

Building a Consensus on the Definition of Green Finance



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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 efficiency and sustainable transport solutions.

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Foreword



India's transition towards low carbon economic development requires mobilization of capital at scale. There is a need for structural transformation of financial policy and regulations to help direct capital towards green economic activities.

This report has taken the first step in defining “green” in context of India's Nationally Determined Contribution (NDC) commitment and economic goals. A formal definition of green finance relevant to India will set the agenda for progress in the next few decades and help foster an environment of transparency, sharing and commitment to green goals.

The evolving global investor dialogue is a signal that there is a clear intent to make the change. These investors are not only the flagbearers of this journey but also an ally for public institutions and policy bodies mandated to enable India's NDC goals.

I congratulate cKinetics and CPI for this effort in bringing to fore a subject of immense strategic relevance; more so, as Indian leadership initiates the implementation efforts in support of India 2030 vision as enshrined in our NDC. I further hope that this initial step is taken further along through necessary engagement with policy makers to ensure its adoption by various agencies thus reiterating India's commitment and desire to emerge as a global climate champion.

Atul Bagai

Head, UN Environment Country Office, India



Glossary

Asset	An asset refers to any resource, property or item which has a financial or economic value
Blended Finance	Is the strategic use of development finance for the mobilization of additional finance towards sustainable development in developing countries (OECD)
Capital flow	Net investments made in a given specified period of time within a defined boundary such as a project, a firm, a country, or a fund
Carbon Capture & Storage (CCS)	It is a carbon abatement process, which captures and deposits carbon dioxide from point sources in the form of an underground geological formation
Carbon Capture and Utilization (CCU)	It is the process of capturing carbon dioxide and utilizing it for business processes including manufacturing of fuels, polymers, carbonates and chemicals
Clean coal technology	Technologies designed to reduce negative environmental impacts associated with coal-based power generation
Climate adaptation	Focuses on building resilience to risks emerging from the climate change
Climate mitigation	Focuses on addressing the climate change impact through avoidance and reduction of greenhouse gas emissions
Credit rating agencies	Ratings which evaluate the credit worthiness of companies or their ability to repay investors
Development Finance Institutions	Financial institutions which provide financial services to the underserved markets
E&S risks	Financial risks for the investors due to environmental and social risks related to the operations of the investee company/ project
Equities	Shares in a company granting ownership to an individual or an institution entitling them a portion in profits
ESG investing	Integration of Environmental, Social and Governance parameters in stock selection process in addition to financial parameters
Green Bonds	A bond specifically earmarked for use in climate and environmental projects
Green Climate Fund (GCF)	A global fund created to support the efforts of developing countries to respond to the challenge of climate change by reducing their greenhouse gas (GHG) emissions and adapting to climate change
Greenhouse gas (GHG)	Atmospheric gases (including carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (N ₂ O), and water vapor) that contribute to the greenhouse effect by absorbing infrared radiation from the sun
Insurance Regulatory and Development Authority (IRDA)	Insurance regulatory authority in India
Lifecycle (cradle-to-grave)	Assessment of the environmental impact associated with all the stages of a product's life starting from raw material extraction to the end of useful life
Pension Fund Regulatory and Development Authority (PFRDA)	Pension regulator of India
Reserve Bank of India (RBI)	Central bank of India controlling the issuance and supply of the Indian rupee
Renewable Energy Service Company (RESCO) model	RESCO invests, installs, operates and maintains a project and executes a power purchase agreement (PPA) for supply of electricity. The power generated is sold to customer for a fixed monthly charge.
Securities and Exchange Board of India (SEBI)	Regulator for the securities market in India
Statutory Liquidity Reserves	Proportion of deposits required to be maintained by the commercial banks in addition to the cash reserve ratio
Stock Exchange	A platform where financial securities can be bought or sold
Sustainable investing	It covers a broader set of investment universe with the aim to build an inclusive, economically, socially, and environmentally sustainable world

Shaping a Green Finance ecosystem in India

THE NEED

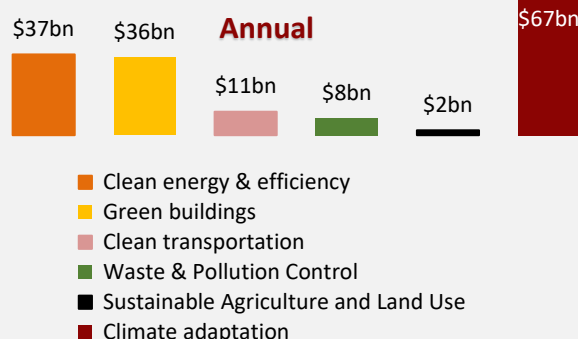
Climate change will impact all sectors – directly or indirectly

Risks to stability also represents opportunities to match growth aspirations with environmental objectives

At least 40% of Bank loans and Capital market exposures are at risk from direct and knock-on effect of climate impact



Total Green Investment needed until 2030



Annualized US\$ 160billion

Policy and regulatory interventions are needed to drive market-wide green transition

THE IMPERATIVE



Balancing NDC and growth goals

Principles of a Green Finance Taxonomy

- Promoting green transformation across all sectors and activities
- Green outcomes measured through climate positive results of an output
- Aligning financial sector to national environmental objectives

What are the drivers for a green transition?

Lenders

Investors

- 1 Investment opportunities in large sectors (energy, transport) undergoing massive transition owing to environmental issues
- 2 Reduced desirability of holding carbon-based assets for longer terms
- 3 Government efforts into diversifying energy needs from sustainable sources
- 4 Demand for disclosures on environmental and social risks

THE CONSIDERATIONS

What are the challenges to green finance uptake?

- Perceived concerns due to insufficient evidence on viability and returns potential of green sectors
- Lack of unified standards, institutional guidance and frameworks risks
- Need for capacity building for environment risk analysis and developing sustainable finance practices
- Insufficient pool of green sector securities and stocks

Solutions to scale up green finance

- Green finance roadmap and green tagging of investment and financing activities
- Climate risk assessment guidance and disclosure mandates
- Collaborating with international institutions and global climate catalysts to help direct flows into green instruments
- Risk coverage through credit guarantees and other specialized products

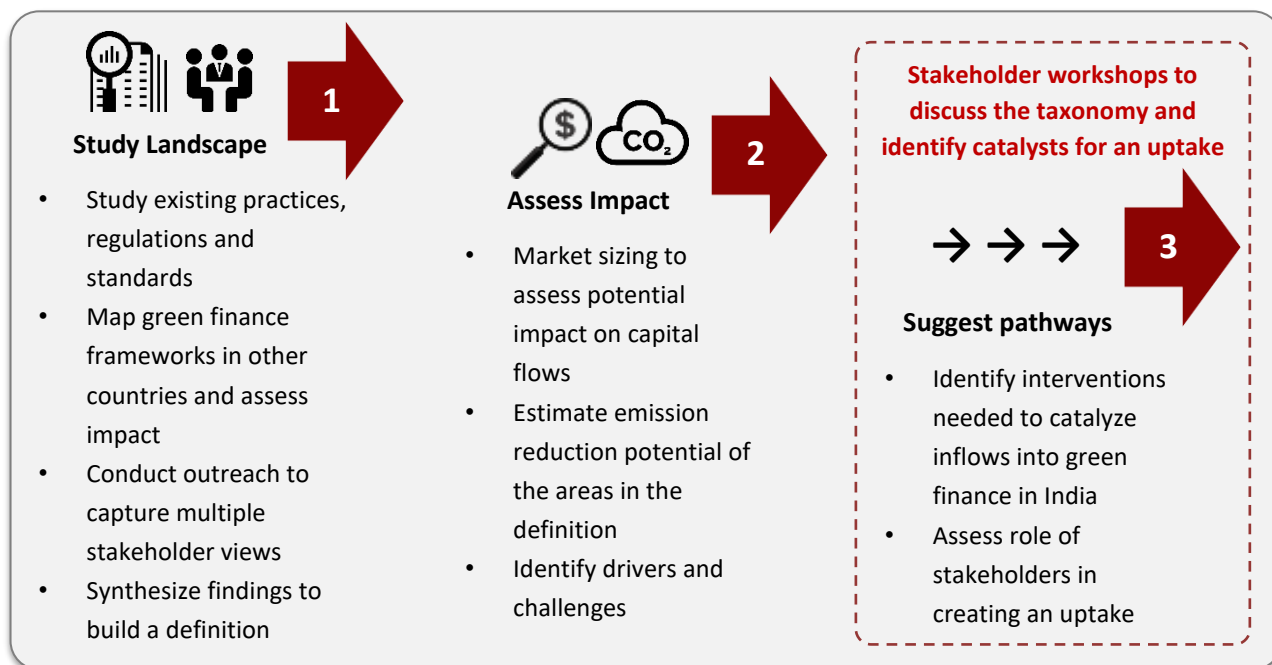
Approach and Methodology

This study analyses existing approaches and dimensions as adopted by different countries and institutions to defining green finance. Pursuant to a review of the existing characterization adopted by different governments, bi-laterals & multi-laterals institutions, catalysts, etc. and the outlook expressed by stakeholders¹ in the Indian landscape, a **definition of green finance** as deemed relevant to the Indian context has been evolved.

At an overarching level, the study considers that India's NDCs provide a practical background of economic objectives that any green finance taxonomy should align with. Thus, the taxonomy has been designed so that it responds to the NDC objectives and further contributes to other environmental objectives that are critical to green sustenance in the long-term.

A definition thus arrived was presented to stakeholders wherein the nature, relevance and applicability of the definition and possible catalysts for operationalizing the definition were also discussed. A sizing of the **investment potential** across 'green' sectors identified under the taxonomy and their **emission mitigation potential** (where sufficient basis was available for an estimation²) was also undertaken. Finally, the study offers a set of efficient **policy, regulatory and market interventions required** to catalyze the various segments along with efficient pathways to drive capital flows into green sectors.

Figure 1: Approach and methodology



¹ Refer Annexure 1 for list of stakeholders engaged during the study

² Given of some of the green areas are cross-cutting in nature (across industries), for instance, clean energy or difficult to fully quantify such as biodiversity, investment and emission mitigation potential has been estimated on best efforts and the final figures thus arrived represent the minimum (and not the maximum) investment requirement and emission mitigation realization expected through 2030.

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EXECUTIVE SUMMARY



1. Executive Summary

Economic development has historically been measured in financial terms – gross domestic product (GDP) being the most prominent one. As societies have continued to evolve and their economic and financial systems have reached greater heights, a realization has slowly emerged– that costs associated with economic development do not account for the quantum of environmental debt and resource depletion incurred in the process. The conventional GDP metric does not provide a basis to measure and assess environment sustainability in the long-term. For enabling this holistic approach, a comprehensive definition of ‘what constitutes Green’ becomes crucial – this will not only help differentiate activities based on their environmental footprint and consequent long-term costs but also help highlight solutions that allow economies to grow sustainably.

This is particularly pertinent at this time for India as the country crafts out pathways to meet its Nationally Determined Contributions (NDC) goals. Per the targets set, India needs additional capital of US\$ 1.8trillion, amounting to an average of ~US\$ 160billion annually, in order to achieve only its adaptation and mitigation targets by 2030. To underline the scale of financing required, it is worth noting that India’s GDP stood at US\$ 2.6trillion for 2017³. In stark comparison, the climate financing in India in 2016 was only around US\$ 14.4billion (with more than three-fourths of this being directed towards renewable energy).

Thus, there is an urgent need to drive large sums of capital from private and public sources into climate positive or ‘green sectors’. Thus, a clear definition or a framework is foreseen as a core need to help engage and coalesce coordinated action.

In the Indian context, framing a definition for “green” requires a nuanced approach that not only looks at seemingly cleaner methods /infrastructure as compared to conventional ones but also provides for transition methods /interventions to modify existing practices into low carbon ones in the medium-term timeframe.

Defining green in context of India

This study aims to lay the foundation for defining “green” in the Indian context through a green finance taxonomy. It further probes the impact of such a taxonomy on the various sectors through a quantitative assessment of the expected investments to achieve emissions reductions targeted in each of these sectors through 2030 in India’s Nationally Determined Contributions (NDCs).

The study observed that ‘green’ initiatives are typically perceived as being equivalent to ‘climate’-related undertakings through conflation of the terms ‘Green Finance’ and ‘Climate Finance’. Climate finance is currently a more prominent concept on the global stage driven by the political climate negotiations. However, UN Environment Programme (UNEP) and other initiatives recognize that imperatives of growth for different countries necessitate investment in areas beyond what is covered in climate finance and mitigation. The UNEP Inquiry adopts a simple approach: climate finance is a subset of green finance, which itself is a subset of sustainable finance. As such, **green finance accrues benefits that go beyond climate change and its measurement of carbon emissions in the form of reduction in air, water and soil pollution, sustainable biodiversity, and similar green objectives that cannot be compartmentalized and measured in terms of greenhouse gas (GHG) emissions alone.**

³ According to International Monetary Fund’s World Economic Outlook (WEO) for April 2018

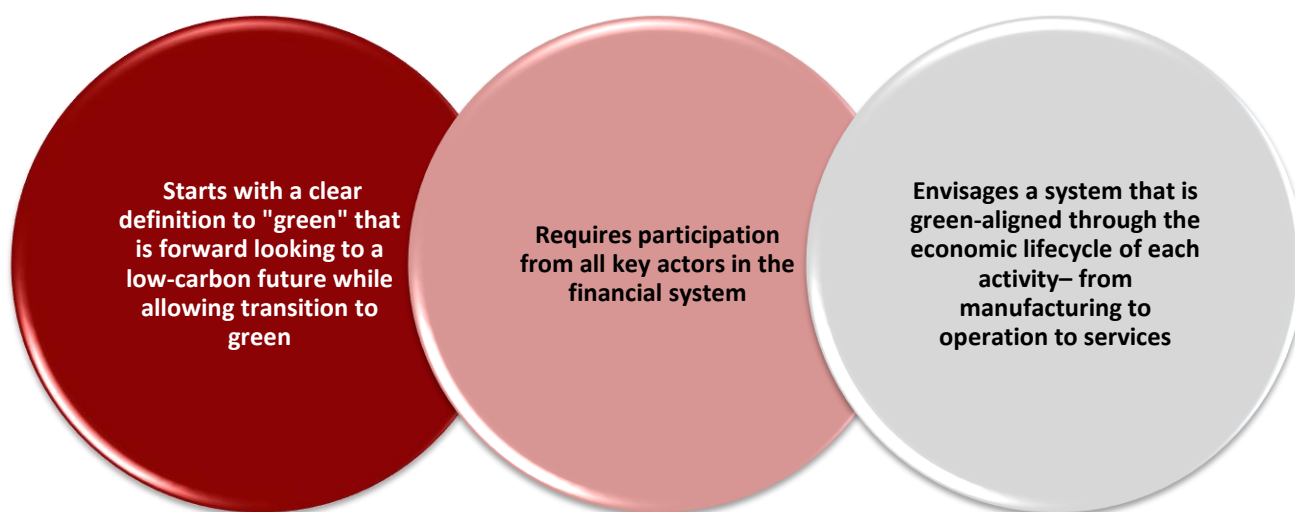
A universally accepted definition of green finance is not available yet, although several initiatives are ongoing across countries as also led by many international organizations. Given that the green priorities vary across countries, the efforts to define green finance are not necessarily aligned with each other even as the focus is on common end-goals.

In a developing economy like India with its diverse and often competing economic and environmental goals, a definition instituted by government, regulator or any authoritative agency would provide crucial conceptual clarity. More significantly, it could help align market participants, especially in the financial sector (like banks, domestic and foreign investors, stock exchanges) to the longer-term agenda of financing growth in an inclusive and sustainable way.

Approach to a green taxonomy

Climate change is an undiversifiable risk to financial stability that can affect portfolio performances through their exposure to heavy carbon emitting and polluting sectors. An important aspect informing this study is the recognition of climate change as a real and urgent threat by investors and asset holders, creating an urgent need to identify and quantify portfolio risks, redesign processes and reallocate portfolios. Investors need the right set of tools to respond to these risks and adopt a harmonized approach that carries green finance into the next decade for India in a coordinated manner.

Figure 2: Coordinated approach to green finance



For an unbiased assessment, it is important to consider the existing drivers and recognize challenges at the domestic level, and compare those with other countries that are on a journey similar to ours.

Domestic considerations

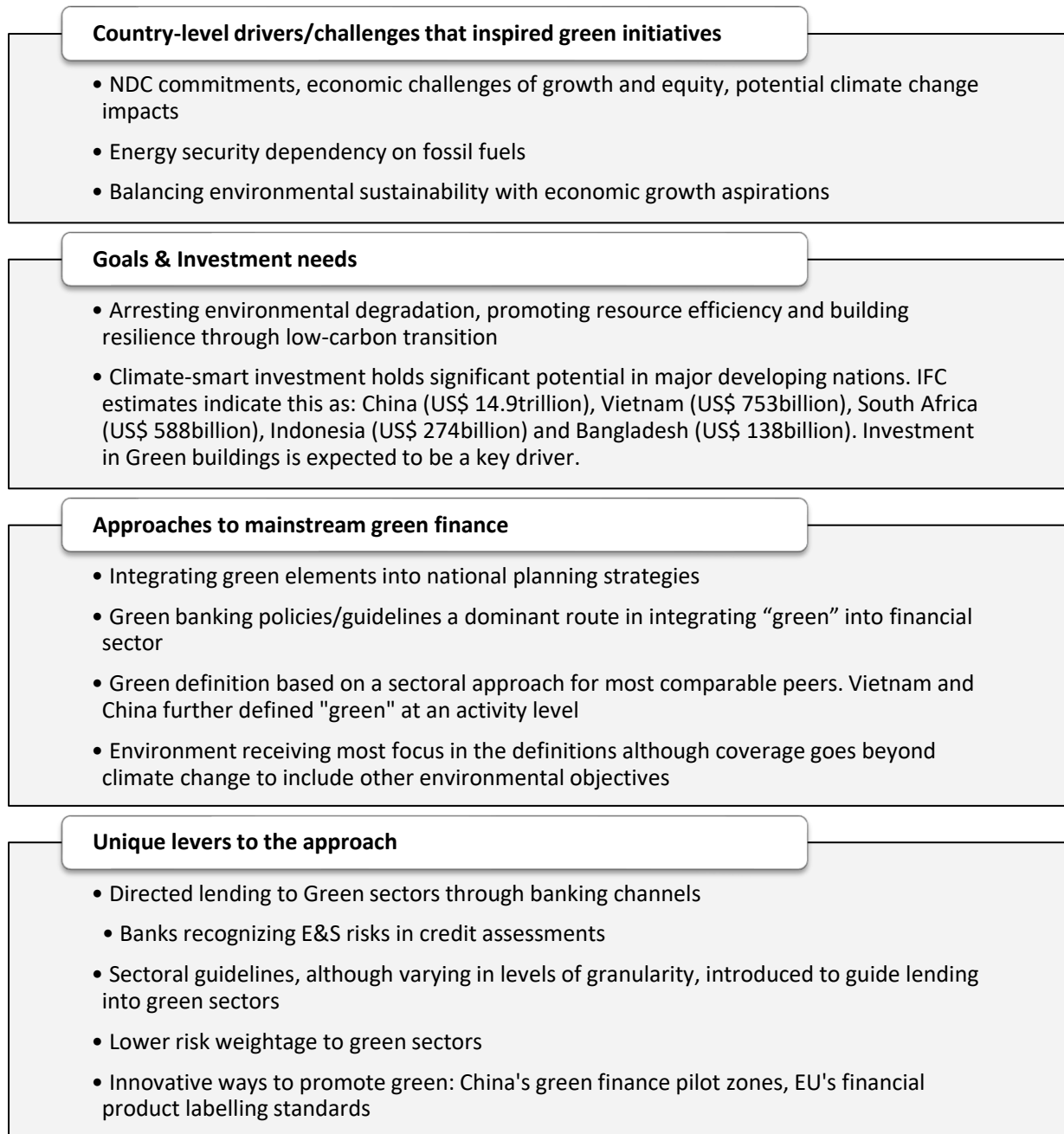
Table 1: Key actors in the success of a green finance uptake

CURRENT FOCUS		CHALLENGES TO GREEN FINANCE UPTAKE
- To deliver on NDCs while balancing inclusive growth - To deliver on long-term low carbon vision, government launched a number of efforts in areas such as Clean and efficient energy, Smart Cities, Green Buildings, Make in India, Urban Mobility, etc. - Pricing fossil fuel consumption through coal cess and incentivizing through PAT schemes, Feed-in-tariffs and renewable energy certificates - Sensitized banking sector about international initiatives like Equator principles (2007), accorded priority for banks to provide loans with a threshold of INR 150million to specific borrowers in renewable energy sector (2015) - SEBI issued green bond issuance guidelines (Total Issuance of INR 6billion by 2017); mandatory business responsibility reporting for top 500 listed entities to mainstream sustainability reporting although current format doesn't add value to carbon emission disclosure practices - Limited focus on climate change risk	GOVERNMENT	- No formal tracking of budget allocations to assess if flows are sufficient to meet NDC targets - Inadequate guidance at policy level to drive capital flows into climate-friendly projects - Existing efforts mostly focused on RE (solar and wind) and not being replicated "at a similar scale" across other sectors like sustainable transport, green building
- Follow E&S risk assessment although mostly for compliance reasons - Banks play a key role in providing long-term financing at competitive rates. However, Basel III compliance requiring larger capital requirements (compliance deadline March 2019 for Indian banks) and existing pressures on loan books (12.1% gross non-performing assets as of 2018) limit banks' ability (and in turn willingness) to deploy funds in emerging sectors where risk is perceived to be higher	REGULATORS	- Environmental risks yet to be recognized as a 'major' threat to financial stability - Climate change risk assessment not part of insurance and pension fund investment guidelines. Regulatory provisions heavily rely on rating agencies to identify high-rated investments, limiting scope for support to climate-friendly projects
Institutional investors, that have access to long-term funds, do not consider climate change risk in their investment decision making	BANKS	- No specific focus on lending to environment-friendly sectors; focus limited to RE based on priority sector lending rules - Insufficient clarity on what constitutes green finance and no guidance to enable clear differentiation between green from non-green sectors - Do not consider climate risk in lending practices
- Current models do not recognize climate risks - No premium placed when assessing project, activity or green associated in environmentally-friendly sectors. No additional risk attached to conventional investments that are not aligning to 1.5° scenario	CAPITAL MARKET PLAYERS	- Insurance, pension, and mutual funds not focused on green financing - Limited sectoral knowledge and assessment tools to categorize and assess environmentally-friendly sectors - Have the capacity but no guidance to create uptake
- Have access to climate finance (NABARD, SIDBI are Green Climate Fund (GCF) accredited direct access entities) - NABARD has an Environment and Social policy that covers 36 eligible activities under agriculture and related sector, social sector and rural connectivity	RATING AGENCIES	Not integrating climate change risk into rating models and do not have enough framework or motivation to undertake this without regulatory guidance and investor demand
	DEVELOPMENT FINANCIAL INSTITUTIONS (DFI)	- Focus may be skewed or limited to selected sectors like agriculture - No mandate to focus on sectors like clean energy, waste and pollution control, water management, transportation - Limited technical expertise, skills and knowledge to undertake a broader approach in green

International perspectives

India shares some of the same challenges as its international counterparts; local solutions can therefore draw on their approaches and relevant experiences.

