largest Indian state-owned electric utilities company based in New Delhi, India. It is an Indian public sector company that is listed on the London Stock Exchange and the Government of India holds 51% of its equity at present.

The total installed capacity of the NTPC Group as of March 31, 2017 stood at 50,498 MW with 620 MW of RE capacity. By March 2018, it had increased to 51,300 MW with 928 MW of RE capacity. The company contributed 23% of the nation's power requirement in FY 2018.

Besides striving for a bigger renewable portfolio and better fuel e□ciencies, in a move towards becoming a carbon-neutral company, NTPC has also successfully tested the co-firing of biomass in a conventional coal-fired boiler. As a strategic move, in 2016, NTPC entered the wind portfolio, and ramped up its presence in solar-based generation. In FY 2017, NTPC added 500 MW in solar capacity. In FY 2018, NTPC added 250 MW of solar, 50 MW of wind and 8 MW of small hydro to its renewable portfolio taking the total to 928 MW of RE capacity. 3.2% of the total power was generated with zero emissions. This is a huge step in the company's long-term corporate plan to achieve 28-30% non-fossil fuel-based generation capacity by 2032.

In 2017, NTPC raised INR 2 thousand crore by issuing rupee-denominated green masala bonds under its USD 4 billion medium-term note program for capital expenditure. The net proceeds from the bond were utilized in the following projects[28]:

28 https://www.ntpc.co.in/sites/default/files/downloads/Post-Issuance-Report.pdf

Table A. Utilization of masala bond proceeds

S.No.	Name of the Project	Capacity (MW)	Project type	Project location
1	Solar PV project in Anantpur district, Andhra Pradesh	250	Solar	Andhra Pradesh
2	Solar PV project in Bhadla district, Rajasthan	260	Solar	Rajasthan
3	Solar PV project in Mandsaur district, Madhya Pradesh	250	Solar	Madhya Pradesh
4	Rojmal Wind Project in Gujarat	50	Wind	Gujarat

Energy e□ciency: In line with NTPC's low carbon strategy, all new thermal capacity additions use supercritical and ultra-supercritical technologies. NTPC is also the frontrunner in flue gas desulphurization to contain sulphur dioxide emissions and testing new technologies to contain nitrogen oxide emissions for Indian coal.

Electric mobility: The company has plans to enter the e-mobility business starting with EV charging stations. Under the FAME Scheme, the company opened two electric vehicle charging stations on a pilot basis on its premises in Delhi and Noida in 2017.