Figure 3: Green finance motivations and experiences in other countries



Stakeholder view

Coordination amongst key actors and alignment of their actions to longer-term national objectives can enable greater green finance uptake in India. Stakeholders engaged over the course of this study highlighted the need for an India-focused taxonomy to be shaped by a set of guiding principles. However, as guiding principles can be broad in scope, most practitioners added that a sectoral view is needed to identify and differentiate economic activities across different sectors to ensure appropriate prioritization of capital flows.

Figure 4: Stakeholder view

Stakeholder speak: Current Practices	 • Focus on sustainable and inclusive growth • Measure impact based on end-results • Not just limited to "green"	 • Providing long-term assistance to viable projects • Already witnessed success with Renewable lending portfolio (low stress vs. conventional power loans) • Allocate a positive score on account of renewables vs. other infrastructure	 • E&S compliance for project financing • Do not track emissions from lending to sectors (conventional or non-conventional)	 • Understand relevance of green but don't consider it as a criteria that drives investing decisions • Regulation disallows investment in securities with ratings lower than AA	 • Financial viability of projects precedes green or climate-friendliness (extractives priced at a premium) • Uncertainty about long-term performance of renewables • ESG looked at from a compliance lens only
Stakeholder speak: what does (uptake of) green finance need?	• Vision-led approach • Clear guidelines for different stakeholders • Broad definition • Give green contributors recognition or financial benefits	• Offer a place in the Priority sector list (like RE) • Policy push with regulatory guidance • Provide viability gap funding • Offer subsidies, tax rebate, import component subsidies, GST (lower bracket)	• Recognize green lending as priority • Incentivise to create uptake • Top-Down process where government intervention is needed although implementation needs to be gradual	• Incentives to encourage fund managers to prioritize the capital allocation into specific green categories • Regulatory guidance to ensure climate-related risks are factored into asset rating at all levels • Sensitization of rating agencies	• Uptake in capital markets unlikely unless it fulfils a specific market need that can be served • Will need to be a market-led approach; currently there is no demand to incorporate these dimensions

Principles and criteria considered under the green finance taxonomy

Learning from international experiences on approaches undertaken for development of green finance taxonomies, direct engagement with stakeholders active on the India realm⁴, and inputs from leading experts⁵, the following set of principles have guided the development of a proposed India-specific Green Finance taxonomy:

1. Promotion of activities that align to broader environmental sustainability goals – these cover protection and conservation of natural resources, clean and efficient use of energy, waste reduction, pollution control and sustainable biodiversity management
2. Alignment to an outcome-linked approach that measures **net contributions** over the lifetime of a project. An outcome is considered green if:
 - a. The output creates climate positive results
 - b. It can indicate a demonstrable and measurable change from the base case⁶
3. Alignment of financial sector to national environmental objectives to govern the flow of resources towards climate positive outcome-aligned sectors

In addition to the guiding principles, which are broad in scope, stakeholders also forwarded the idea that a sectoral view identifying ‘green’ economic activities across different industries and segments be provided for illustrative purposes. A summary representation of the sector coverage under the taxonomy is presented in Figure 5.

⁴ Refer Chapter 4 for details on Stakeholder View. List of stakeholders engaged during this study is available in Annexure 1

⁵ Refer Annexure 2

⁶ Represents the starting point against which future performance can be measured

Figure 5: Green finance taxonomy - sectoral summary

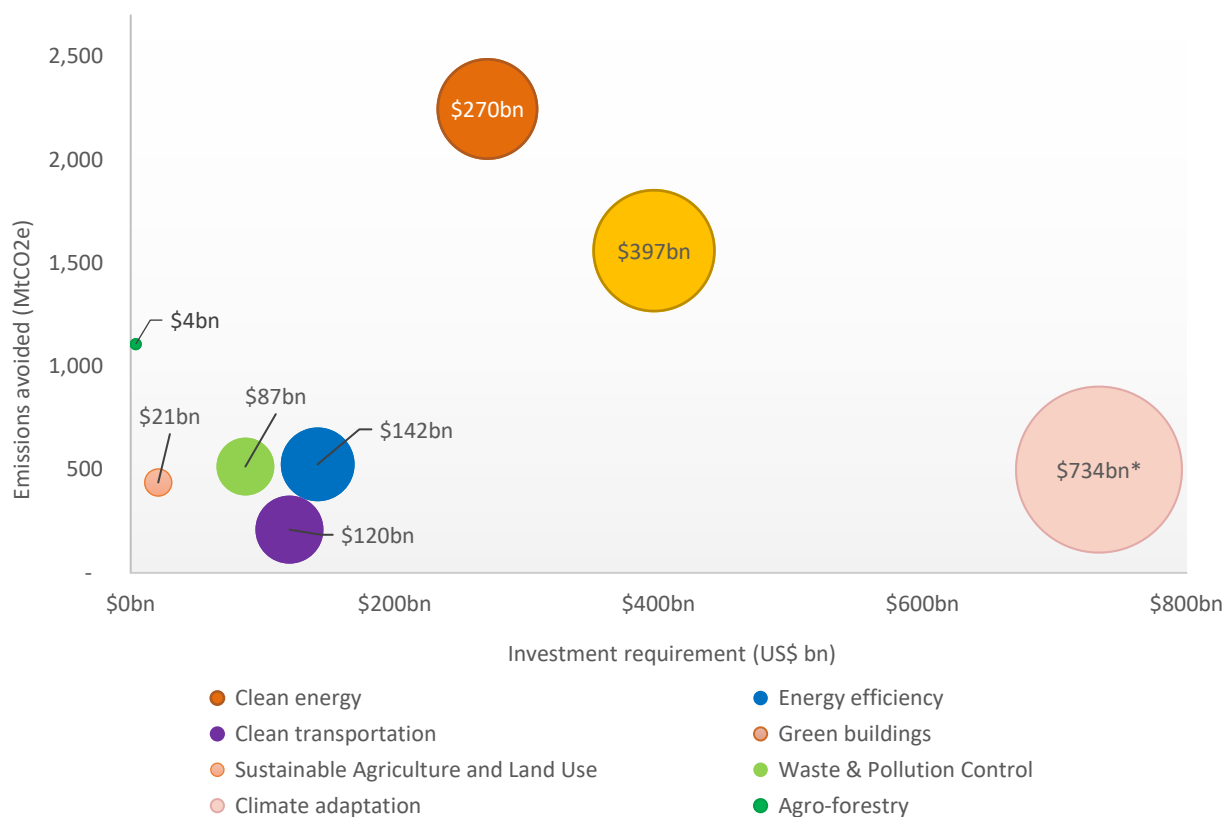
Clean Energy	Energy Efficiency	Clean Transportation	Green Buildings	Sustainable Agriculture and Land Use	Waste & Pollution Control	Water Use & Conservation	Climate Adaptation
Wind	Process efficiency	Vehicles	New buildings	Ecological Protection	Waste water treatment	Water Conservation	Disaster monitoring, warning and emergency response system
Solar	Bulk energy services	Key components	Renovation, upgrade and modernization of existing building stock	Biodiversity	Sludge in waste water	Rural drinking water safety	Flood mitigation
Small hydro	Product		Alternative construction materials	Forestry Development	Air pollution	Urban water conservation	Hygiene emergency
Tidal	Process/ Technology			No-till farming	Municipal Solid Waste (MSW)	Water conservation	Epidemic disaster
Geothermal				Organic agriculture	Soil pollution	Waste water methane	Forest protection
Biomass energy				Integrated pest control (IPM)	Tailings and Associated Mine	Waste water – sludge used as fertilizer	Drought management
Nuclear				Precision farming	Industrial Solid Wastes, Exhaust Gas, and Effluent	Inputs manufacturing	Public health management
Smart grids				Animal husbandry and Fishery	Renewable energy waste resource	Supply chain	Food security
Green energy corridors				Agro-forestry	Electromechanical Products	Raw materials manufacturing	Manufacturing devices
EV charging infrastructure				Conservation and management of wet lands	Co-generation		Raw materials manufacturing
Transport Infrastructure				Farming equipment and pesticide	Environmentally sustainable products		Storage and distribution
Facilities				Raw materials	Resource-efficient packaging and distribution		R&D
Clean coal technologies				Storage and Distribution	Manufacturing devices and equipment		Disaster monitoring, warning and emergency response IT system
Renovation & Modernization (R&M) of thermal power technologies				IT Development and Services	Raw materials manufacturing		
Generation equipment					Storage and Distribution		
R&D for RE equipment, EE products					R&D		
Renewable energy (solar) appliances & products							
Systems and equipment for Delivery Asset							
Energy Storage							

Legend

Assets	Projects/processes/activities that are already low carbon or enable low carbon performance
Implementation Practices	Practices/techniques/solutions that are considered green due to their impact on the environment
Manufacturing & R&D	Creation of products/activities that are deployed into green projects/processes

Investing in green transitions

An overview of investment needs across different sectors indicated in the taxonomy is presented below.



Size of the bubble represents investment requirement (cumulative)
 MT CO2e (million metric tonnes of carbon dioxide equivalent)
 *Adaptation associated emissions reduction potential not quantified

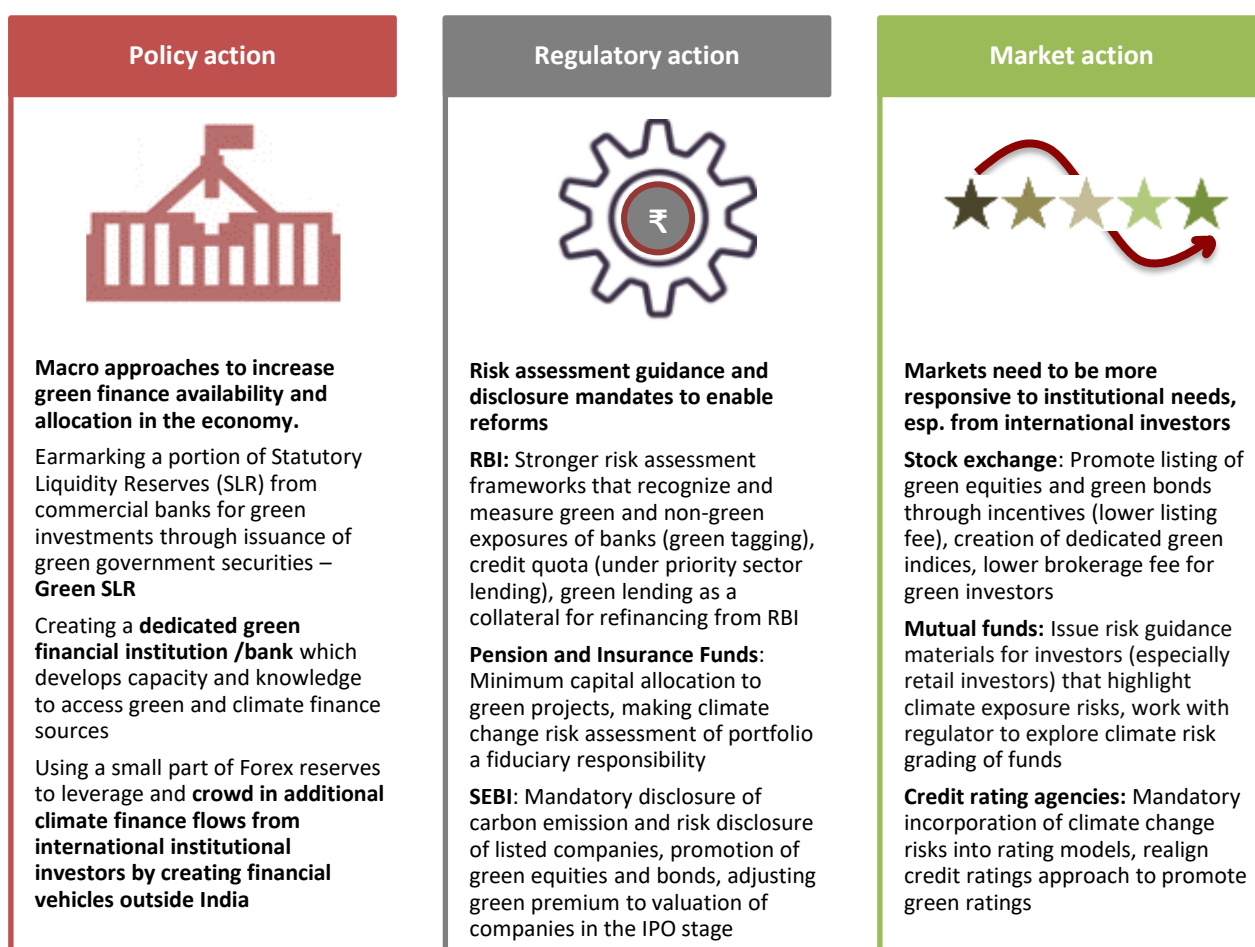
Figure 6: Investment needs and emission reduction potential across major sectors, 2020-2030

Model estimates indicate that clean energy will be a powerful source to facilitate large-scale carbon emission reduction. That being said, new investments occurring or expected to occur in sectors like buildings, automobiles, industries, agriculture will need better alignment with environmental objectives. For instance, investment in buildings will continue given the demand from housing sector but environmental sustainability measures need to be ensured so that the unbuilt stock is conceptualized to be energy efficient from the start. Investments in biodiversity, agro-forestry and climate adaptation will help increase India's carbon sink. A bigger socio-economic issue requiring greater importance is the amount of waste and pollution (air, soil, water) the country generates which needs urgent attention because of the high amounts of particulate matter pollution.

A wave of change is already underway with the increase in government's "green-aligned" policies in energy, transportation and agriculture sectors. Other sectors need to catch onto this wave of change similarly.

The views expressed by stakeholders and experiences of other international markets unequivocally point to the fact that interventions that can help evolve a transformative green finance environment will need to include both public policy and institutional approaches, as presented below.

Figure 7: Policy and regulatory interventions to catalyze green finance at scale



Growth of nations will increasingly get defined and measured by their ability to balance economic growth and environmental considerations. Many developing and developed nations are making significant strides, challenging the economic and financial status quo, and upgrading themselves with eco-friendly and environmentally-aware institutions and processes. India needs to undertake similar bold steps that are strategic to its growth in the next few decades. While creating a green finance taxonomy is only a first step to this longer-term endeavor, it is a significant one that can ensure “growth” and “green” are emphasized in parallel to foster in a modern era of “green growth”.

INTRODUCTION TO GREEN FINANCE



2. Introduction to Green Finance: Setting the Context

Sustainable development requires a coordinated approach that aligns environment, social, and economic objectives duly supported by a strong governance structure. However, framing an alignment across these objectives has been a key challenge.

While economic objectives are relatively well understood and have been clearly defined in quantitative terms, environmental and social objectives, even though deeply enshrined in all economic activities, have been less adequately defined, measured and reported. To address this, countries have come to agree and measure the impacts on environmental degradation through the lens of climate change which, simply stated, is “a change in the usual weather found in a place”⁷.

The Paris Agreement, regarded as one of the most critical international set of guidelines towards fighting climate change, adopted a bottom-up approach asking 189 countries to submit their own commitments, thereby setting countries on a path to a low-carbon future. However, for the low carbon/green growth to be mainstreamed, a comprehensive quantifiable approach is needed. This study aims to bring forth exactly that through the lens of green finance by highlighting how “green” needs to be ensconced within economic objectives.

Green finance has been reflected upon in a number of ways although **no internationally agreed definition exists currently**. Quite often, Sustainable Finance, Green finance, and Climate Finance are used interchangeably and therefore misunderstood. Moreover, there are other terms such as ESG investments and responsible investments which are sometimes used as substitutes for green finance by various stakeholders.

As a first step, this study focuses on defining what is “green” in the context of Green finance. This builds off the approaches/frameworks formulated by different agencies and countries, a few of which are discussed below.

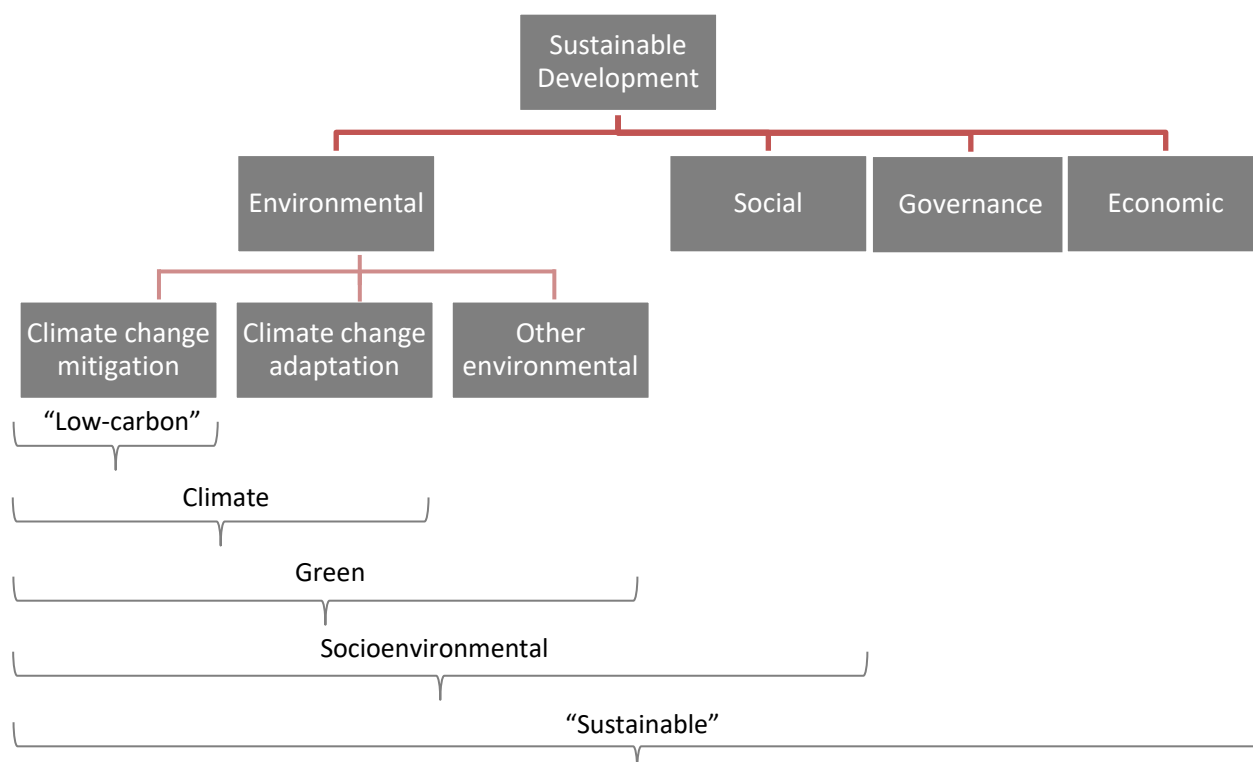
UN Environment Programme (UNEP) Inquiry

UNEP Inquiry presents the interplay of different terminologies taking a simple approach: Climate finance is a subset of Green finance, which itself is a subset of Sustainable finance, as represented in Figure 8⁸.

⁷ <https://www.nasa.gov/audience/forstudents/k-4/stories/nasa-knows/what-is-climate-change-k4.html>

⁸ http://unepinquiry.org/wp-content/uploads/2016/09/1_Definitions_and_Concepts.pdf

Figure 8: Differentiating climate finance and green finance



Source: UNEP Inquiry

Sustainable Finance covers a broader set of investments with the aim to build an inclusive, economically, socially, and environmentally sustainable world.

Green finance includes climate finance but also includes other environmental objectives necessary to support sustainability, particularly aspects such as biodiversity and resource conservation.

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.”⁹

⁹ <https://unfccc.int/topics/climate-finance/the-big-picture/introduction-to-climate-finance>

Some of the existing definitions of green finance include:

G20 Green Finance Study Group

Green finance can be understood as the “financing of investments that provide environmental benefits in the broader context of environmentally sustainable development. These environmental benefits include, for example, reductions in air, water and land pollution, reductions in greenhouse gas (GHG) emissions, improved energy efficiency while utilizing existing natural resources, as well as mitigation of and adaptation to climate change and their co-benefits.”¹⁰

Deutsches Institut für Entwicklungspolitik (German Development Institute)

Green finance comprises:

1. the financing of public and private green investments¹ (including preparatory and capital costs) in the following areas
 - environmental goods and services (such as water management or protection of biodiversity and landscapes)
 - prevention, minimization and compensation of damages to the environment and to the climate (such as energy efficiency or dams)
2. the financing of public policies (including operational costs) that encourage the implementation of environmental and environmental-damage mitigation or adaptation projects and initiatives (for example feed-in-tariffs for renewable energies)
3. components of the financial system that deal specifically with green investments, such as the Green Climate Fund or financial instruments for green investments (e.g. green bonds and structured green funds), including their specific legal, economic and institutional framework conditions.¹¹

The need for India to have a focused green finance definition comes from its unique standing in the transition towards low-carbon based development. India’s transition requires a taxonomy that creates a path for growth into green sectors while also allowing for retrofits or energy efficiency measures to take place in existing sectors. An India specific green finance taxonomy will allow the country to customize its own transition by factoring in variables that are peculiar to India.

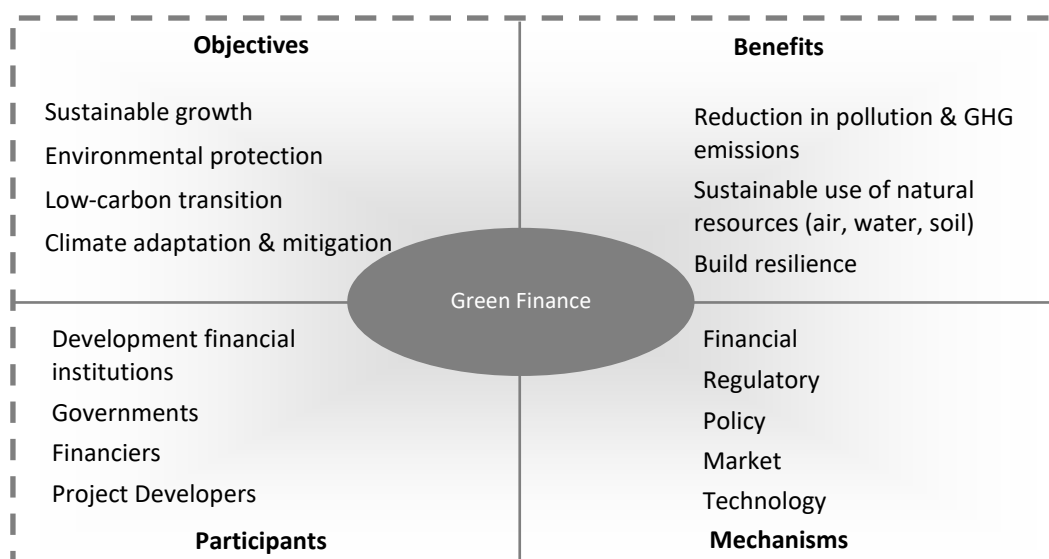
It has been noted that there are challenges in tracking the entire gambit of activities entailed in green growth or even climate finance as only flows that are directly related to assets/ activities enabling reduction of emissions are considered, and any indirect flows that result in emissions reduction are ignored to avoid double counting. As an illustrative example, investment into the deployment of a wind farm is counted, but finance related to technology R&D, manufacturing of farm equipment, revenue support provided to the wind farm owners, future refinancing or future sale of such an asset are not considered.¹²

Clearly, if growth and environmental sustainability need to be pursued as an integrated ‘green’ agenda in India, there needs to be an approach that fosters growth by standardizing practices, recognizing all market participants, providing policy and regulatory framework to incentivize action and enhancing transparency through regular reporting. A conceptual framework synthesizing the green finance ecosystem is presented below.

¹⁰ http://unepinquiry.org/wp-content/uploads/2016/09/Synthesis_Report_Full_EN.pdf

¹¹ <https://www.cbd.int/financial/gcf/definition-greenfinance.pdf>

¹² <https://climatepolicyinitiative.org/wp-content/uploads/2018/11/Global-Climate-Finance-An-Updated-View-2018.pdf>

Figure 9: Conceptual representation of green finance ecosystem

A combination of public, private and alternative sources funding will need to be raised to fill the investment gap. The need to catalyze broader financial sector participation creates the need for a structured (if not holistic) definition of green finance.

Without a clear definition, attribution is likely to be subjective and may actually trigger dissonance if actions are deemed not in sync (like greenwashing¹³). Also, environmental compliance of norms does not always lead to a climate positive action. For instance, a captive coal-based power plant being setup by a textile manufacturer at its facilities as per environmental norms may not be considered as climate-friendly as it does not contribute to carbon reduction. A clear definitional framework would ensure that components of green finance including components supporting aspects related to climate risk mitigation and adaptation are accurately accounted for and that capital flows are encouraged towards these areas to ensure progress on all objectives.

Green finance can play an important role in addressing the investment gap by catalyzing private participation, provided there is a clear definition, framework and mechanism to support new capital inflows

¹³ Incorrect classification of unsuitable products or projects or flows as environmentally sustainable



CURRENT LANDSCAPE

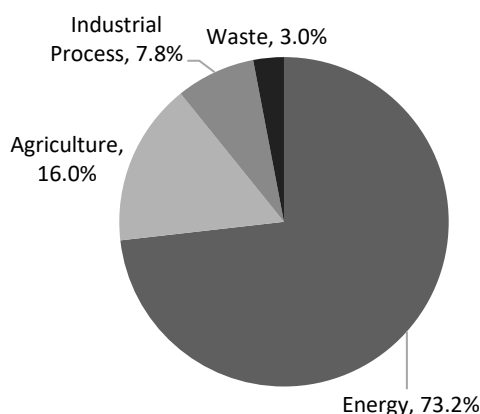


3. Current Landscape

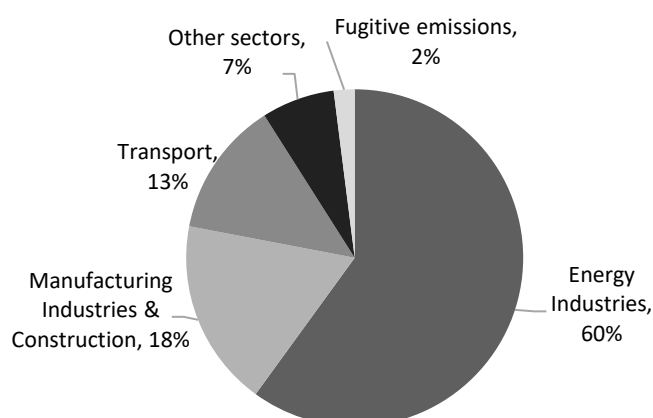
India's NDC target of reduction of emission intensity of its GDP over 33%-35% by 2030 from 2005 levels revolve around seven areas: renewable energy, energy efficiency, carbon efficient and resilient cities, waste management, clean transportation, pollution control, and afforestation¹⁴. The focus on these areas reflects from the sector-wise emissions distribution, especially from the energy sector.

Figure 10: Status of GHG emissions

Distribution of GHG emissions by sector, 2014



Distribution of emissions across Energy Sector Categories, 2014



Source: India Second Biennial Update Report to the United Nations Framework Convention on Climate Change

India is likely to witness an increase in emissions due to its continuing development needs across energy, industry, transport and infrastructure sectors. Despite low per capita emissions (1.95 tonnes CO₂¹⁵ compared to world average of 4.2 tonnes CO₂ emissions¹⁶), India represents 7.1% of the total global greenhouse gas emissions¹⁷, which has seen an average growth rate of 6% over the past decade.¹⁸

Like many of its comparable peers, adopting a low carbon pathway has been made a part of India's national strategy since committing to the Cancun pledge in 2010 to reduce emissions intensity of GDP 20–25% by 2020 (against 2005 levels) and then the 2015 Paris commitment (as expressed in NDC) to reduce emissions intensity 33–35% by 2030 (against 2005 levels). In addition, under the 2015 NDC, India aims to achieve about 40% cumulative electric power installed capacity from non-fossil fuel-based energy sources and create a carbon sink of 2.5 to 3 billion tonnes of CO₂ equivalent through additional forest and tree cover by 2030.¹⁹

¹⁴ <http://pib.nic.in/newsite/PrintRelease.aspx?relid=128403>

¹⁵ Based on 2.53 Gigatonne CO₂ & GHG emissions and 1.3 billion population (2016)

¹⁶ <https://www.carbonbrief.org/guest-post-why-indias-co2-emissions-grew-strongly>

¹⁷ http://wedocs.unep.org/bitstream/handle/20.500.11822/26895/EGR2018_FullReport_EN.pdf?sequence=1&isAllowed=y

¹⁸ <https://www.carbonbrief.org/guest-post-why-indias-co2-emissions-grew-strongly-in-2017>

¹⁹ <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/India%20First/INDIA%20INDC%20TO%20UNFCCC.pdf>

The government has undertaken various measures to achieve the NDCs, some of which are indicated below.

Table 2: Key measures to achieve the NDCs

Category	Key targets, policies and schemes
Renewable Energy	- Adoption of 175 GW Renewable energy by 2022. Increase share of cumulative electric power installed capacity from non-fossil fuel-based sources to 40% by 2030. - National Wind-Solar Hybrid Policy: Promotion of large grid connected wind-solar PV hybrid system - National Smart Grid Mission: To accelerate Smart Grid deployment - Green Energy Corridor scheme: Development of infrastructure for evacuation & integration of the renewable energy capacity
Green Buildings	Energy Conservation Building Code: To establish minimum energy performance standards for buildings
Transportation Electric Vehicles	- National Electric Mobility Mission Plan: Aimed at achieving electric/hybrid vehicle sales of about 6-7 million by 2020 in addition to a certain level of indigenization of technology²⁰ - Faster Adoption and Manufacturing of Hybrid & Electric Vehicles (FAME) Scheme: Launched under NEMMP, the scheme aims to support the market development and manufacturing ecosystem for hybrid/electric vehicles in India - Charging Infrastructure for Electric Vehicles- Guidelines and Standards: To support creation of EV charging infrastructure²¹
Municipal Solid Waste	Swachh Bharat Mission: Aims to improve cleanliness through improved Solid and Liquid Waste Management activities and achieve Open Defecation Free (ODF) India
Climate-Smart Urban Water	National Water Mission: To ensure integrated water resource management
Climate-Smart Agriculture	- Pradhan Mantri Krishi Sinchayee Yojana: To enhance water use efficiency in irrigation - Rashtriya Krishi Vikas Yojana: To ensure development of agriculture and allied sectors - National Food Security Mission: To increase annual production of rice, wheat, pulses and coarse cereals

India needs additional capital of US\$ 1.8trillion, amounting to annual investments of US\$ 160billion, in order to achieve adaptation and mitigation targets by 2030 (based on a sectoral/sub-sectoral investment model detailed out further along in this report). The above measures highlight government's commitment to achieve the NDCs but, given the size of investment required, there is support needed from multiple actors.

In order to coalesce action from these actors, India needs to adopt a standardized approach. In the following section, the current focus of key actors in the Indian financial ecosystem and the challenges limiting the uptake of green finance amongst them is discussed.

²⁰ <https://dhi.nic.in/UserView/index?mid=1347>

²¹ <https://powermin.nic.in/sites/default/files/webform/notices/scan0016%20%281%29.pdf>

Drivers of the financial ecosystem

Table 3: Key actors in the success of a green finance uptake

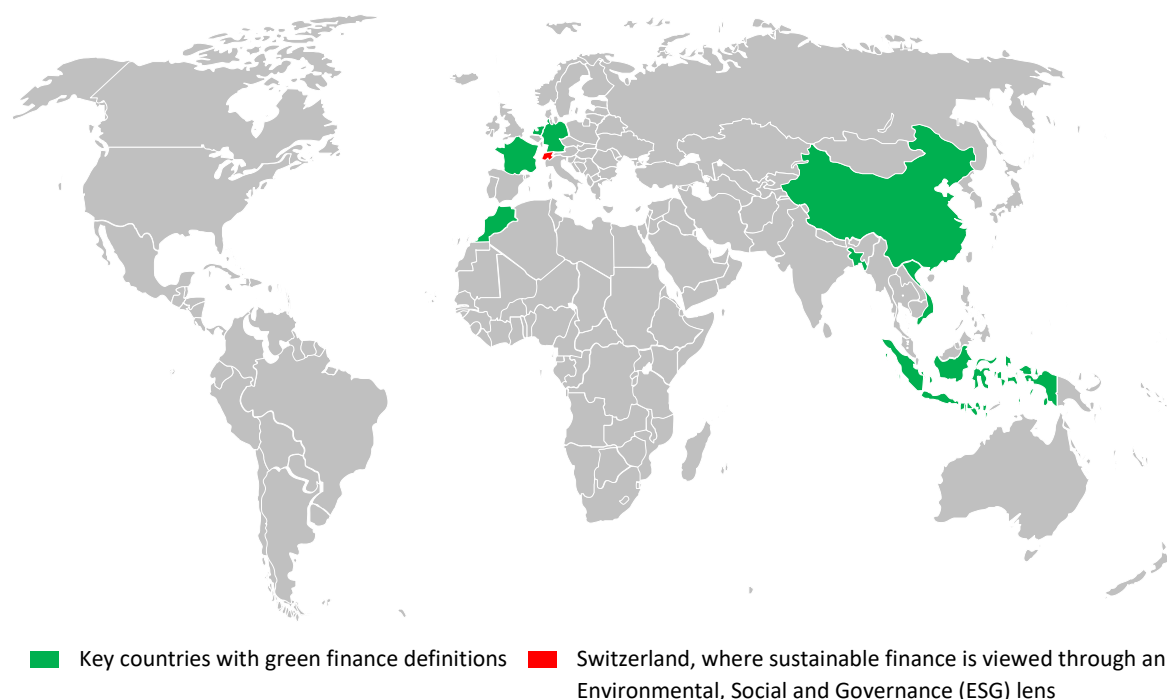
CURRENT FOCUS		CHALLENGES TO GREEN FINANCE UPTAKE
- To deliver on NDCs while balancing inclusive growth - To deliver on long-term low carbon vision, government launched a number of efforts in areas such as Clean and efficient energy, Smart Cities, Green Buildings, Make in India, Urban Mobility, etc. - Pricing fossil fuel consumption through coal cess and incentivizing through PAT schemes, Feed-in-tariffs and renewable energy certificates	GOVERNMENT	- No formal tracking of budget allocations to assess if flows are sufficient to meet NDC targets - Inadequate guidance at policy level to drive capital flows into climate-friendly projects - Existing efforts mostly focused on RE (solar and wind) and not being replicated "at a similar scale" across other sectors like sustainable transport, green building
- Sensitized banking sector about international initiatives like Equator principles (2007), accorded priority for banks to provide loans with a threshold of INR 150million to specific borrowers in renewable energy sector (2015) - SEBI issued green bond issuance guidelines (Total Issuance of INR 6billion by 2017); mandatory business responsibility reporting for top 500 listed entities to mainstream sustainability reporting although current format doesn't add value to carbon emission disclosure practices - Limited focus on climate change risk	REGULATORS	- Environmental risks yet to be recognized as a 'major' threat to financial stability - Climate change risk assessment not part of insurance and pension fund investment guidelines. Regulatory provisions heavily rely on rating agencies to identify high-rated investments, limiting scope for support to climate-friendly projects
- Follow E&S risk assessment although mostly for compliance reasons - Banks play a key role in providing long-term financing at competitive rates. However, Basel III compliance requiring larger capital requirements (compliance deadline March 2019 for Indian banks) and existing pressures on loan books (12.1% gross non-performing assets as of 2018) limit banks' ability (and in turn willingness) to deploy funds in emerging sectors where risk is perceived to be higher	BANKS	- No specific focus on lending to environment-friendly sectors; focus limited to RE based on priority sector lending rules - Insufficient clarity on what constitutes green finance and no guidance to enable clear differentiation between green from non-green sectors - Do not consider climate risk in lending practices
Institutional investors, that have access to long-term funds, do not consider climate change risk in their investment decision making	CAPITAL MARKET PLAYERS	- Insurance, pension, and mutual funds not focused on green financing - Limited sectoral knowledge and assessment tools to categorize and assess environmentally-friendly sectors - Have the capacity but no guidance to create uptake
- Current models do not recognize climate risks - No premium placed when assessing project, activity or green associated in environmentally-friendly sectors. No additional risk attached to conventional investments that are not aligning to 1.5° scenario	RATING AGENCIES	Not integrating climate change risk into rating models and do not have enough framework or motivation to undertake this without regulatory guidance and investor demand
- Have access to climate finance (NABARD, SIDBI are Green Climate Fund (GCF) accredited direct access entities) - NABARD has an Environment and Social policy that covers 36 eligible activities under agriculture and related sector, social sector and rural connectivity	DEVELOPMENT FINANCIAL INSTITUTIONS (DFI)	- Focus may be skewed or limited to selected sectors like agriculture - No mandate to focus on sectors like clean energy, waste and pollution control, water management, transportation - Limited technical expertise, skills and knowledge to undertake a broader approach in green

Framing perspective from international experiences

A combination of developing countries and international economic groups like the European Union were studied to examine their approaches to framing definitions of green finance, associated policies, regulations and ensuing impact. As many have only recently started on their green growth journey, measurements at a performance level are preliminary and limited. Nonetheless, these still serve as relevant frameworks to map the extent of measures being undertaken by countries that are on a similar journey as India and face similar economic growth, climate change and climate investment challenges²².

Some of the drivers that seem to have influenced recognition of green finance in these economies, their approach to mainstream “green” and key unique levers that facilitated the approach are summarized below. A detailed mapping of the various actions undertaken by key peer countries is discussed in Annexure 4 and Annexure 5.

Figure 11: Key countries where a green finance definition has been created



Major countries, together representing 28% of the global population, have adopted a green finance definition including China, Vietnam, Bangladesh, Indonesia, France, Germany, Netherlands. There are encouraging signals coming from Europe where a detailed taxonomy (67 activities across 8 sectors) of environmentally sustainable economic activities has been proposed along with a number of other measures in the areas of climate-related benchmarks and disclosures and disclosure requirements in related to Environmental, Social and Governance (ESG) factors. Once implemented, these measures are collectively expected to create a significant impact on the direction of investment flows in one of the leading developed regions of the world.

Interestingly in Switzerland, sustainable finance covers any form of financial service that integrates ESG criteria into business or investment decisions.

²² To ensure the analysis factored in the Indian context, the peer group was identified based on the methodology discussed in Annexure 3.

Figure 12: Green finance progress observed in comparable countries

	Bangladesh	Vietnam	China	Indonesia	EU
Approach to mainstream green finance	- Green Banking Guidelines issued by the central bank - Key green finance categories include renewable energy, energy efficiency, solid and liquid waste management, recycling and recyclable products - Mandatory Environmental & Social Risk Management for Banks and FIs	- Central bank issued Catalogue to define green sectors: renewable energy, energy saving and energy efficiency, land use conversion and management, sustainable forestry, sustainable waste management, and green agriculture - Capital markets regulator driving company sustainability reporting	- Green finance definition with multiple levels—sectors, sub-sectors and activity - Categories include: energy saving, pollution prevention and control, resource conservation and recycling, clean transportation, clean energy, ecological protection and climate change adaptation	- Green finance covered in the “Indonesian Roadmap for Sustainable Finance 2015-2019” - Definition covers climate change mitigation, resource efficiency, protection and natural capital and biodiversity, climate change adaption - Policy on green bond issuance to invite private participation and provide clear guidance	- Sustainable taxonomy proposed in 2018, rollout in 2020-22 - Taxonomy defines environmentally sustainable activities in these areas: mitigation, adaptation, water protection, waste recycling, pollution and healthy ecosystems - Develop labelling standards for financial products and prospectus for green bonds in 2019
Performance* & Tracking tools	~US\$ 6.56billion disbursed in green finance (FY17); 77.7% from private commercial banks. Green credit 7.1% of total FY17 credit²³ - Bank reporting on green lending, carbon footprint and environment-related CSR activity flow into CAMELS rating²⁴	~US\$ 4.7million as of June 2017 disbursed towards green finance. 1.7% of total outstanding credit provided for green finance in 2017²⁵ - Quarterly reporting by banks on E&S risk management and green finance flows to central bank	- US\$ 1.37trillion (10% of all loans) in green credit (2019)²⁶. Green credit >95% of green financing²⁷ - USD 289bn of green bonds outstanding (2018)²⁸ - Better asset quality: Non-performing loans (NPL) for green credit at 0.37% vs. 0.87% average NPL of major banks²⁹	- Country issued its first sovereign green bond of US\$ 1.25billion in 2018 - Banks required to develop sustainable financing action plans and report green financing	

*Performance numbers unavailable where green policy, definition was implemented recently or it is yet to be implemented

²³ BDT 548.6billion of green credit vs. BDT 7,723.40billion of outstanding bank credit in FY17

²⁴ CAMELS is a supervisory rating system used to classify a bank's overall condition

²⁵ <https://vietnamnews.vn/society/482531/viet-nams-efforts-for-green-growth-need-more-active-moves.html#7DXzG4b2OT9WBjri.97>

²⁶ Latest numbers from The People's Bank of China

²⁷ Lu, Z.W. and Tang, W.Q (2017) An Overview of China's Green Financial Market in 2017.