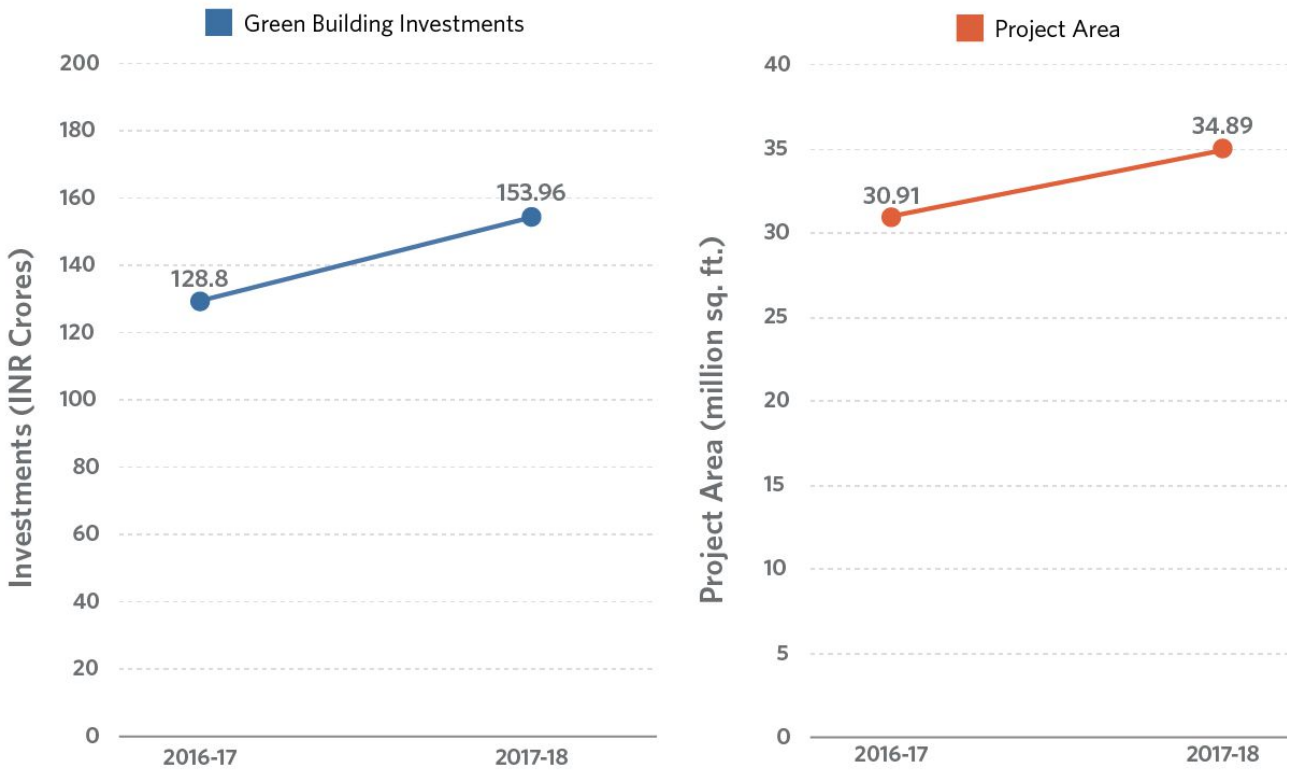
ANNEXURE III

GREEN BUILDING INVESTMENTS IN INDIA

Increased awareness among homebuyers and real estate developers has enabled the green building sector to emerge as a promising investment option. Rating and certification agencies such as GRIHA, LEED, IGBC, and IFC-EDGE are playing a proactive role in bridging the performance gap (mismatch between design and operation of a green building) by incorporating requirements to verify that buildings are used in a way that maximizes the e□ectiveness of e□ciency measures.

Although the initial investment required to make a building green may be higher than a conventional building, the long-term benefits of green buildings more than compensate for the additional costs incurred. Several state governments are competing with each other to provide policy and financial incentives to attract investments in green buildings. Between 2016-2018, about 65.8 million square feet of area came under the green building sector amounting to INR 283 crores in investments.

Figure C: Total green building investments (in inr crores) and project area (in million sq. ft.)



ANNEXURE IV

GOVERNMENT SCHEMES AND INITIATIVES

The following table lists some of the important schemes and missions launched by the Government of India. It also lists key takeaways from the annual United Nations Climate Change Conference (CoP), and other policy interventions that impacted green finance investments in a significant way. The events listed below range from 2010 to 2018.

Year	Event.
2010	National Clean Energy Fund established
2010	Renewable Energy Certificate (REC) and Renewable Purchase Obligation (RPO) mechanism introduced
2010	Jawaharlal Nehru National Solar Mission (JNNSM) launched
2010	National Mission on Sustainable Habitat (NMSH) launched to promote energy e□ciency in buildings, management of solid waste and a modal shift to public transport
2010	COP 16 held in Cancún, Mexico. Agreement signed for US$100 billion per annum Green Climate Fund (GCF), and Climate Technology Centre and Network (CTCN).
2010	Through the Finance Bill 2010-2011, a corpus called National Clean Energy Fund (NCEF) created out of cess on coal produced or imported ("polluter pays" principle) to finance and promote clean energy initiatives.
2011	National Mission for Enhanced Energy E□ciency (NMEEE) launched to strengthen the market for energy e□ciency by creating a conducive regulatory and policy regime. The following schemes were envisaged: 1. Perform Achieve and Trade Scheme (PAT) 2. Market Transformation for Energy E□ciency (MTEE) 3. Energy E□ciency Financing Platform (EEFP) 4. Framework for Energy E□cient Economic Development (FEEED) A proposal was presented to develop fiscal instruments to leverage financing for energy e□ciency through risk mitigation: Partial Risk Guarantee Fund for Energy E□ciency (PRGFEE) Venture Capital Fund for Energy E□ciency (VCFEE) to promote energy e□ciency National Energy Conservation Award and Painting Competition
2011	COP 17 held in Durban, South Africa. The conference participants agreed to begin negotiations on a legally binding deal comprising all countries, to be adopted in 2015, governing the period post-2020.
2012	Cycle I of Perform Achieve and Trade Scheme (PAT) launched
2012	Indian Solar Manufacturers Association (ISMA) established
2012	Solar Energy Corporation of India established
2012	National Manufacturing Policy 2011 launched
2012	Modified Special Incentive Scheme (M-SIS) launched
2012	Accelerated depreciation and generation-based incentives withdrawn from wind power projects