<http://greenfinance.xinhua08.com/a/20180108/1744086.shtml>

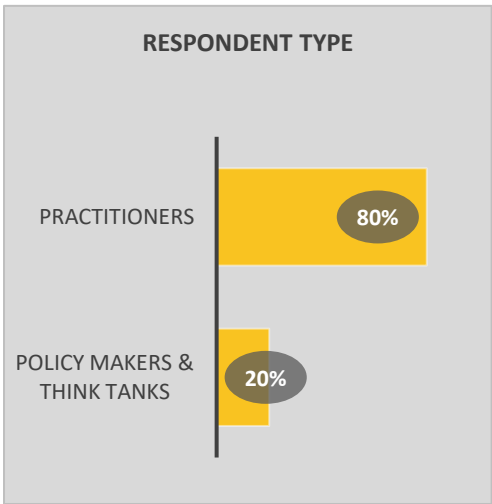
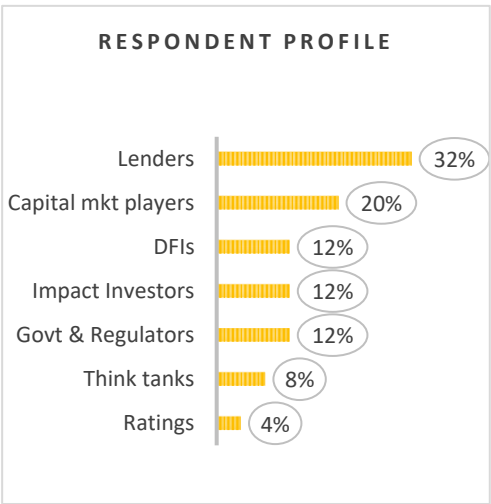
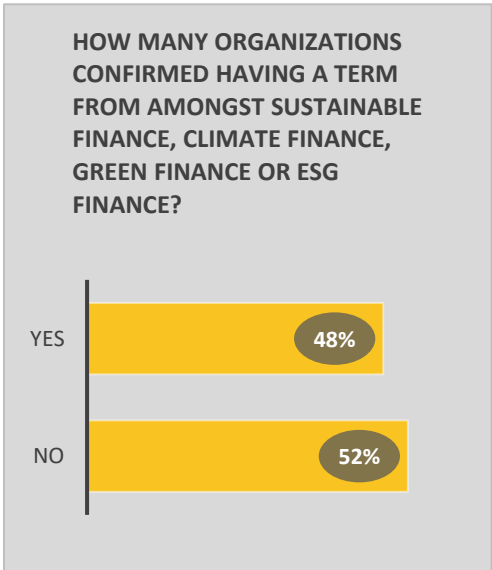
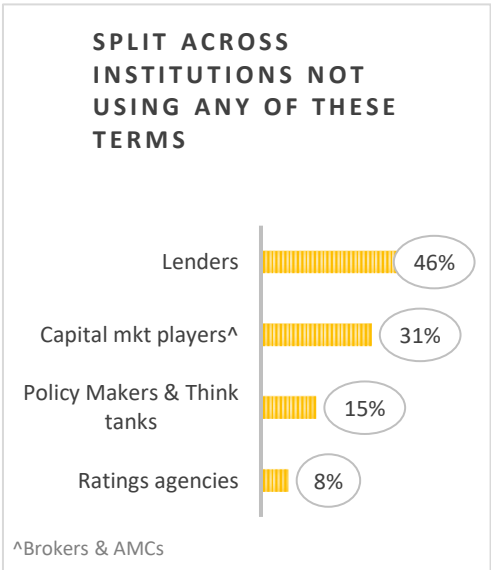
²⁸ https://www.climatebonds.net/system/tdf/reports/china-sotm_cbi_ccdc_final_en260219.pdf?file=1&type=node&id=35798&force=1

²⁹ Notes on the Green Credit Statistics Information Disclosure, CBRC

In addition to mapping the international action on green finance, the study engaged with financial institutions, policy makers and regulators, think tanks and credit rating agencies to frame a holistic 360° view on green finance.

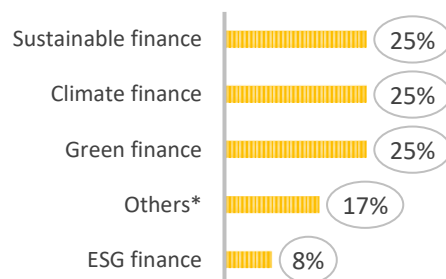
Defining green finance: Stakeholder view

The study entailed a detailed mapping of key stakeholders and their perspectives on the different dimensions of 'Green Finance'. A schematic overview of the current state, stakeholder perceptions, and outlook is summarized below.

Parameters	Responses																
Respondent profile	 RESPONDENT TYPE PRACTITIONERS 80% POLICY MAKERS & THINK TANKS 20%  RESPONDENT PROFILE <table border="1"> <thead> <tr> <th>Stakeholder Type</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Lenders</td> <td>32%</td> </tr> <tr> <td>Capital mkt players</td> <td>20%</td> </tr> <tr> <td>DFIs</td> <td>12%</td> </tr> <tr> <td>Impact Investors</td> <td>12%</td> </tr> <tr> <td>Govt & Regulators</td> <td>12%</td> </tr> <tr> <td>Think tanks</td> <td>8%</td> </tr> <tr> <td>Ratings</td> <td>4%</td> </tr> </tbody> </table>	Stakeholder Type	Percentage	Lenders	32%	Capital mkt players	20%	DFIs	12%	Impact Investors	12%	Govt & Regulators	12%	Think tanks	8%	Ratings	4%
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Govt & Regulators	12%																
Think tanks	8%																
Ratings	4%																
Key takeaways	Policy makers & think tanks consisted of government & affiliated agencies, regulators and think tanks. Practitioners involved lenders (banks, infrastructure NBFCs, DFIs), capital market players (insurers and brokers), impact investors, and rating agencies																
Clarity / Usage of terminologies at the organizational level	 HOW MANY ORGANIZATIONS CONFIRMED HAVING A TERM FROM AMONGST SUSTAINABLE FINANCE, CLIMATE FINANCE, GREEN FINANCE OR ESG FINANCE? YES 48% NO 52%  SPLIT ACROSS INSTITUTIONS NOT USING ANY OF THESE TERMS <table border="1"> <thead> <tr> <th>Institution Type</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Lenders</td> <td>46%</td> </tr> <tr> <td>Capital mkt players^</td> <td>31%</td> </tr> <tr> <td>Policy Makers & Think tanks</td> <td>15%</td> </tr> <tr> <td>Ratings agencies</td> <td>8%</td> </tr> </tbody> </table> ^Brokers & AMCs	Institution Type	Percentage	Lenders	46%	Capital mkt players^	31%	Policy Makers & Think tanks	15%	Ratings agencies	8%						
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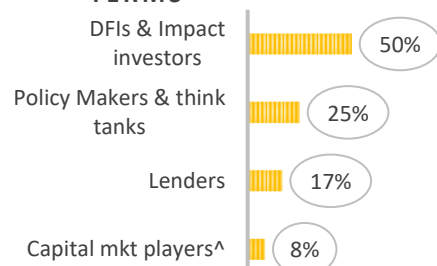
Clarity / Usage of terminologies at the organizational level

AMONG THOSE USING ANY OF THESE TERMS, WHICH TERM DID THEY IDENTIFY?



*responsible finance, impact investing

SPLIT ACROSS RESPONDENTS WHO COULD ACCURATELY CHARACTERIZE THESE TERMS



^Brokers & AMCs

Key takeaways

- A majority of stakeholders could not clearly identify or associate any internal initiatives /use of a term that connotes Sustainable, Climate, Green or ESG finance within their organizations.
- Amongst the ones who could clearly identify one of the said terms – mostly DFIs, impact investors, and policy makers - sustainable, climate and green finance were reportedly equally known.

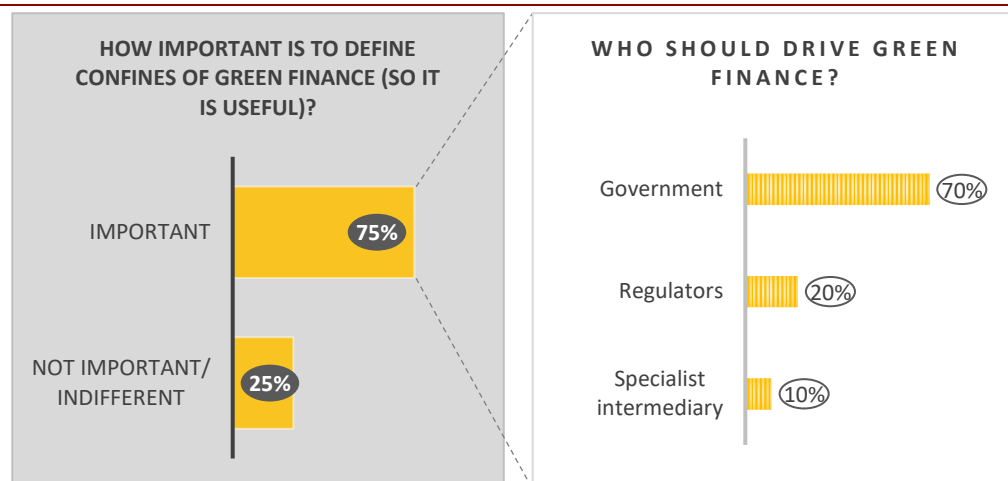
Stakeholder speak: Current Practices



Stakeholder speak: what does (uptake of) green finance need?



Institutionalization



Key takeaways

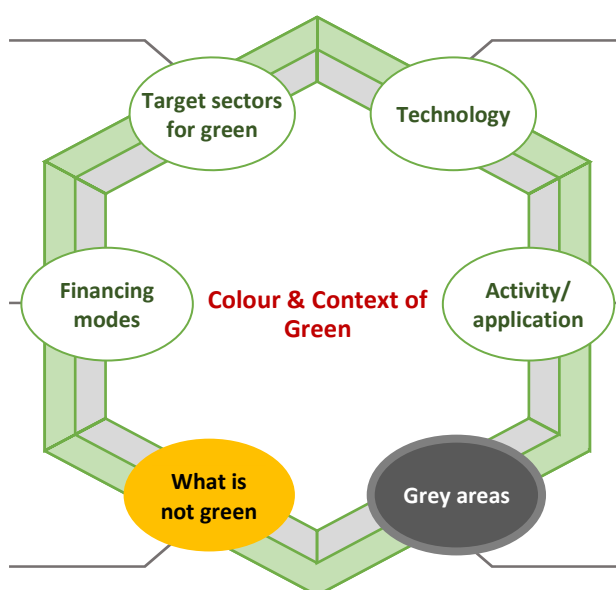
- Most practitioners aware of the importance of a definition. Banks, regulators, DFIs, think tanks, foundations view formulating a definition an "important milestone" if there is serious thought to drive the market
- Rating agencies and capital market players do not consider green finance important.
 - No demand from market for Rating agencies to consider climate proactiveness in credit ratings
 - Difficult for insurers to model impact of climate risk in their investing

Stakeholder speak: defining green

- Industrial (biggest polluters)
- Energy (go beyond renewables)
- Urban Transportation
- Pollution prevention and control
- Water conservation services
- Infrastructure

- Climate finance is green
- Infrastructure lending is green
- Renewable energy financing in any form is green (even when lending to conventional sector)
- Loans & bonds are green
- Government budget expenditure

- *Carbon Capture & Storage (CCS)*
- Manufacturing as an activity is not green, e.g., EV manufacturing, storage device manufacturing (like batteries)



- Green (low carbon) technologies
- Product alignment to 1.5° or 2° scenario
- Low carbon transport
- Wastewater related technologies
- Climate resilient Buildings

- *Carbon capture and utilization (CCU) in industrial applications is green*
- *Energy efficiency and energy saving facility is green*
- Urban mass transit (metro) is considered green
- EV charging stations are green
- *Clean coal (technologies) is green as it reduces emissions*

- *Clean coal as a product is not green*
- Biofuels are a point of contention in terms of greenness
- *Coal plant even if reduces emissions is not green*
- *Energy efficiency upgrades of thermal power plants*

*Similar topics across multiple categories colour-coded

Understanding climate risk exposures

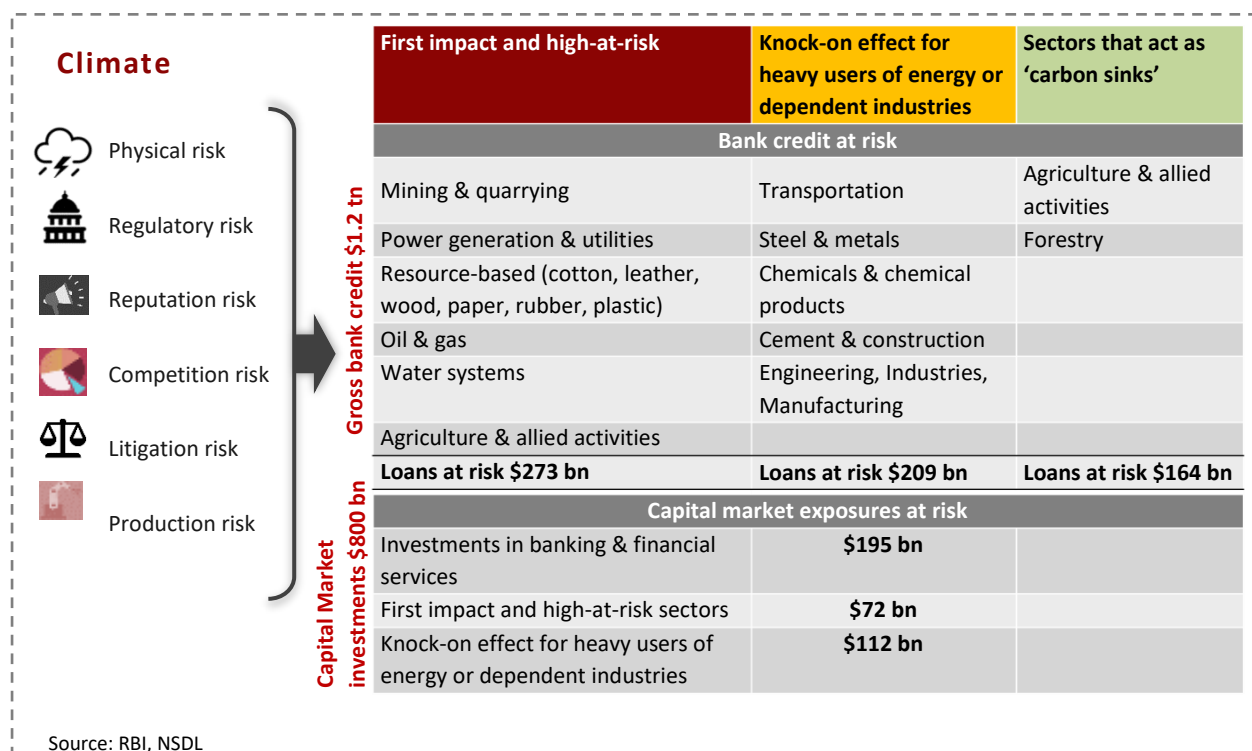
Climate change is a systemic risk to financial stability that can affect portfolio performances with exposures to heavy carbon emitting and polluting sectors. An important aspect informing this study is the recognition of climate change as a real and urgent threat by investors and asset holders, creating an urgent need to identify and quantify portfolio risks, redesign processes and reallocate portfolios.

Compared to short/medium term investors, there appears to be a larger risk of impact on long term investors (like insurance companies and pension funds) since the liability duration of these investors and the realization of climate risks are long-term. For instance, an increase in the frequency of natural disasters (floods, storms) will result in higher insurance claims. It is a cause of concern for insurance companies whose liabilities are intricately linked to asset values in sectors such as agriculture (crops) and infrastructure (buildings, roads, highways, ports). India's cumulative losses from weather events are estimated at US\$ 45billion (2008-17), having doubled from US\$ 20billion in the previous decade³⁰.

Indian government and regulatory institutions need to work with the financial sector to come up with a plan to stress-test the entire financial sector's exposure to **(a) physical risks** that are event-driven (floods, cyclones) or longer-term shifts in climate patterns; and **(b) transition risks** stemming from policy actions, legal, technology and market changes. This will be a starting point for climate risk assessment and reporting and also provide direction for new products and systems to enhance system's resilience to climate shocks.

Globally, a divestment wave is driving investors to remove high carbon emitting sectors such as mining, oil & gas, coal-based power generation from their portfolios owing to their physical and transition risks³¹. The financial performance of these and many other associated/dependent sectors is likely to erode further as litigation, reputational and regulatory risks drive investor action.

Figure 13: Climate risk exposure in the Indian financial sector



³⁰ <https://www.actiononclimate.today/wp-content/uploads/2019/01/climate-losses-revised.pdf>

³¹ Transition risks are those arising from the transition to a low-carbon and climate-resilient economy

Given the sector-wide transitions likely to be underway, new investment opportunities are seen on the anvil. Thus, even as **global markets are still coming to terms with the magnitude and nature of climate-associated risks, asset owners globally (including pension funds, sovereign wealth funds, foundations) are setting targets to increasingly gain exposure to investments into clean technologies, waste and water infrastructures.**

It is worth noting that India, being one of the fastest growing economies globally, enjoys high level of interest as an investment destination from international institutions and Foreign Portfolio Investors (FPI), who have invested US\$ 420billion as FDI (April 2000-March 2019)³² and US\$ 480billion (March 2019)³³, respectively. There is also a high level of confidence from domestic financial sector participants including banks and long-term capital market investors that together hold over US\$ 2.5trillion in loans and investments³⁴. While all of this illustrates a reasonable flow of capital, there needs to be conscious effort to redirect this capital into green sectors and position India as an economy that attracts more international investments into green areas.

China presents an exemplary case where an entire green finance network has been created to bring in new capital into green sectors to meet US\$ 320billion (2015-2020 annual investment) target. The country currently reports that it has a sizeable green loan book of US\$ 1.37trillion³⁵, around US\$ 960billion invested into green and low-carbon projects (leveraging the public-private partnerships model)³⁶ and US\$ 289billion in green bonds (2018)³⁷.

A green finance taxonomy will create common ground that allows participants to view environmental data in context of national goals, empower investor decisions and align them to policy objectives and provide a framework to encourage companies and project developers to strengthen their green investing.

³² https://dipp.gov.in/sites/default/files/FDI_Factsheet_27May2019.pdf

³³ <https://www.fpi.nsdl.co.in/web/Reports/ReportDetail.aspx?RepID=84>

³⁴ As per latest figures available, Bank and NBFC credit outstanding stood at US\$ 1.25trillion (March 2019) and US\$ 254billion (FY2018), respectively; amount invested by domestic Mutual Funds, Pension Funds (EPFO, NPS) and Insurance companies was US\$ 346billion (March 2019), US\$ 175billion (March 2018) and US\$500 billion (March 2018), respectively.

³⁵ latest numbers from PBOC

³⁶ http://unepinquiry.org/wp-content/uploads/2017/11/China_Green_Finance_Progress_Report_2017_Summary.pdf

³⁷ https://www.climatebonds.net/files/reports/china-sotm_cbi_ccdc_final_en260219.pdf

CONCEPT

INTRODUCING THE GREEN FINANCE TAXONOMY FOR INDIA



4. Introducing the Green Finance Taxonomy for India

Learning from international experiences, direct engagement with stakeholders active in the India realm, and inputs from the Expert Committee, the following set of principles have emerged to guide the development of a proposed India specific Green Finance taxonomy:

1. Promotion of activities that align to broader environmental sustainability goals – these cover protection and conservation of natural resources, clean and efficient use of energy, waste reduction, pollution control and sustainable biodiversity management
2. Alignment to an outcome-linked approach that measures **net contributions** over the lifetime of a project. An outcome is considered green if:
 - a. The output creates climate positive results
 - b. It can indicate a demonstrable and measurable change from the base case³⁸
3. Alignment of financial sector to national environmental objectives to govern the flow of resources towards climate positive outcome-aligned sectors

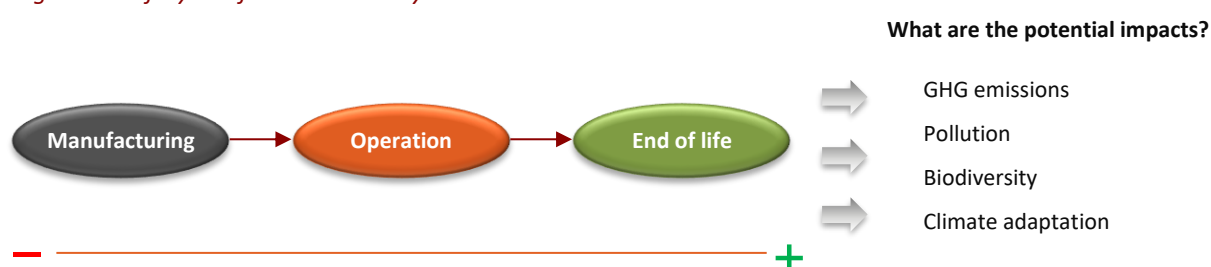
The taxonomy has been aligned with the NDC measures but it also recognizes additional, equally critical, environmental objectives like biodiversity conservation, pollution prevention, and water sanitation.

There are multiple frameworks by which one can define green finance: conceptual definition, principles-based, sectoral taxonomy, exclusionary criteria³⁹. Based on stakeholder and expert committee inputs, it was observed that a green finance taxonomy should focus on activities where outcomes generate a measurable impact or a demonstrable change from the current or the base case⁴⁰. As guiding principles can be broad in scope, stakeholders also forwarded the idea that a sectoral view that identifies economic activities across different sectors be provided for illustrative purposes. Therefore, a sectoral view has been created to list activities that occur in a value chain and provide dimensions by which their ‘greenness’ may be assessed.

Even as Greenness can be depicted through a “shades of green” approach⁴¹: dark green (already achieving low-carbon goals), medium green (facilitating significant reduction in emissions), and light green (some emission reduction in the short term), the stakeholders discussion indicated that such approach may incentivize /limit financing in favor of dark green (like renewable energy generation) vis-à-vis letting a more integrated view of green investments evolve and thus enable capital flow to retrofits and /or energy efficiency measures (which may be categorized as medium or light green).

The below graphic presents how contributions, moving through the lifecycle (“cradle-to-grave”) of economic activities in an asset, can make it green at a net level. While individually, these pillars may not create potentially positive impacts (on emissions, pollution, biodiversity or adaptation), at an aggregate level they will help result in environmentally positive outcomes. Sectoral illustrations are provided in Table 4.