2012	COP 18 held in Doha, Qatar. The Doha Climate Gateway documents produced language on loss and damage, formalized for the first time in the conference documents.
2013	Green energy corridor project initiated with the target of evacuating approx. 20,000 MW of large-scale renewable power and improving the grid in the implementing states.
2013	Science, Technology and Innovation (STI) policy launched in India
2013	Renewable Regulatory Fund (RRF) established under Indian electricity grid code
2013	Wind Independent Power Producers Association (WIPPA) established
2013	JNNSM 2nd phase guidelines launched (Domestic content requirement for 50% of solar plants)
2013	COP 19 held in Warsaw, Poland. The required monitoring, reporting and verification arrangements for domestic action finalized for implementation.
2013	National Electric Mobility Mission Plan (NEMMP) 2020 to achieve national fuel security by promoting hybrid and electric vehicles in the country
2014	Development of solar cities scheme launched - Up to INR 50.00 lakhs provided per identified city or town
2014	Scheme for the development of solar parks and ultra-mega solar power projects launched as a flagship demonstration facility
2014	India's cumulative renewable power capacity reached 35,500 MW in 2013–2014
2018	India's cumulative renewable power capacity reached 70,500 MW in 2017-2018
2014	COP 20 held in Lima, Peru. The 'Lima Call for Climate Action' agrees on the framework and information required for intended nationally determined contributions
2015	Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME India) Scheme formulated by the Department of Heavy Industry
2015	Street Lighting National Programme (SLNP) implementation started by EESL with overall target of replacing 3.5 crore streetlights
2015	Unnat Jyoti by A□ordable LEDs and Appliances for All (UJALA) implementation started by EESL with overall target of replacing 77 crore LEDs by March 2019
2015	International Solar Alliance launched at the United Nations Climate Change Conference in Paris
2015	Ministry of New and Renewable Energy released its notification on the national o□-shore wind policy
2015	COP 21 held in Paris, France. Negotiations resulted in the adoption of the Paris Agreement.
2015	Indian Renewable Energy Development Agency (IREDA) awarded Mini Ratna Status by MNRE and the authorized capital of IREDA increased from INR 1,000 Cr. to INR 6,000 Cr.
2015	Invest India revamped in 2015-2016 as India's o□cial agency dedicated to investment promotion and facilitation.
2016	National Smart Grid Mission launched to develop smart grid, micro grids, consumer engagements, and training and capacity building
2016	Suryamitra Skill Development Programme (SSDP) launched to improve the spirit of entrepreneurship in solar power sector by MNRE
2016	COP 22 held in Marrakech, Morocco. Focus on water scarcity, water cleanliness, and water-related sustainability, a major problem in the developing world, including many African states.
2016	NCEF renamed to National Clean Energy and Environment Fund (NCEEF). Coal cess increased to INR 400 per tonne in the Union budget 2016-2017 and renamed "Clean Environment Cess".
2017	Energy Conservation Building Code (ECBC) updated by BEE
2017	Ministry of Power published competitive bidding guidelines for the production of renewable power
2017	MNRE issued national lab policy for renewable energy testing and certification.

2017	COP 23 held in Bonn, Germany. "Powering Past Coal Alliance" launched, led by the UK and Canada. Talanoa dialogue to "take stock" on the progress of climate action. Negotiations held on developing the Paris "rulebook".
2017	Draft Technology Development and Innovation Policy (TDIP) issued by MNRE to further research, development and demonstration (RD&D) efforts with an eye to promote indigenous technology development, manufacturing and quality improvement.
2017	Infrastructure status awarded for solar projects
2017	The Clean Energy Ministerial (CEM) announced EV 30@30 campaign to target at least 30% new electric vehicle sales by 2030.
2018	The Government sets targets to install 175 GW of renewable energy capacity by the year 2022, including 100 GW from solar, 60 GW from wind, 10 GW from bio-power and 5 GW from small hydro power.
2018	Tariff policy mandating purchase and generation obligations revised by Ministry of Power
2018	National Wind-Solar Hybrid Policy introduced by the Ministry of New and Renewable Energy
2018	Indian PM Narendra Modi approved the submission of India's second biennial update report (BUR) to the United Nations Framework Convention on Climate Change towards fulfilling the country's reporting obligation under the convention.
2018	COP 24 held in Katowice, Poland. Guidelines for the "global stock take" pledge-and-review cycle finalized. Developed countries commit $100 billion annually from 2020 to fund climate action in developing countries.
2018	National Energy Storage Mission (NESM) developed to focus on demand creation, indigenous manufacturing, innovation and necessary policy support to proliferate energy storage in the country.
2018	MNRE hosted the 1st Assembly of International Solar Alliance (ISA), 2nd Indian Ocean Rim Association (IORA) Energy Ministerial Meet and 2nd Global RE-Invest Meet and Expo.
2018	MNRE fixed an annual physical target to set-up 65,180 biogas plants for the year 2017-2018 under the National Biogas and Manure Management Programme (NBMMP)

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