Figure 14: Lifecycle of sectoral activity



³⁸ Represents the starting point based on which future performance can be measured

³⁹ European Commission, 2017

⁴⁰ Represents the starting point based on which future performance can be measured

⁴¹ Centre for International Climate and Environmental Research (CICERO) has a Shades of Green rating methodology to evaluate green bonds

Green finance: Sectoral view

Table 4: Green finance taxonomy for India

Sub-category		Description	Scope	Green considerations	India relevance, targets, initiatives
CLEAN ENERGY					
Asset Creation (power, heat)	Wind	Use of airflow through wind turbines to generate electricity	Construction and operation of the facility	A. Location: • Location of solar parks important for wildlife. Setting up of large solar and wind farms in wildlife-rich locations can lead to a loss of habitat B. Lifecycle assessment – GHG emissions	Target: 60GW by 2022 ⁴² Current: 34.6GW, i.e. 10% of total installed power capacity (December 2018)
	Solar	<u>Solar PV (rooftop/utility)</u> : cells directly convert sunlight into electricity <u>Utility scale concentrated solar power (CSP)</u> : use mirrors or lenses to concentrate (focus) sunlight onto a small area and then converts it into heat to create steam to drive a turbine that generates electrical power <u>Solar thermal applications</u> : collect sun's energy and transform into heat that can be used later. Solar thermal applications have residential and industrial uses such as domestic water heating, heating swimming pools, space heating, water processes for industrial heating and agricultural drying	<u>Solar PV and CSP</u> : Construction and operation of solar power plant <u>Solar thermal system</u> : Construction and operation of systems like solar water heater, solar heating system, solar cooling system		Target: 100GW by 2022 ⁴³ Current: 24GW, 6.9% of total installed power capacity (December 2018)
	Small hydro (up to 25 MW capacity)	Converts energy of flowing water into electrical energy	Construction and operation of the facility		Target: 5GW by 2022 ⁴⁴ Current: 4.5GW, 1.3% of total installed power capacity (December 2018).
	Tidal	Form of hydropower energy that uses energy of the oceanic tides to generate electricity.	Construction and operation of the facility		High costs (est. INR 30-60crore per MW) inhibit commercialization. Recognition could lead to scale which could bring down costs. Strong case with 7,517 km coastline.

⁴² <http://pib.nic.in/newsite/PrintRelease.aspx?relid=155612>

⁴³ Ibid.

⁴⁴ Ibid.

Sub-category		Description	Scope	Green considerations	India relevance, targets, initiatives
					Energy potential estimated around 8000 MW ⁴⁵
	Geothermal	Utilizes heat stored in the earth's crust. Geothermal resources include dry steam, hot water, hot dry rock, magma, and ambient ground heat.	Construction and operation of the facility		Target 10,000 MW by 2030 ⁴⁶
	Biomass energy	Biomass energy is generated from the conversion of solid, liquid and gaseous products derived from biomass. It involves processing of biomass which includes any organic (biological) matter available on a renewable basis including wastes and residues from agriculture, forestry and related industries as also the organic waste from municipal and industrial sources.	Construction and operation of the facility	•Lifecycle emissions •Liquid biofuels for transport have been most heavily associated with the environmental and social criticisms of bioenergy. •Traditional use of biomass in cooking needs to be avoided.	Biomass Target: 10GW installed capacity by 2022. Current installed capacity: 8.7GW (December 2018)
	Nuclear	Uses nuclear reactions to generate heat used to produce electricity. Nuclear is recognized as one of the lowest emitters of GHGs that can generate electricity. ⁴⁷	Construction and operation of the facility	Raw material storage, disposal of nuclear waste (toxicity), risk of accidents	Target: 13.5GW installed capacity by 2024 and 22.5GW by 2031. ⁴⁸ Current installed capacity: 6780 MW, i.e., 2% of current installed capacity (December 2018)
Delivery Asset	Smart grids	Smart grid components including Wireless/ Wired/ Optic Communications, smart power meters, smart substations, controls, sensors	Setting up of smart grid infrastructure (will support both conventional and renewable power).	• Lifecycle assessment – GHG emissions	Electricity transmission and distribution (T&D) system losses in India are among the highest in the world ⁴⁹ . As of 2014-15, these were reported to be 22.77%, that is over twice the world average and nearly three times the levels in the US. ⁵⁰
	Green energy corridors	Dedicated infrastructure for evacuation of renewable energy from generation points to the load centres through strong grid connections	Setting up transmission and distribution network		

⁴⁵ <http://www.pib.nic.in/newsite/PrintRelease.aspx?relid=90205>

⁴⁶ MNRE Draft National Policy on Geothermal Energy

⁴⁷ <https://www.iaea.org/topics/nuclear-power-and-climate-change>

⁴⁸ <http://dae.nic.in/writereaddata/parl/budget2018/lsus2064.pdf>

⁴⁹ <https://www.eia.gov/todayinenergy/detail.php?id=23452>

⁵⁰ <https://beeindia.gov.in/sites/default/files/Transmission%20and%20Distribution%20Losses%20by%20CEA.pdf>

	Sub-category	Description	Scope	Green considerations	India relevance, targets, initiatives
	EV charging infrastructure	Setting up and operation of EV charging stations and energy supply facilities for battery charged vehicles	Construction and operation of the facility		Available of electric charging infrastructure will be critical to uptake of EVs in the country.
	Transport Infrastructure	Construction of new roads, bridges, infrastructure upgrades, railway lines for freight and passenger traffic	Infrastructure construction companies, contracting companies setting up the projects		This area is already making a big impact in metros and has found mentions from Niti Aayog as a potential option to promote shared mobility.
	Facilities	Examples include district cooling and heating facilities that may be used for commercial or residential buildings	Set-up and operator of the facility		
Implementation Practices	Clean coal technologies	Technologies like Pulverized Combustion Ultra Super Critical (PC USC), Pressurised Circulating Fluidised Bed Combustion, Super Critical, Combine Cycle (PCFBC SC CC), Integrated Gasifier Combined Cycle (IGCC), Solid Oxide Fuel Cell (SOFC), Integrated Gasifier Fuel Cell (IGFC), Underground Coal gasification (UCG). These technologies were recognized in India's NDCs as possible options to make existing thermal power plants cleaner.	Investment in Ultra supercritical and Supercritical technologies that are high-efficiency, low-emission (HELE)		Low efficiency levels at existing coal plants (28% average efficiency compared to 36% in China and 33% in the US) resulting from subpar quality of coal available in the country (that carries low energy content meaning more coal needs to be burnt to achieve same level of electricity) and subcritical technologies employed in coal-fired plants (that are low-cost but use more coal) have had the government consider measures to control coal-related GHG emissions through the employment of clean coal technologies. ⁵¹
	Renovation & Modernization (R&M) of thermal power technologies		Renovation, modernisation and Life Extension of old coal power stations		Energy efficiency targets set for 144 old thermal stations (as per NDC). R&M of existing old power plants requires less investment (vis a vis. setting up a new plant), can be completed in a shorter time frame and can help reduce emissions through adoption of upgraded technologies. ⁵²

⁵¹ <https://www.industry.gov.au/sites/g/files/net3906/f/June%202018/document/pdf/coal-in-india.pdf>

⁵² <http://www.cea.nic.in/reports/others/thermal/trm/lahmeyer.pdf>

Sub-category		Description	Scope	Green considerations	India relevance, targets, initiatives
Manufacturing & R&D	Generation equipment	Generation equipment including but not limited to: •wind: wind power monitoring system, control, systems of wind farms •solar PV: PV modules (panels), inverters, mounting structures, trackers, batteries and charge controller •small hydro: hydraulic machinery, steel structures, turbines, generator unit •tidal: turbine, generator, steel or floating structures •geothermal: geothermal vents, steam generator, condenser, turbine	Construction and operation of the facility	• Lifecycle assessment – GHG emissions • Ensuring that the products are manufactured sustainably (compliance with BEE standards) • Addressing environmental and social considerations	Indian government, in alignment with the 'Make in India' campaign, is encouraging locally manufactured products by prescribing that solar power projects bidding in RE sector projects need to source a majority of the components/ products locally
	R&D for RE equipment, EE products	R&D for creation of new and improved RE products and technologies. Examples of R&D projects include: •new product development: design and development of organic solar cell sub-modules which can be potentially low-cost, light-weight usable in tents, congested city environments (where modules need to be folded or rolled and kept away when not in use).⁵³ •cost efficient solutions: develop efficient single phase system to convert solar energy to electrical energy from solar PV.⁵⁴	Capital expenditures to RE dedicated projects		R&D in manufacturing needs to be recognized as a critical building block for a wider scale-up for renewable energy (target of 175 GW through renewable energy by 2022) and energy efficiency in India
	Renewable energy (solar) appliances & products	Includes solar lighting systems like lantern, solar street lighting and heating systems like solar cookers	Construction and operation of the facility		
	Systems and equipment for Delivery Asset	Key components	Construction and operation of the facility		

⁵³ <https://mnre.gov.in/file-manager/UserFiles/Solar%20R&D%20Projects/Ongoing-R&D-projects-in-solar-PV-5.pdf>

⁵⁴ <https://mnre.gov.in/file-manager/UserFiles/Solar%20R&D%20Projects/Ongoing-R&D-projects-in-solar-PV-11.pdf>

Sub-category		Description	Scope	Green considerations	India relevance, targets, initiatives
	Energy Storage	Equipment and key components	Construction and operation of the facility	• Lifecycle assessment – GHG emissions • End-of-life disposal	• As part of India's NDCs, targets under Clean and Efficient Energy System (large-scale development of RE) and National Smart Grid Mission will require development of energy storage technologies • The National Wind-Solar Hybrid Policy⁵⁵ recognizes the importance of energy storage devices in improving the plant & infrastructure utilization efficiency, power reliability and grid stability • Battery manufacturing is critical for a large-scale transition to EVs
ENERGY EFFICIENCY					
Implementation Practices	Process efficiency due to employment of products, services and technologies that are considered energy efficient	Energy savings in Industrial processes can occur in a few ways. • Manufacturing process (whole or in-part) can be made energy-efficient through industrial automation (reducing human intervention), employing better machinery (fixed asset upgrades), • Energy retrofits such as heat pumps, conversion to LED lighting, power management through motion sensors, smart meters, smart grids, improvements in HVAC systems • Reduction in fuel consumption by shifting from fossil fuel to renewables	Specific plant where these EE measures are employed in manufacturing, asset operations	Lifecycle assessment – GHG emissions	
	Bulk energy services	Energy recovery technology, and storage, transmission and distribution which results in reduced energy losses			
Manufacturing & R&D	Product	Development of products that reduce energy consumption levels of end user without any necessary changes in their requirements.	Manufacturer of the Product/technology and its key components	• Ensuring that the products are	

⁵⁵ <https://mnre.gov.in/sites/default/files/webform/notices/National-Wind-Solar-Hybrid-Policy.pdf>

Sub-category		Description	Scope	Green considerations	India relevance, targets, initiatives
		Examples can be seen in lighting, appliances, building materials, fans and ACs, motors, transformers, pumps, compressors, etc. Lighting products: Compact fluorescent lamps (CFLs), Light-emitting diode (LED) bulbs that have been replacing incandescent bulbs. Energy efficient appliances: Consumer durables like air conditioners, ceiling fans, washing machines that comply with certain Standards and Labels. In India, energy efficiency labelling under The Standards & Labeling Programme from Bureau of Energy Efficiency (BEE) has both mandatory and voluntary forms of labelling. ⁵⁶		manufactured sustainably • Addressing environmental and social considerations	
	Process/ Technology	Energy efficient process or technology like industrial automation software, energy saving technologies that reduce energy consumption a process, system or technology. (without changing its requirements)			
CLEAN TRANSPORTATION					
Asset Creation	Low emission Vehicles	Examples of low emission public transport include urban rail transit, Bus Rapid Transit systems, Electric vehicles (rail, trams, buses). Examples of private and freight vehicles include cars, buses, other vehicles.	Ownership of the asset	Lifecycle assessment – GHG emissions	Target: 6-7 million EVs by 2020 ⁵⁷ <u>Initiatives:</u> •Under FAME (Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles), government already offers EV purchase subsidies to 2-wheelers, 3-wheeler auto, passenger 4-wheeler vehicles, light commercial vehicles and buses. •Government is also incentivising cities to launch electric buses.

⁵⁶ <https://www.beeindia.gov.in/content/standards-labeling>

⁵⁷ <https://dhi.nic.in/writereaddata/Content/NEMMP2020.pdf>

Sub-category	Description	Scope	Green considerations	India relevance, targets, initiatives
				• Delhi is looking to procure 1,000 electric buses in 2019.⁵⁸
Manufacturing	Key components	Motor manufacturing, battery, mechanical parts manufacturing	Manufacturer or assembler of the asset and its key component	Environmental and human rights concerns related to mining of raw materials • End-of-cycle waste management Currently there is no lithium-ion battery production in India although the government push to increase EV penetration (FAME incentives) will likely mean that manufacturing of batteries would be a critical end-product pricing factor. According to NITI Aayog and RMI estimates, India would require approximately 800 GWh of batteries per year by 2030 to support 100% EV sales across all types of personal vehicles, representing US\$ 125 billion (INR 8 lakh crore) investment in battery manufacturing⁵⁹
GREEN BUILDINGS				
Asset Creation	New buildings	A green building is one that, in its design, construction or operation uses less water, improves energy efficiency, conserves natural resources, recycles waste and provides healthier spaces for occupants, as compared to a conventional building. ⁶⁰ These buildings can be commercial like offices, malls, hotels, retail establishments, educational institution buildings, hospitals, etc., or residential private dwellings and multifamily residential buildings	Structure as well as application of processes that are green, sustainable and resource-efficient throughout life-cycle of the building: from design, construction, operation and maintenance, renovation etc.	Green compliance verification through a recognized global or Indian green rating agency • With the launch of initiatives like Smart Cities Mission, Pradhan Mantri Awas Yojana, Atal mission for Rejuvenation and Urban Transformation, the need to establish green buildings has come to fore as all these initiatives centrally focus on establishing sustainable, safe and efficient habitats for the long-term • Leadership in Energy and Environmental Design (LEED) certified buildings in India stood at 752 LEED-certified projects with

⁵⁸ http://www.ptinews.com/news/10211075_Tender-for-1-000-e-buses-to-be-floated-next-year--DTC-MD.html

⁵⁹ https://niti.gov.in/writereaddata/files/document_publication/India-Energy-Storage-Mission.pdf

⁶⁰ <https://www.worldgbc.org/what-green-building>

Sub-category		Description	Scope	Green considerations	India relevance, targets, initiatives
	Renovation, upgrade and modernization of existing building stock	Including energy conservation retrofits, lighting, appliance or equipment upgrades, cost of heating, cooling, insulation, etc.	Performance upgrades of existing building stock only (including commercial and residential buildings)	- Water, energy and waste conservation measures - Compliance through certification from a recognized national or international rating agency	20.28 million gross sq.mt of space. Similar numbers for other countries ranking above India include the US (30,669 projects, 385.65 mn gross sq mt), China (1,211 projects, 47.16 m gross sq mt) and Canada (2,970 projects, 40.77 mn gross sq mt). ⁶¹
Manufacturing	Alternative construction materials	Examples include use of alternatives to cement and concrete, e.g., use of natural products, recycled plastic	Manufacturer of the materials	Certifications (through a nationally recognized rating agency) to promote environmentally sustainable construction material	
SUSTAINABLE AGRICULTURE AND LAND USE					
Implementation Practices	No-till farming	Use of conservation farming techniques to exclude soil tillage and prevention of crop residue to incorporate with soil	Project Implementation and operation	GHG Emission	Developing ecologically sustainable climate resilient agricultural production systems is a part of India's NDC plan.
	Organic agriculture	Management practices that can help farmers adapt to climate change	Project Implementation and operation	GHG Emission and biodiversity considerations	There are three schemes currently promotion organic agriculture: Paramparagat Krishi Vikas Yojana (PKVY), Mission Organic Value Chain Development for North Eastern Region (MOVCDNER) and National Programme of Organic Production (NPOP) ⁶²
	Integrated pest control (IPM)	Integrated pest management systems including best preventive and control measures and using pesticides only when needed	Project Implementation and operation		There is national policy on IPM and part of India's NACCAP
	Precision farming	Using information technology, data gathering, and proximal data gathering to improve fertilizer,	Project Implementation and operation (Information technology, GPS, satellite	GHG Emission	National mission for sustainable agriculture gives importance to access of information on farming practices with an

⁶¹ US Green Building Council's (USGBC), 2018⁶² <http://pib.nic.in/newsite/PrintRelease.aspx?relid=181608>

Sub-category		Description	Scope	Green considerations	India relevance, targets, initiatives
		soil and water management for agriculture activities	positioning (GNSS) data, remote sensor, drones)		objective of boosting productivity and income.
	Animal husbandry and Fishery	Sustainable animal farming techniques including manure processing, waste management, fishery thoroughbred, etc.	Project Implementation and operation	GHG Emission	Animal husbandry is one of the key sectors under the national adaptation plan
	Agro-forestry	Integration of forestry, crops farming, and livestock farming in the same piece of land	Project Implementation and operation	GHG Emission and biodiversity considerations	Focussed in India's Agro-forestry policy 2014 and part of India's plan to enhance carbon sinks
	Conservation and management of wet lands	Protection, preservation and sustainable use of wetlands	Project implementation and operation	Biodiversity and climate adaptation	
Asset Creation	Ecological Protection	National park, national geological park, project of natural heritage, natural reserve, etc.	Project Implementation (Facility construction) and operation	Biodiversity	
	Biodiversity	Protection of coastal, marine and watershed environments, and restoring degraded ecosystems (including their genetic and species diversity)			
	Forestry Development	Afforestation, Forestry seed breeding and seedling production, etc	Project implementation and operation	GHG Emission	
Manufacturing	Farming equipment and pesticide	Farming equipment such as Roller/crimper, tillage equipment used for no-till farming and organic agriculture. Pesticide used for integrated pest control	Plant for manufacturing of equipment and pesticides	- Lifecycle assessment – GHG emissions - Ensuring that the products are manufactured sustainably (compliance with standards)	Farming equipment and pesticides are currently taxed in India.
	Raw materials	Construction materials such as cement, steel, iron and equipment for facility construction and maintenance (for example national and geological park, etc.)	Plant for manufacturing of raw materials used for farming equipment	Lifecycle assessment – GHG emissions	
	Storage and Distribution	Storage and Distribution of farming equipment, pesticide and raw materials	Warehouse construction and inventory financing of equipment and pesticide	Lifecycle assessment – GHG emissions	
	IT Development and Services	Information technology development and services for precision farming	IT Development and services	Lifecycle assessment – GHG emissions of PCs/	

Sub-category		Description	Scope	Green considerations	India relevance, targets, initiatives
				Laptops/ peripheral items	
WASTE & POLLUTION CONTROL					
Asset Creation	Wastewater treatment	Convert wastewater into an effluent that can be returned to the water cycle with minimum impact on the environment	Wastewater treatment plant	Pollution control and GHG emissions reduction	Abatement of pollution and setting up of resilient urban centres are the key activities of India's NDC plan. Rising population, urbanization, and industrialization has led to severe wastewater, solid waste management, and toxic air problem in cities. India generates a staggering 1.7 million tonnes of faecal waste a day and 78% of the sewage generated remains untreated⁶³. India's air pollution problem is severe which reflects from WHO's database: 11 of the 12 cities with the highest levels are located in India⁶⁴
	Sludge in wastewater	Solid, semisolid, or slurry residual material that is produced as a by-product of wastewater treatment processes	Sewage treatment plant		
	Air pollution	Air pollution control equipment and control facility	Device/Facility Construction and Operation		
	Municipal Solid Waste (MSW)	MSW including hazardous waste and medical waste treatment facilities	Solid waste disposal facility and MSW treatment plant		
	Soil pollution	Remediation of soil pollution			

⁶³ Down to Earth

⁶⁴ https://www.who.int/airpollution/data/aap_air_quality_database_2018_v13.xlsx?ua=1; <https://www.vox.com/2018/5/8/17316978/india-pollution-levels-air-delhi-health>

	Sub-category	Description	Scope	Green considerations	India relevance, targets, initiatives
	Tailings and Associated Mine	Redevelopment of mine with a purpose of resource efficiency improvement, development of geothermal power, reinjection and integrated utilization	Tailings and waste-rock management facilities		
	Industrial Solid Wastes, Exhaust Gas, and Effluent	Collection and resourcelization of industrial solid waste, exhaust gas, and effluent	Collection, operation and recycling facility	GHG emissions reduction	Promotion of waste to wealth is a key element of India's NDC plan.
	Renewable energy waste resource	Recycling, Sorting and Dismantling System, and processing and reuse of wasted resource			
	Electromechanical Products	Construction and operation of remanufacturing device/facility for Electromechanical products such as auto parts, engineering machines, and machine tools.			
	Co-generation	Facility used for simultaneous production of heat and electricity	Cogeneration power plant		Co-generation is one of the key initiatives of India's NACCP
Manufacturing	Environmentally sustainable products	Developing products with reduced environmental impact from raw material extraction and processing to end-of-life disposal	Facility and supplies related to resource-efficient, transportation and distribution packaging optimising the value chain to reduce fuel consumption, reducing transportation emissions, eco-friendly warehousing		
	Resource-efficient packaging and distribution	Resource-efficient and fit-for-purpose packaging using low impact materials and an efficient value chain for distribution			
	Manufacturing devices and equipment	Manufacturing of devices, equipment, tools used in setting up plants, facility construction materials, etc	Manufacturing plants devices, equipment, tools, facility construction materials, etc		
	Raw materials manufacturing	Materials such as cement, steel, iron and equipment for facility construction and maintenance	Plant for manufacturing of materials		
	Storage and Distribution	Storage and Distribution of equipment, devices, construction materials, etc	Warehouse construction and inventory financing of	Lifecycle emissions of warehouse	

Sub-category		Description	Scope	Green considerations	India relevance, targets, initiatives
			equipment, devices, construction materials, etc.		
	R&D	R&D expenses on development of new products and devices used for environmentally sustainable products	Financing for R&D expenses		As waste and pollution control is a key component of India's NACCP, product innovation in this area will be key to India's NDC goal. There are incentives from Government to produce biodegradable plastics in India ⁶⁵
WATER USE & CONSERVATION					
Asset Creation	Water Conservation	Industrial water saving technology, agricultural water saving irrigation, transformation of urban pipeline network for water supply, and integrated use of water resource	Facility Construction and Operation	GHG Emission and pollution	There is a national water policy; water conservation is a part of India's NACCP. The water policy stresses both water utilization and conservation. Climate adaptation programme. The national water mission has a target to increase water use efficiency by 20%. In addition, the mission focusses on assessment of impact of climate change on water resources, water conservation, augmentation and preservation, etc. ⁶⁶
	Rural drinking water safety	Providing piped and improved water supply to rural areas	Drinking water infrastructure		
	Urban water conservation	Reduction in water demand and careful use for household, municipal and industrial uses	Facility construction and operation		
	Water conservation	Activities to conserve and sustainably manage the natural resources of fresh water	Water Conservation Equipment & Supplies		
	Wastewater methane	Installing anaerobic sludge digestion, biogas capture systems etc. to capture methane from municipal wastewater systems	Wastewater methane capture facility	GHG Emission and air pollution	Ethane emissions from wastewater is a key source of GHG emission. Waste sector in India accounts for 3.5% of the total GHG emissions
	Wastewater – sludge used as fertilizer	Treat the primary sludge through biological, chemical or thermal treatment that can be used as a fertilizer to improve soil properties	Wastewater sludge treatment facilities	Excessive use of this fertilizer for a longer period increases metal bioavailability in soil and ultimately causes food chain contamination	

⁶⁵ <https://economictimes.indiatimes.com/blogs/et-editorials/fund-rd-in-obps-biodegrading-plastics/>

⁶⁶ <http://nwm.gov.in/>

Sub-category		Description	Scope	Green considerations	India relevance, targets, initiatives
Manufacturing	Inputs manufacturing	Manufacturing of devices, pipes, systems, equipment, tools use in setting up plants, facility construction materials, etc	Manufacturing plant for devices, equipment, tools, facility construction materials, etc		
	Supply chain	Distribution of device, systems, pipes, tools, equipment, etc.	Warehouse construction and inventory financing		
	Raw materials manufacturing	Materials such as cement, pipes, systems, steel, iron and equipment for facility construction and maintenance	Plant for manufacturing of materials		
CLIMATE ADAPTATION					
Asset Creation	Disaster monitoring, warning and emergency response system	Disaster monitoring of major infrastructure and emergency response system	Facility Construction and Operation	Climate Adaptation	Disaster prevention and management is a part of India's NAPCC. Optimizing water use is a part of India's NDC plan. The national disaster management programme covers disaster prevention programmes. It also includes building cyclone shelter, costal protection infrastructure
	Flood mitigation	River dyke construction and riverway dredging engineering	Facility Construction and Operation		
	Hygiene emergency	For addressing natural disaster and extreme weather, the production and storage of hygiene emergency response facilities	Facility and supplies		The national disaster management programme covers disaster relief program. Disaster control programme includes surveillance and control of vector borne disease
	Epidemic disaster	Waning, monitoring, prevention and control system of animal epidemics	Facility to house and/or burials of animals, health care facilities for animals, and immunization supplies and operation		
Implementation Practices	Forest protection	Natural forest protection project (NEPP), converting cultivated land into forests, construction and maintenance of shelter forest	Project Implementation		

	Sub-category	Description	Scope	Green considerations	India relevance, targets, initiatives
	Drought management	Investments in reducing the probability of drought occurrence or in mitigation of losses resulting from drought	Project implementation related to (1) Soil and water conservation, and (2) Herd management Relief measures		Drought management is a part of India's climate change adaptation plan (NAPCC)
	Public health management	Designing of public health approach to climate change that would include services extending to both clinical and population health services	Public health implementation such as health outreach, vaccination, vector programs		Emergency medical relief program in case of natural calamities is a part of India's climate change adaptation plan (NAPCC)
	Food security	Addressing challenges of potential increase in food insecurity and malnutrition due to climate change	Project implementation related to food security such as food supplies and storage, local farming and irrigation, agriculture infrastructure, and territorial integration		Food security is a part of sustainable goal and is on the high of India's development priorities. It is well acknowledged in India's NDC plan
Manufacturing	Manufacturing devices	Manufacturing of systems, devices, tools, machinery required for disaster monitoring and warning, control, emergency systems and supplies, dyke construction, drugs, etc	Manufacturing plant		
	Raw materials manufacturing	Raw materials such as cement, pipes, steel, and iron for facility construction and maintenance	Plant for manufacturing of raw materials		
	Storage and distribution	Distribution of disaster preparedness supplies; storage of hygiene emergency response facilities	Warehouse construction and inventory financing		
	R&D	R&D for drugs developed for climate adaption and emergency	R&D expenses for discovery and development of climate adaption and emergency drugs		
	Disaster monitoring, warning and emergency response IT system	Information transmission, software and information technology services	Development of IT systems and Services		

INVESTING INTO GREEN TRANSITIONS



5. Investing in Green Transitions: Sizing the Investment Requirement

Key green sectors: Investment opportunity and GHG reduction potential (2020-30)

A step-by-step mapping of key green sectors and sub-sectors was undertaken to estimate the investment requirement. Given that some of the sectors/sub-sectors identified as green are cross-cutting in nature (e.g., clean energy or difficult to fully quantify sectors such as biodiversity), investment and emission mitigation potential has been estimated and the final figures thus arrived at are conservative and represent the minimum investment requirement and emission mitigation realization expected through 2030.

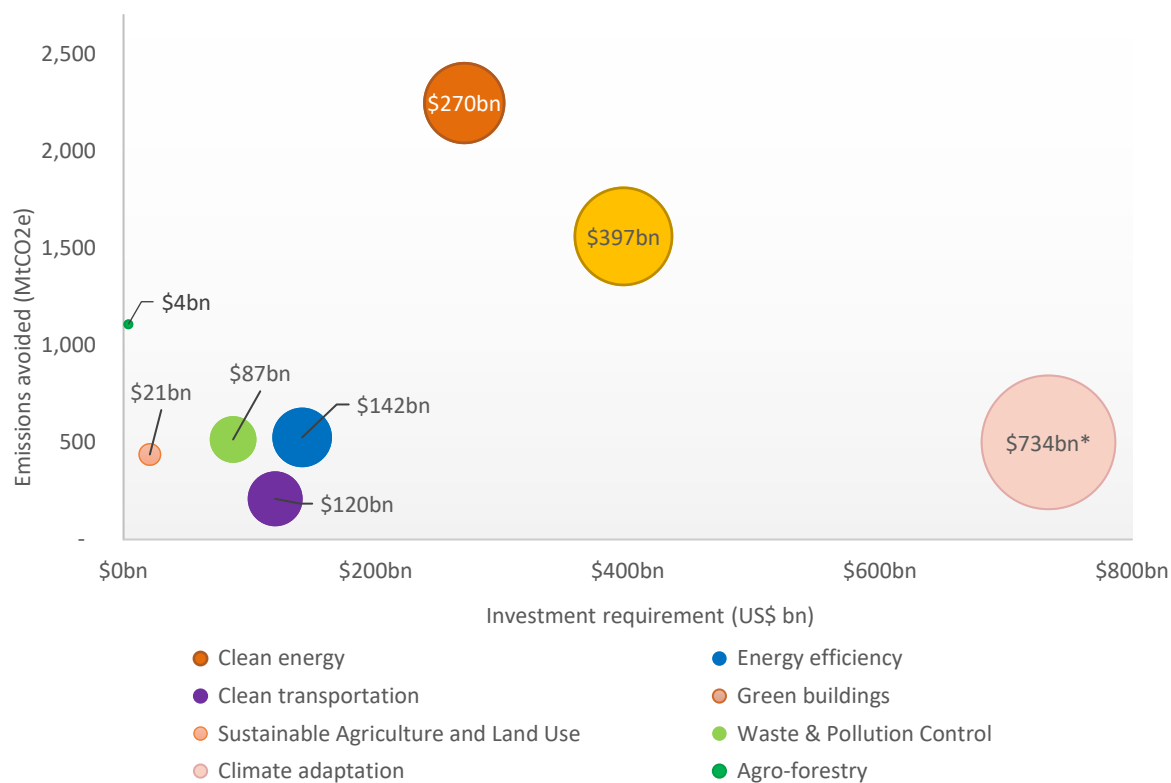


Figure 15: Investment needs and emission reduction potential across major sectors, 2020-2030

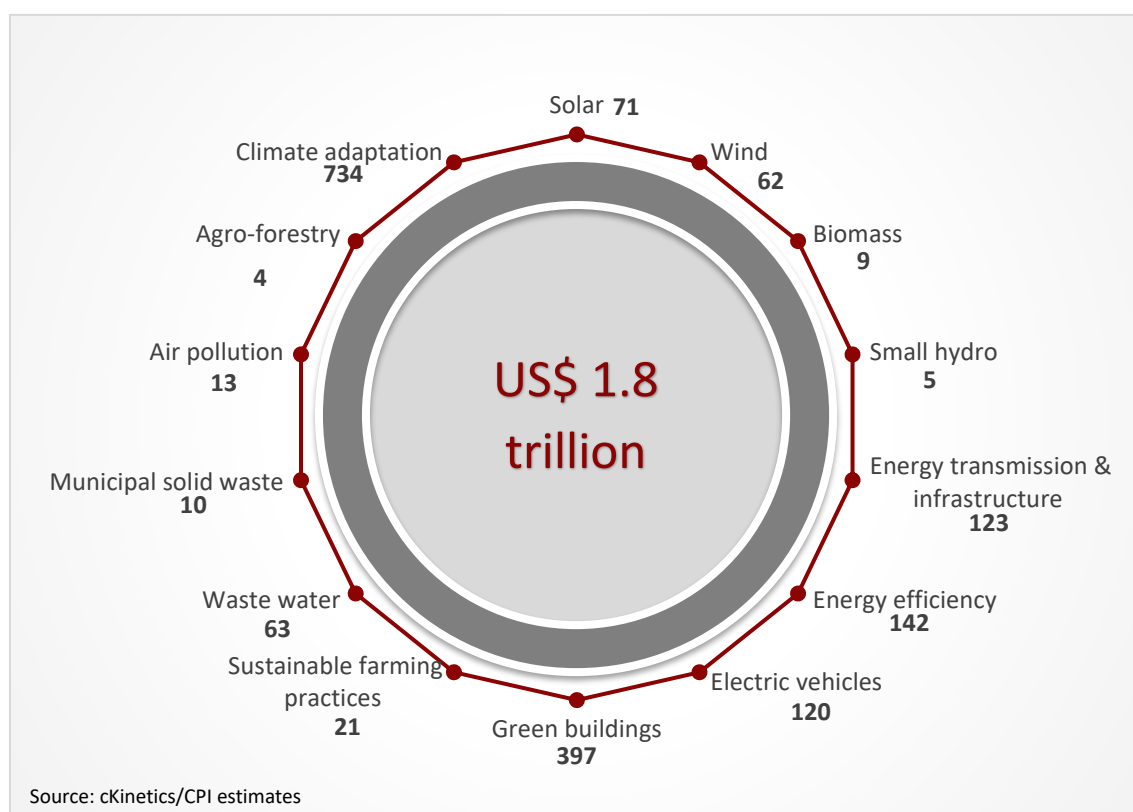
It is estimated that public investment sources will contribute 25% of the total mitigation related investment gap (US\$ 1.04trillion) through 2030. However, this capital will primarily serve as a catalyst to attract greater private participation. For instance, public funding in ventures to de-risk private capital, spending to support adaptation initiatives, or rolling out demand and supply side incentives in emerging industries that enable green sectors to gain scale in operations.

There is an urgent need to develop an integrated approach to green financing to mobilize the required amount of capital to meet India's NDC goals.

Beyond renewables, investments that can be identified as green are under-recognized and only marginally explored in other major sectors. These are the sectors heavily impacted from climate change in value terms and likely to undergo a transformation through 2030. A bottom-up analysis as part of this study confirms market estimates⁶⁷ that renewable energy attracts US\$ 10-15 billion annually, although there is limited data to tag green investments in other sectors. This is not to say that all investment (beyond renewable energy) cannot be green or environmentally friendly, but given the lack of regulatory requirement or market pressure to color investments (green vs. brown), it is difficult to accurately gauge current levels of green investment.

Across the eight sectors identified within the taxonomy, a breakdown of investment requirements was undertaken, which further established the point that while clean energy is benefitting from a massive public sector push and private sector opportunity, the risk and investment requirements in other sectors continues to rise.

Figure 16: Detailed breakdown of cumulative investment requirements at the sub-sector level



⁶⁷ CPI, BNEF

A sectoral analysis of key sectors/sub-sectors of the taxonomy was undertaken to identify the drivers, barriers, business models, and possible financing mechanisms to create a full realization of the climate mitigation and adaptation potential. A summary of this analysis is presented below.

Table 5: Key drivers, challenges and characteristics of key green sectors

Clean Energy	
Key drivers	
- Renewables undermine coal competitiveness. Coal is facing headwinds from its own rising costs and the broader economic shift favouring renewable growth. Levelized cost of energy (LCOE) is expected to continue to move in favour of renewables⁶⁸ Long-term risks of stranded assets⁶⁹ will likely drive down coal investments further. A change in the investment trajectory can be seen already – investment into renewables now exceeds coal. (The past two-year average investment into renewables stood at US\$ 19billion vs. US\$ 8billion in coal⁷⁰) Private sector participation has been key in capacity expansion and mobilizing capital from banks, bonds (green) and private equity sources instead of relying in foreign capital. In fact, FDI flow into non-conventional has not kept pace with sector growth⁷¹. This has also brought a ‘power’ shift in sector traditionally majority held by central and state governments (that owns two-thirds of the conventional capacity) Vast market potential for India that has an estimated RE potential of 1,096 GW comprising 750 GW in solar power, 302 GW in wind, 25 GW in bio-energy and 21 GW in small hydro⁷². Less than 10% of this potential has translated into capacities	
Challenges	
Lower returns and heightened risks for developers. Government auctions have been a preferred method for adding new RE capacities. The overcompetitive bidding process has resulted in low margins for developers as also overexposed them to risk of a sudden change in business conditions (e.g., rise in equipment costs) Evacuation and grid integration. On-demand availability of power requires timely evacuation, grid integration and avoidance of curtailment⁷³. India has made progress by setting up green energy corridors (GEC) to evacuate RE, but such projects need to run ahead of new capacity additions. Currently, the GEC is underfunded⁷⁴ Slow demand uptake from residential sector. In solar rooftop, 70% of the installed capacity comes from commercial and industrial (C&I) customers⁷⁵ who find this solution attractive due to better cost economics of solar vs. grid power⁷⁶ as also accelerated depreciation benefits. In comparison, less than 20% solar rooftop demand has come from domestic (residential) consumers due to low/subsidized electricity tariffs, lack of consumer awareness and high upfront costs Policy uncertainty and payment delays from electricity distribution utilities (DISCOM) weaken sector confidence, reduce pace of installations and create viability challenges for small developers	
Business characteristics and financing mechanisms	
High upfront costs require financing support in initial years Medium to long-term investment horizon depending on type of project Steady, long-term margins possible due to low recurring capital expenditure and operating costs - Significant amount of financing for renewable power projects has originated from SBI, IREDA, L&T Finance and IDFC⁷⁷. Dependency on banks and NBFC carries risks as financial sector is overwhelmed with non-performing assets (NPAs)	

⁶⁸ <https://www.teriin.org/sites/default/files/2018-12/Coal-Transition-in-India.pdf>

⁶⁹ The International Energy Agency defines stranded assets as “investments which have already been made but which, at some time prior to the end of their economic life (as assumed at the investment decision point), are no longer able to earn an economic return as a result of changes in the market and regulatory environment brought about by climate policy”.

⁷⁰ <https://www.iea.org/wei2019/>

⁷¹ FDI into non-conventional energy at US\$ 4.8 billion in last 5 years.

⁷² <http://pib.nic.in/newsite/PrintRelease.aspx?relid=174832>

⁷³ Curtailment is a reduction in the output of a generator from what it could otherwise produce given available resources, typically on an involuntary basis.

⁷⁴ http://164.100.47.193/isscommittee/Energy/16_Energy_39.pdf

⁷⁵ Commercial includes shops and offices, and Industrial includes manufacturing units

⁷⁶ According to Bridge to India, C&I consumers account for more than 50% of India’s total power demand and make savings of up to 50% through rooftop solar systems as their grid tariffs are typically between INR 7-10 (US\$ 11-16)/ kWh

⁷⁷ <https://www.cenfa.org/wp-content/uploads/2018/06/2017-COAL-vs-RENEWABLE-Report.pdf>

• Renewable Energy Service Company (RESCO) model could give a boost to solar rooftop installations in the residential sector by reducing the initial cost burden provided consumers awareness is raised, RESCOs are ensured of recoveries (in case of defaults) and power purchase agreements are adhered to and maintained
Energy Efficiency (EE)
Key drivers
• Primary energy demand will continue to increase (541 million tonnes of oil equivalent (Mtoe) in FY2017 to 877 Mtoe in FY2031⁷⁸). Industrial sector consumes maximum power (57.7% share). Currently accounting for only ~9% share each, energy demand from residential and commercial⁷⁹ and transport is expected to become fairly significant (2.2x and 5.6x increase, respectively) in FY2031 • Government-owned Energy Efficiency Services Limited (EESL) has been a key driver for the EE market through its large-scale market transformation programs like pan-India transition to LED street lights, mass procurement of LED bulbs, replacing agricultural pumps with energy efficient technologies, rolling out smart meters⁸⁰ and, more recently, releasing tenders to set up Electric vehicle (EV) charging stations • For industries, PAT has given rise to demand for energy efficiency solutions like pollution equipment, created a market mechanism to trade energy savings and overall created obligation and incentive for industries to invest and save. Further efforts to make PAT compliance a norm across industries (expanding scope to cover 80% of top emitting sectors) will help drive industry investments
Challenges
• Some of the key issues for the sector include – lack of awareness about EE solutions and energy performance contracting, limited ESCO credibility, limited technical assessment capability of Financial institutions (FIs) in evaluating EE projects, and the involvement of new, innovative (and unestablished with higher perceived risk) technologies • Limited access to internal funds and borrowing capacity make it difficult for SMEs to invest in EE, while small project size and development costs make financing transaction costs higher for the SMEs. High initial investment and lack of financial incentives deters implementation even when lifetime costs of EE solutions turn out to be lower • EE appliances await a wider EE transformation. While EESL has successfully created a thriving market for LEDs through mass procurement programs, there are bigger challenges in the form of residential and commercial cooling (refrigeration and air conditioning) that need to be addressed in a cost-efficient manner. For instance, currently a 5-star AC is priced around INR 8,000-10,000 higher than a 3-star AC. Given that consumer purchase decisions are influenced by purchase prices (especially for high ticket purchases), it impacts the choice for EE products
Business characteristics and financing mechanisms
• High initial investment cost needs for EE solution implementation. Industrial projects seeking energy efficiency can be capital intensive, for instance, waste heat recovery projects can take investments costs of up to INR 16crore (US\$ 2.25million) per MW⁸¹. Similarly, energy efficient appliances with higher energy ratings are not yet cost competitive enough to become first choice of consumers • Creating dedicating financial commitments for banks to lend a minimum amount towards EE projects of MSMEs • Market needs to move beyond traditional instruments like dedicated credit lines (soft loans) with risk sharing facilities and into creation of sector-specific instruments that can help build scale like green instruments, insurance products to protect ESCOs in the event of non-realization of projected EE savings • Greater push needed for banks to invest in capacity building initiatives that create/build skillset and in-house employee expertise in assessing industry-specific EE requirements
Clean Transportation
Key drivers
• Electric vehicles (EV) present a significant investment opportunity for automobile manufacturing sector. The Indian automobile industry, sized at US\$ 93billion, contributes 7.1% of the total GDP (FY15-16)⁸². It is one of the top destinations attracting Foreign direct investment (FDI) with cumulative inflows of US\$ 21.4billion (during April 2000-March 2019)⁸³

⁷⁸ https://www.beeindia.gov.in/sites/default/files/press_releases/UNNATEE%20Report.pdf

⁷⁹ Energy usage from lighting and appliances, HVAC heating, ventilation and air conditioning (HVAC) and energy demand in cooking

⁸⁰ It is a type of electricity meter that communicates directly with the electricity distribution utilities (DISCOM) and provides users with an accurate analysis of their energy usage

⁸¹ <http://ietd.iipnetwork.org/content/waste-heat-recovery-power-generation>

⁸² Automotive Sector Achievements Report, Department of Heavy Industries

⁸³ https://dipp.gov.in/sites/default/files/FDI_Factsheet_27May2019.pdf

- **Linkage with energy sector, personal mobility needs, and emission targets serve as key drivers to move towards clean and shared mobility solutions.** To put it in perspective, there is a stronghold base of automotive industry that witnesses demand in excess of 26 million vehicles (FY18-19)
- **Two-wheelers dominate the market** with 84% share in total automobile sales (FY18-19) followed by 13% in passenger vehicles and 3% in three-wheelers. According to Niti Aayog, two- and three- wheeler segments are the most market-ready to transition to EVs⁸⁴
- **Case for transition to EVs** becomes stronger with the potential savings in terms of fuel (70% of diesel, 99.6% of petrol consumed by transport sector⁸⁵), reduction in air pollution and the expected growth in demand for vehicles in a sector which accounts for 11% of India's carbon emissions⁸⁶
- **Government tightening of norms** and suggested move to completely transition two and three wheelers to electric

Challenges

- **Lack of adequate charging infrastructure reduces purchase confidence** in a vehicle that is currently more expensive than conventional ones. Other countries already ahead in their transition have a strong charging infrastructure base – 70,000 charging stations (2.6 million EVs) in China and 24,000 stations (1.1 million EVs) in the US⁸⁷. There are some 222 charging stations in India⁸⁸
- **Lack of capabilities to support battery manufacturing locally**, reliance on imports for key raw materials (lithium, nickel, cobalt, graphite) alongside no technological capabilities in producing lithium batteries
- **Limited grid capacity and overall infrastructure readiness** to handle a massive ramp up in EVs

Business characteristics and financing mechanisms

- **Vehicle loans** from bank and NBFCs are the dominant route for financing. For the lending institution, it is considered as **personal lending or retail financing**
- **Setting up a local manufacturing base for EVs is expensive and requires greater policy push.** Clarity in government policy on long-term transition is needed to provide confidence to automobile manufacturers to set up (or modify) their manufacturing facilities. Lack of a clear policy, for instance, the future of subsidies and conditions set up under FAME 2 is making it difficult for large manufacturers to commit to long-term transition plans that require substantial capital investments

Green Buildings

Key Drivers

- **Real estate industry is primed to undergo transition**
 - Increasing government focus on affordable housing (Housing for All mission), having granted it infrastructure status⁸⁹
 - Rising urban migration and economic growth driving demand for residential and commercial space
 - Regulatory reforms: Goods and Services Tax (GST) and Real Estate Regulation Act (RERA)
- **Large part of the housing stock is yet to be built** with urban and rural housing shortage at 19 million⁹⁰ and 44 million⁹¹, respectively. Green buildings combine the prospect of sustainable development with resource efficiencies for India
- **Early signals from significant growth in recent years.** The registered green building space reached 6.3 billion sq ft, having more than trebled between 2014 and 2018 and further expected to touch 10 billion sq ft by 2022⁹²
- **Subsidy available** under Pradhan Mantri Awas Yojana (Urban), PMAY (U) scheme that can significantly bring down the interest component for a borrower

⁸⁴ https://niti.gov.in/writereaddata/files/document_publication/RMI_India_Report_web.pdf

⁸⁵ <http://pib.nic.in/newsite/PrintRelease.aspx?relid=102799>

⁸⁶ <https://data.worldbank.org/indicator/EN.CO2.TRAN.ZS?locations=IN>

⁸⁷ https://energypolicy.columbia.edu/sites/default/files/file-uploads/EV_ChargingChina-CGEP_Report_Final.pdf

⁸⁸ <https://www.ey.com/Publication/vwLUAssets/ey-electrifying-india-building-blocks-for-a-sustainable-ev-ecosystem/%24File/ey-electrifying-india-building-blocks-for-a-sustainable-ev-ecosystem.pdf>

⁸⁹ <http://pib.nic.in/newsite/PrintRelease.aspx?relid=176165>

⁹⁰ <http://www.nbo.nic.in/Images/PDF/urban-housing-shortage.pdf>

⁹¹ http://planningcommission.nic.in/aboutus/committee/wrkgrp12/rd/wgrep_iay.pdf

⁹² https://igbc.in/igbc/html_pdfs/IGBC_Annual_Report_2017_2018.pdf

Challenges
• End-consumer demand challenges: Lack of public awareness around green buildings, limited preference for sustainable building materials (like perforated bricks or hollow blocks), higher (real or perceived) first costs (i.e., cost for construction) and low client demand are identified as the biggest barriers to green building activity in India⁹³ • Demand is higher from the commercial (office) space with the government focus on increasing energy efficiency in commercial spaces⁹⁴, whereas similar regulatory focus is lacking on the residential side where massive development is underway
Business characteristics and financing mechanisms
• Primarily funded through housing loans from banks and NBFCs • Incremental capital investment in green buildings has come down also bringing down the payback period, and removing the argument of 'significant' additional costs being incurred to make a building green (incremental cost ranged between 15-18% in early 2000s that was less than 2% in 2015⁹⁵) • To promote green uptake from residential sector, linking of mortgage costs to green ratings (lower cost for green rated homes) and allowing a raise in eligibility limit for borrowers seeking to finance green homes can help expand demand
Organic Farming
Key drivers
• Increasing health awareness – Consumers are becoming aware of the food safety and environmental impact of tradition farming • Rising disposable income – Higher disposable income allows consumers to spend high-priced nutrient, safe, and environmentally friendly organic foods • Change in food habits – Indian consumers have started giving importance to nutrient content and quality of food which was earlier neglected • Support from the Government - Financial assistance and technical support from the Government is available under various schemes such as National Mission for Sustainable Agriculture (NMSA), Mission for Integrated Development of Horticulture (MIDH), and Rashtriya Krishi • Availability of right technology – Availability of software solutions, internet of things, and solar-powered electricity for storing organic foods in remote areas. Technology allows to gauge the quality of output and mitigate traceability challenge
Challenges
• Lengthy procedure and expensive certification cost – Farmers need a verification agent to label the foods as organic. The procedure is lengthy since the verification must undertake due diligence measure before giving certificates. The cost of certification is also expensive for small and marginal farmers • Lack of standardization of certificates – Standards are not uniform across different certification agencies, which requires a farmer to get certificate from multiple agencies in case the farmer produce multiple organic products • High cost of farming in initial years – As land is not fit for organic farming, yield is low in the initial years, cost per unit of output increases in the initial years • Limited awareness among consumers – Consumers are not aware of benefits of organic farming as market promotion is limited. This is limiting the growth of organic food sales • High cost of organic food – High certification, labelling, training, and logistic (per unit basis) makes organic farming expensive than conventional farming
Business characteristics and financing mechanisms
• Premium Price of products – only targeting a niche consumer group aware of benefits of organic foods, having high disposable income, and willing to spend higher amount on healthy foods • Higher labour cost and lower yield during conversion years – High labour force required to make the land fit for organic farming and lower yield due to transition from conventional to organic farming • Higher operating expenses – Need of certification increases operating expenses and high organic input cost as conventional fertilizers is not used in organic farming • Medium to long investment horizon (3 years transition period for certification and making land fit for organic farming)

⁹³ <https://www.worldgbc.org/sites/default/files/World%20Green%20Building%20Trends%202018%20SMR%20FINAL%2010-11.pdf>

⁹⁴ Energy Conservation Building Code (ECBC) sets minimum energy standards for new commercial buildings

⁹⁵ https://igbc.in/igbc/html_pdfs/aboutGBC/CII%20IGBC%20Dossier%20on%205%20Billion%20sq.ft%20of%20green%20building%20footprint%20.pdf

• Medium- and long-term upfront capital for land conversion • Higher working capital to cover higher operating expenses • Banks and NABARD are the suitable low-cost medium and long-term debt and working capital financing
Agroforestry
Key drivers
• Rising demand of agroforestry products such as plywood, timber, and pulp • Alternative source of income for farmers in addition to farming • Government support for agroforestry since it increases farmer income, generates employment, and enhances the ecosystem under various policy initiatives such as Planning Commission Task Force on Greening India 2001, National Bamboo Mission 2002, and Green India Mission 2010
Challenges
• Restrictive regulation on harvesting and transporting of agroforestry products such as obtaining permits for harvesting and transportation from different government agencies • Price volatility of agroforestry products such as wood, timber, and pulp prices • Unorganized market (no price discovery mechanism) – farmers don't get the due price since they don't have direct access to market • Lack of good quality planting material such as improved seed varieties and clones • Lack of institutional finance and insurance coverage
Business characteristics and financing mechanisms
• Medium to long investment horizon – There is a long-time (5 to 25 years) gap between plantation and harvesting of agroforestry products • High working capital requirement (mostly labour cost) between plantation and harvesting • Risk of high losses due to theft and natural calamities such as flood, drought, and storm • Long term soft loans for growing trees and incurring labour cost to protect trees against risks such as theft • Grants to conduct capacity development programs and subsidize high quality plants materials • Subsidized insurance coverage against losses • NABARD can offer long term soft loans to cover upfront and recurring cost • Budgetary outlays – To subsidize insurance cost and high-quality plan materials
Wastewater
Key drivers
• Shrinking fresh water sources and water scarcity • Increasing demand from industries and commercial establishment • Growing urbanization generates higher amount of waste water in cities with inadequate wastewater treatment plan • Government policy and support under Swachha Bharat Mission and Smart City programme
Challenges
• Subsidized water price makes wastewater treatment plan commercial infeasible • Poor financial health of urban authorities does not allow them to set up wastewater treatment plan • Poor contractual agreement between urban authorities and private developer doesn't give confidence to financiers to provide capital to set up wastewater projects
Business characteristics and financing mechanisms
• Capital intensive business (for civil construction, plant, building, etc.) • Substantial operating and maintenance cost • Long investment horizon – Around 15 years (break even period – 3 to 8 years) • Economically unviable on pure commercial basis; profitability depends on grants, customer base, and additional water availability • Financing depends on type of business model: Privately owned model needs long term commercial capital for a longer period while government owned model needs working capital to undertake O&M activity • Budgetary outlay to cover a portion of upfront cost as wastewater project is not commercially viable • Banks can be directed to provide low cost debt capital to private sector

Municipal Solid Waste (MSW)	
Key drivers	
- MSW is a major environmental problem in metropolitan cities, for example, pollution from burning of solid waste. There are growing concerns over the impact of MSW on human health, environment, and socio-economic well-being - Favourable support from the Government under various policy measures such as Swachh Bharat, Smart City program	
Challenges	
- The poor financial health of urban authorities, which does not allow them to undertake this MSW projects Lack of financial feasibility – Cash flow generation from the project is not enough to cover the financial cost Lack of capacity – local authorities don't have adequate and skilled manpower for effective waste management Lower user charges – As low as INR 20 to INR 100 per month per household	
Business characteristics and financing mechanisms	
Capital intensive – Need to develop transfer station, waste processing facility, and landfill which requires heavy upfront capital High operating cost – Incurred on the collection, transportation, and cleaning of solid waste Economically unviable on a pure commercial basis as user charges are low and there is a limited avenue of generating additional income. This makes the project entirely dependent on public finances - Long term and low-cost capital to set up the facility, and working capital to cover operating expenses Government can fund the project on annuity basis to make the project financially viable; low cost of capital can reduce the annuity cost of the project Government financing can cover a portion of upfront cost to reduce the riskiness of the project (developer of the project) Banks can provide low-cost debt capital, and the private sector can bring in required equity capital; the cost of debt and equity capital depends on the commercial viability of the project and contractual commitment of the government	
Air Pollution	
Key drivers	
Growing concerns over the impact of air pollution on health – 140 million people breathing polluted air which is 10 times the WHO prescribed safe limit and 1.2 million deaths due to air pollution in India - Growing demands for air filter owing to rapid industrialization, the vehicular market in particular Increasing compliance standards, for example, Bharat stage standards for a commercial vehicle Economic losses - 3% loss to the GDP due to air pollution especially health-related cost	
Challenges	
Pollution norms are frequently violated since regulatory inspections of plants are not frequent Access to emissions records is generally restricted to the regulator, so there is limited public pressure on the government to come with stringent measures to control air pollution High compliance cost for the private sector – The capital and operating cost of air pollution controlling equipment is high Inadequate policy measures – The recently launched of new Programme (National Clean Air Programme, 2019) is lacking on multiple fronts: - No clarity on funding provision – a paltry INR 300crore has been allocated - No assessment was done on the financial needs of the mitigation action plan - Lack of clarity on resources required to air pollution mitigation actions. - No suitable mechanism to finance the projects or technologies for combating air pollution	
Business characteristics and financing mechanisms	
- Manufacturing of air pollution controlling equipment is capital intensive - The long investment horizon for the manufacturer, project developer (electric bus, waste to energy and solid waste management projects for example), and user (Industrial buyers) Not a cash flow generating business for industrial and commercial users but a compliance cost - The need for public funding for, for example: - Subsidizing electric bus to make it commercially viable - Purchasing of dust-pressing equipment - Monetary benefits to farmers not to burn crops - Purchasing air control monitoring equipment	

○ Mass purchase of certain air pollution control equipment when a large section of society is not able to purchase ○ Concessional capital to undertake R&D to invent cost-effective air pollution control equipment ○ Subsidized loans to industrial sectors to buy air-pollution controlling equipment
Climate adaptation
Key drivers
• The high density of economic activity and population in India • India, being a tropical country, crop yield is vulnerable to warming • High dependence on monsoon for agriculture – Climate change affects the rain pattern and consequently adversely affecting agriculture • Being the 2nd largest populous country and home to 2/3rd of the world's poor, social and economic cost due to climate change is high
Challenges
• Historically, climate adaptation is the mandate of the Government as climate adaptation is a public good • Poor policy and the institutional environment – Concerns over contractual enforcement and the rule of law discourage private investment on climate adaptation • Uncertain value proposition – Lack of certainty on benefits of investing in climate adaptation as there is no historical record • High upfront cost – Most of the climate adaptation projects are capital intensive
Business characteristics and financing mechanisms
• Long investment horizon – Benefits of climate adaptation project yield benefit over a long time • Long-term debt at a lower rate for capital-intensive projects to make it economically viable • Risky and growth capital for products/services with adaptation benefits; for example, investment in disaster warning systems, hygienic products, and developing climate adaptation drugs • Concessional capital for a commercially infeasible project such as rural water supply, sanitation

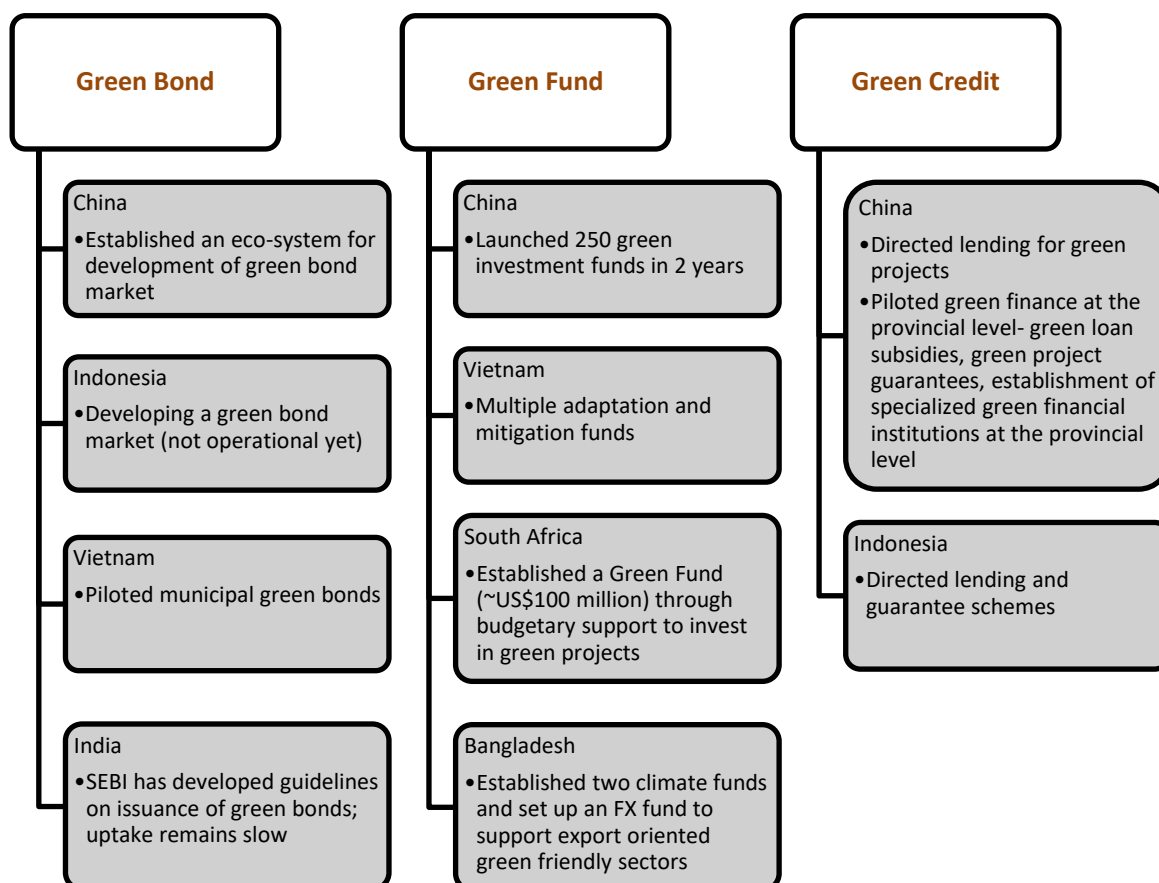
ACCELERATING TRANSFORMATIVE ACTION



6. Green Finance: Actions to Accelerate Transformation

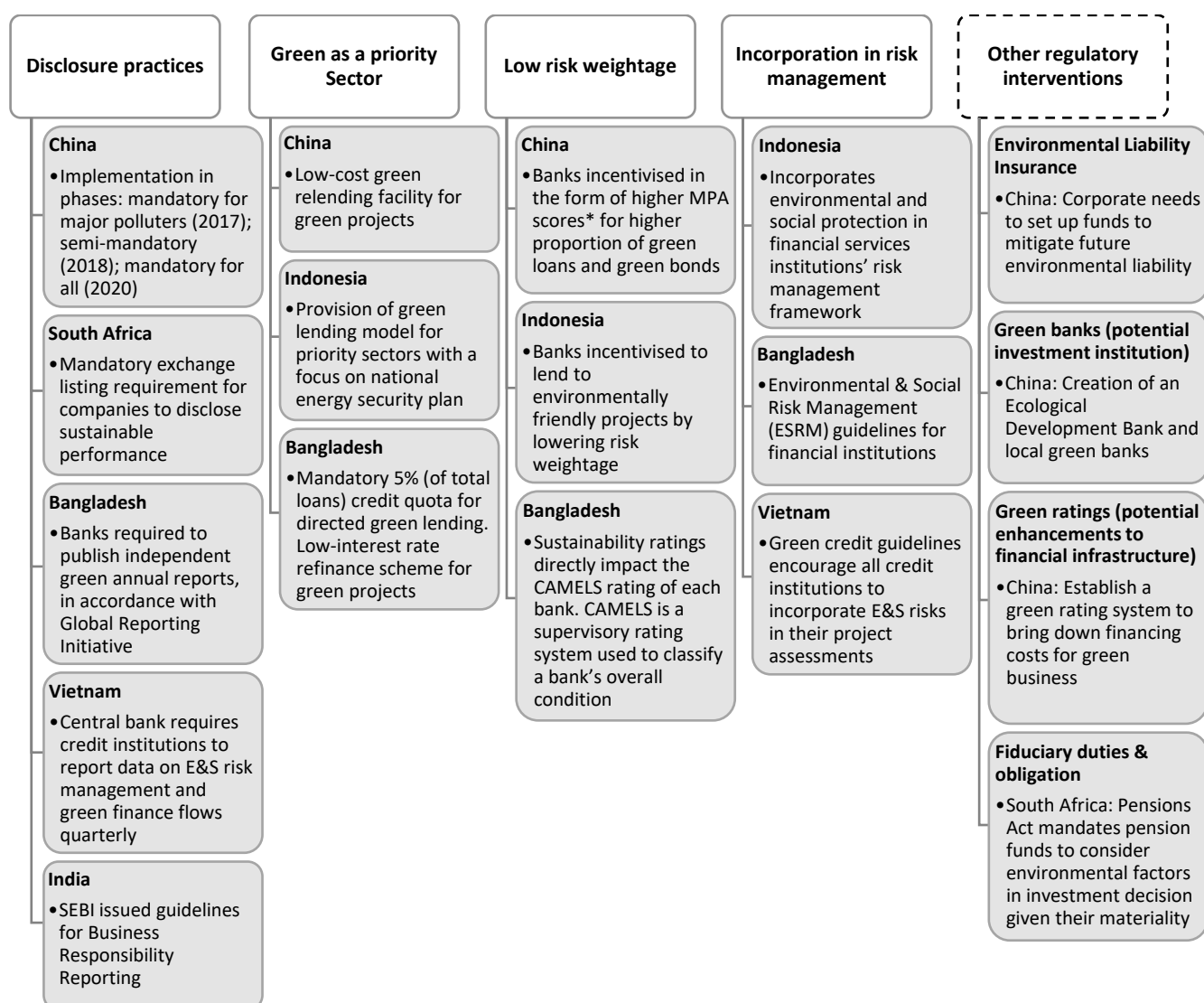
Having defined green finance with respect to application, usage, and sectors, it is equally important to reflect on the approaches to enhance capital flows for green investments. An overview of some key international policy and regulatory interventions⁹⁶ to catalyze green financing are presented below.

Figure 17: International perspectives on policy interventions in green finance



⁹⁶ High level summary of the same is provided in Annexure 4

Figure 18: International perspectives on regulatory interventions in green finance



* Macro Prudential Assessment (MPA) system introduced by China's Central Bank in 2016 to assess banks' capital adequacy ratios, assets and liabilities, liquidity, and risk

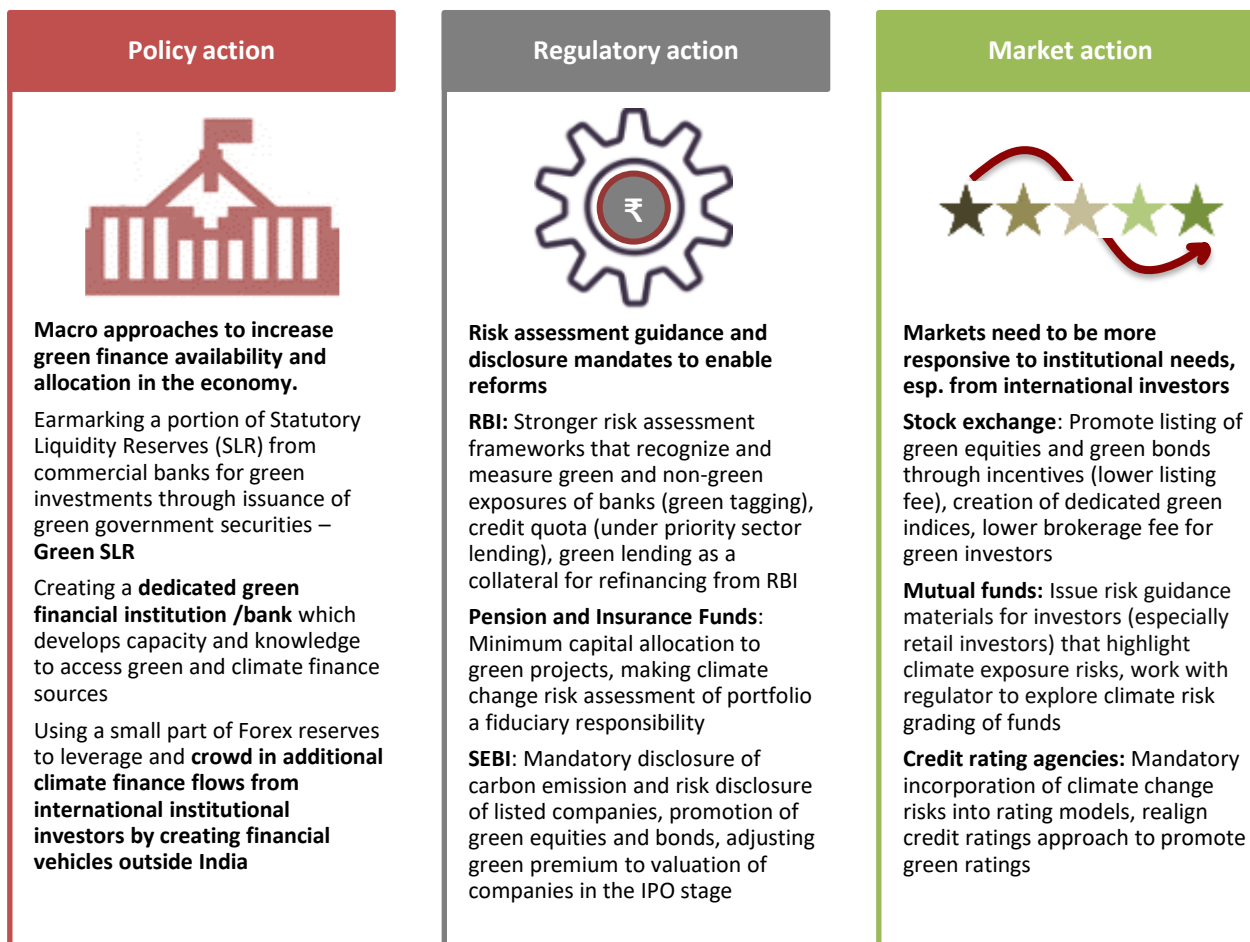
Opportunities and actions to enable green finance uptake within the financial sector participants

Implications and potential actions on the Indian front

Given the carbon emitting and polluting nature of certain activities wherein fully internalizing negative externalities is difficult, there is a need to correct this market failure by designing financial mechanisms to reward green investment. The financial mechanism could be created through blended financing (blending public capital with private capital to comfort private investors), providing better terms of credit (e.g. credit quota, subsidized interest rate, credit enhancement), and regulatory support (e.g. lower risk weightage to green lending, minimum investment in green sector).

Based on a bottom-up analysis of the impact of a green finance taxonomy on the investment and lending environment and mapping of sector-level investment requirements (in line with the NDCs) through 2030, this study presents some prospective interventions that can help evolve a transformative green finance environment in the country.

Figure 19: Policy and regulatory interventions to catalyze green finance at scale



India needs to undertake strong steps to guide its economic growth in the coming decades. The financial sector, with its power and ability to direct capital flows, is central to this shift. As global political pressures increasingly hold all nations accountable to protecting the natural habitat, a transition is being observed in how growth is viewed through the lens of environmental objectives. As covered in this study, many developing and developed nations are making significant strides in setting brave targets, holding their policy and financial institutions accountable to making progress beyond 2030 goals by aiming at targets such as carbon neutrality for 2050. While creating a green finance taxonomy is only a first step to this longer-term endeavor, it is a significant one that can ensure “growth” and “green” are emphasized in parallel to foster in a modern era of “green growth”.

ANNEXURES

Annexure 1: List of Stakeholders Engaged

The table below highlights some of the key stakeholders: public and private banks, NBFCs, regulatory bodies, and institutional investors that were engaged for consultation.

Contact Name	Designation	Name of the organization
Amarendra Mohan	Senior Program Director	Centre for Advanced Financial Research and Learning (CAFRAL)
Anand Bhounik	Managing Director and Chief Analytical Officer	India Ratings
Anita Marangoly George	Executive Vice-President Growth Markets	CDPQ India
Aparajit Pandey	Programme Director (Climate, Energy and Resources)	Observer Research Foundation (ORF)
Arun Srinivasan	EVP & Head – Fixed Income	ICICI Prudential
Dinesh Pruthi	Deputy General Manager (Sustainability)	State Bank of India
Elodie Feller	Investment Programme Lead	UNEP Finance Initiative
Frédéric Asseline	Principal Climate Change Specialist	Asian Development Bank (ADB)
Jaisingh Dhumal	Chief Manager & Head, Technology Finance Group	ICICI Bank
K.P. Baiju	Deputy General Manager	State Bank of India
Kristina Alnes	Senior Advisor	Center for International Climate Research (CICERO)
Lakshmi Iyer	Chief Investment Officer (Debt)	Kotak Mahindra Asset Management Co. Ltd.
Mona Kachhwaha	Director Investments	Caspian
Pawan Singh	MD & CEO	PTC India Financial Services
Pravin Kutumbe	Member (Finance and Investment)	Insurance Regulatory and Development Authority of India (IRDAI)
R R Rashmi	Distinguished Fellow, Earth Science and Climate Change	TERI
Rajasree Ray	Economic Adviser, Deptt of Economic Affairs	Ministry of Finance
Rajeev Kumar Gupta	Deputy General Manager	India Infrastructure Finance Company Limited (IIFCL)
Rajesh Kumar Miglani	Senior Climate Business Specialist	International Finance Corporation (IFC)
Rajnish Kadambar	Senior Environment Risk Specialist	IDFC Bank
Reema Sen	Managing Partner	RSSG BFSI Advisory
Satish Mandhana	Managing Director & Head of Investments	EverSource Capital
Satyajit Suri	Chief Operating Officer	Raintree Ventures
Shamik Roy	SVP & Head DCM	ICICI Securities
Shankar Pande	Chief General Manager	National Bank for Agriculture and Rural Development (NABARD)
Sudipto Basu	Deputy General Manager, Project Finance	ICICI Bank
Supratim Bandyopadhyay	Member (Finance)	Pension Fund Regulatory and Development Authority (PFRDA)
Vidya Iyer	AVP & Fund Manager - Fixed Income	ICICI Prudential
Vishal Ambani	Senior Vice President, Project and Structured Finance	Mizuho Bank

Annexure 2: Expert Committee

Name	Designation	Name of the organization
A. Damodaran	Professor, Economics & Social Sciences	IIM Bangalore
Amarendra Mohan	Senior Program Director	CAFRAL
Atul Bagai	Head	UN Environment Country Office, India
Rathin Roy	Director	National Institute of Public Finance & Policy
Runa Sarkar	Professor, Economics Group	IIM Calcutta
Sharmila Chavaly	Principal Financial Advisor	Northern Railway

Annexure 3: Country Selection Framework

The country validation framework maps key parameters relating to exposure to climate externalities (risks) and future potential to respond to climate risks (financial resources), and compares these to India to identify a peer set that shares similar challenges and opportunities. Human Development Index⁹⁷ (rank): Countries with low levels of human development (higher ranking) generally have low emissions but are often the most vulnerable to climate risks. We use the following set of indicators to compare the peer set.

- Vulnerability to Climate change⁹⁸ (rank): Intergovernmental Panel on Climate Change (IPCC) defines Vulnerability as “the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity”. A lower score denotes higher vulnerability.
- GDP per capita⁹⁹, current prices in PPP in US\$) 2017E: Higher per capita denotes better capacity to absorb transition costs towards a low carbon economy.
- 5-year average GDP growth % (2019E-23E): Higher growth rates, if unmanaged, may create greater strain on economic resources.
- % share in global CO₂ & GHG emissions¹⁰⁰ (kton CO₂), 2016: Indicator defines the existing state of vulnerability in climate-associated risks. Countries with higher emissions would require a very urgent and rapid action towards reducing their greenhouse gas emissions.
- CO₂ & GHG emissions per economic output¹⁰¹ (kg per PPP \$ of GDP): Reducing CO₂ emissions per unit of GDP (known as carbon intensity) is a key metric in the intended nationally determined contribution (INDC) promised by many countries. India has promised to reduce the emission intensity by 33-35% from 2005 levels by the year 2030.

Each indicator is aligned to a uniform scale of 1 to 5 (with 1 being the lowest score). Each indicator is allocated a specific score based on this rating scale. Individual scores (under each indicator) are then weighted and summed up to arrive at a final weighted score for each country. The assignment of weights is dependent on relative importance of the indicator in prompting a climate action from a country.

Scoring metric	HDI (Rank) score	Vulnerability to Climate change (Rank) score	GDP per capita score	% GDP growth score	Share in global CO ₂ & GHG emissions score	CO ₂ & GHG per \$ GDP score
	>150 = 5	Rank 1-10 = 5	>50K = 5	>6% = 5	>10% = 5	>0.4 = 5
	100-150 = 4	Rank 11-20 = 4	25-50K = 4	4-6% = 4	2-10% = 4	0.3-0.4 = 4
	60-100 = 3	Rank 21-35 = 3	15-25K = 3	2-4% = 3	1%-2% = 3	0.2-0.3 = 3
	20-60 = 2	Rank 36-50 = 2	5-15K = 2	0-2% = 2	0.5%-1% = 2	0.1-0.2 = 2
	<20 = 1	Rank over 50 = 1	<5K = 1	Less than 0% (negative growth) = 1	less than 0.5% = 1	less than 0.1 = 1
WEIGHTS	20%	20%	10%	20%	10%	20%

⁹⁷ HDI is a composite statistic of life expectancy, education, and income per capita indicators. A country scores higher HDI when the life expectancy at birth is longer, the education period is longer, and the income per capita is higher.

⁹⁸ According to HSBC Global Research report: Fragile Planet.

⁹⁹ IMF World Economic Outlook, 2018

¹⁰⁰ Fossil CO₂ & GHG emissions of all world countries, 2017: EDGAR (Emissions Database for Global Atmospheric Research)

¹⁰¹ Calculates the amount of CO₂ & GHG emissions (expected to be) released to produce every additional dollar of GDP

Country Comparables for India

Country	Human Development Index (Rank)	HDI Score	Vulnerability to Climate change (Rank)	Vulnerability to Climate change (Rank) Score	GDP per capita, current prices in PPP in US\$, 2017E	GDP per capita Score	5-year average GDP growth% (2019E-23E)	% GDP growth Score	% share of CO ₂ & GHG emissions globally, 2016	Share of global emissions Score	CO ₂ & GHG emissions per economic output (kg per PPP \$ of GDP)	Emissions per \$ GDP Score	WEIGHTED SCORE
India	130	4	1	5	7,194	2	7.6	5	7.09%	4	0.267	3	4.0
China	86	3	26	3	16,696	3	6.0	5	29.18%	5	0.450	5	4.0
Vietnam	116	4	14	4	6,928	2	6.5	5	0.58%	2	0.318	4	3.8
South Africa	113	4	10	5	13,573	2	1.7	2	1.09%	3	0.509	5	3.7
Bangladesh	136	4	4	5	4,230	1	7.0	5	0.21%	1	0.108	2	3.4
Indonesia	116	4	17	4	12,404	2	5.3	4	1.48%	3	0.163	2	3.3
Mexico	74	3	8	5	19,938	3	2.8	3	1.23%	3	0.179	2	3.2
Russia	49	2	35	3	27,893	4	1.5	2	4.65%	4	0.414	5	3.2
Thailand	83	3	11	4	17,894	3	3.6	3	0.76%	2	0.219	3	3.1
Morocco	123	4	16	4	8,568	2	4.0	4	0.16%	1	0.193	2	3.1
Brazil	79	3	19	4	15,637	3	2.3	3	1.29%	3	0.143	2	3.0
Malaysia	57	2	21	3	29,144	4	4.8	4	0.74%	2	0.285	3	3.0
Nigeria	157	5	15	4	5,941	2	2.4	3	0.23%	1	0.074	1	2.9
Turkey	64	3	48	2	27,049	4	2.0	3	1.03%	3	0.168	2	2.7
United States	13	1	39	2	59,792	5	1.8	2	14.02%	5	0.257	3	2.6
South Korea	22	2	57	1	39,548	4	2.7	3	1.69%	3	0.297	3	2.5
Japan	19	1	42	2	42,942	4	0.6	2	3.47%	4	0.228	3	2.4
United Kingdom	14	1	31	3	44,292	4	1.6	2	1.03%	3	0.126	2	2.3
France	24	2	43	2	44,081	4	1.6	2	0.93%	2	0.116	2	2.2
Germany	5	1	54	1	50,804	5	1.5	2	2.17%	4	0.185	2	2.1
Singapore	9	1	52	1	94,105	5	2.6	3	0.14%	1	0.092	1	1.8
Switzerland	2	1	60	1	62,125	5	1.7	2	0.11%	1	0.076	1	1.6
EU					37,438	4	2.5	3	80.87%	5	0.282	3	
G20					41,176	4	1.8	2	9.60%	4	0.163	2	

Annexure 4: Mapping the International Experiences

	Bangladesh	Vietnam	China	Indonesia	South Africa	EU
Country Drivers/Challenges	- Climate change vulnerabilities: Countries like Bangladesh¹⁰², India, Pakistan and Sri Lanka at high risk. Low-lying Bangladesh faces higher risk of flooding, cyclones, having severe hotspots¹⁰³. Most of the population (163mn) located in severe (16%) and moderate (66%) hotspots - NDC¹⁰⁴: ↓5% (unconditional), up to ↓15% (conditional) emissions intensity from Business as Usual (BAU) levels by 2030 in power, transport, and industry sectors	- Continued reliance on natural resources and the competing target to reduce strain on land use and biodiversity in a growing economy - NDC: ↓8% (unconditional), up to ↓25% (conditional) in GHG emissions by 2030 from BAU. Includes 20%↓ target for emissions intensity (per unit GDP) and 45%↑ on forest cover. NDC covers Energy, Agriculture, Land Use, Land Use Change and Forestry (LULUCF) and Waste	- Population Size, staggering economic growth, rapid industrialization and urbanization have strained natural ecosystems. - Country heavily relies on coal (62% of energy mix in 2016). Environmental hazards from air, water and soil pollution pose significant risk - NDC: reduce CO₂ emissions per unit of GDP by 60% to 65% from the 2005 level. Focus on energy, iron & steel, chemical, and transportation	- Extensive tropical rainforests with high biodiversity at risk - Extreme vulnerability to natural disasters (with increased frequency being a direct consequence of climate change) - NDC: ↓29% (unconditional) up to ↓41% (conditional) in GHG emission by 2030 from BAU. - NDC focus on Land and forest restoration and increasing renewable energy mix	- Developmental economy with poverty elimination and eradication of inequality identified as two key priorities. Climate policy action towards low carbon transition facing these overriding priorities - Acute energy challenges from coal reliance (90% share in energy mix) - NDC: Reduction in emissions (unconditional) by -26% to +12% by 2030 from 2010 level excl. LULUCF (Land use, land-use change, and forestry)¹⁰⁵	- EU 2030 climate and energy targets: ↓40% in GHG emissions compared to 1990 levels, share of renewable energy ↑27%, energy savings target of 27% compared to BAU - EU requires additional EUR 180billion annually to meet 2030 climate and energy targets (EIB estimates) - Filling the investment gap requires increased private sector participation
Goals & Investment Potential ¹⁰⁶	- Protect environmental degradation - Ensure sustainable banking practices to promote resource efficiency and low carbon industries - Climate-smart investment potential by 2016-30 (IFC): US\$ 138billion - Green buildings: US\$ 113billion - Transport infrastructure: US\$ 5billion - Renewable energy: US\$ 17billion	- Greening the sectors and promoting resource efficiency - Improve living standards and create environmentally friendly lifestyle - Climate-smart investment potential by 2016-30 (IFC): US\$ 753billion - Transport infrastructure: US\$ 571billion - Renewable energy (solar, hydro): US\$ 59billion - Green buildings: US\$ 80billion	- Environmental pollution control - Protecting the environment by changing China's structure of the economy and conserving energy and resources - Climate-smart investment potential by 2016-30 (IFC): US\$ 14.9trillion - Transport infrastructure: US\$ 725billion - Renewable energy (solar, hydro): US\$ 773billion - Green buildings: US\$ 12.9trillion	- Making the financial sector resilient, competitive and sustainable - Driving finances into sustainable businesses - environmentally friendly, economic growth and employment generating, and inclusive - Climate-smart investment potential by 2016-30 (IFC): US\$ 274billion - Transport infrastructure: US\$ 20billion - Renewable energy (solar, hydro): US\$ 23billion - Green buildings: US\$ 209billion	- Increase share of renewable mix in energy mix - Efficient usage of natural resources, particularly water - Preserving biodiversity and ecosystem - Pollution control - Climate-smart investment potential by 2016-30 (IFC): US\$ 588billion	- Mobilize private capital towards green and sustainable investments - Provide thrust for further action in areas such as labels, disclosure, standards and changes to prudential rules - As per EIB, EU would need an additional funding of EUR 270billion (US\$ 307billion) annually to meet the sustainable development goals related to the energy, transport, water and the waste sector

¹⁰² South Asia's Hotspots. The Impact of Temperature and Precipitation Changes on Living Standards

¹⁰³ The report defines a *hotspot* as a location where changes in average weather will have a negative effect on living standards.

¹⁰⁴ An "unconditional contribution" is what countries could implement without any conditions and based on their own resources and capabilities. A "conditional contribution" is one that countries would undertake if international means of support are provided, or other conditions are met. Source: Pocket Guide To NDCs under the UNFCCC

¹⁰⁵ <https://climateactiontracker.org/countries/south-africa/pledges-and-targets/>

¹⁰⁶ https://www.ifc.org/wps/wcm/connect/59260145-ec2e-40de-97e6-3aa78b82b3c9/3503-IFC-Climate_Investment_Opportunity-Report-Dec-FINAL.pdf?MOD=AJPERES&CVID=IBLd6Xq

Annexure 4: Mapping the International Experiences

	Bangladesh	Vietnam	China	Indonesia	South Africa	EU
Approach	- Green guidelines aligned to overall Climate Change Strategy and Action Plan. The central bank that issued Green Banking Guidelines is the primary enabler for driving green banking - Soft start with issuance of CSR guidelines (voluntary) and RE refinance schemes later built on with Green Banking policy and Environmental & Social Risk Management (mandatory) in credit risk assessment by Banks and FIs	- Established National Green Growth Strategy (2011-20) in 2009 to facilitate low carbon transition (8-10% lower emissions), greening production (efficient use of natural resources, green agriculture, green industry, pollution prevention), greening lifestyles (wastewater, urban transportation and green urban standards) - Green banking to play a key role. Central bank issued Catalogue to define green sectors - Capital markets regulator driving company sustainability reporting	- Green finance integrated with other economic policies - Set up Green Finance Taskforce by People's Bank of China (PBOC); "Establishing a Green Financial System" made an official mandate from Central Party Committee and State Council - Green finance definition with multiple levels– defines sectors, sub-sectors and project activity covering eligible projects with guidelines and description - Green finance defined in two dimensions: Green Bond and Green Credit Guidelines	- Economic development plan integrated with sustainable development framework. Green finance aspect comes under "Indonesian Roadmap for Sustainable Finance 2015-2019" by Financial Services Authority - Green finance definition covers climate change mitigation, resource efficiency, protection and natural capital and biodiversity, as well as climate change adaption - Policy on green bond issuance to invite participation from private players as also provide clear guidance	- Initial steps undertaken but as yet no broader green finance definition - Stock Exchange adopted Green Bond Principles (GBP) from International Capital Market Association (ICMA) as guidelines for green bond listings. Green defined at 2 levels: sectors and activities Green project categories under GBP include: climate change adaptation, climate changes mitigation, natural resource conservation, biodiversity conservation, and pollution prevention and control	- Sustainable taxonomy proposed in 2018, planned rollout in 2020-22. Plan to embed sustainability taxonomy in EU law - Taxonomy focuses on defining environmentally sustainable activities; future iterations may include social - Sectoral approach: mitigation, adaptation, water protection, waste recycling, pollution and healthy ecosystems - Develop labelling standards for financial products called EU Ecolabel and prospectus for green bonds in 2019
Unique levers	- Green credit (directed lending and refinance schemes) - Sector-specific guidelines and checklists - E&S risk management - Introduced as voluntary guidelines that later took shape as mandatory reporting	- Sector-specific guidelines and checklists - Incorporation in risk management - Granular green selection guidelines - Standardized reporting	- Green credit (directed lending and refinance schemes) - Granular green guidelines - Green Finance Pilot programs in provinces to encourage local banks to place greater emphasis on green lending - Standardized reporting	- Low risk weightage to green - Incorporation in risk management	Climate change risk management in investment decision making of pension funds	- Provide standards, and sustainability benchmarks (EU Ecolabel) - Standardized reporting (to be implemented)
Performance* & Tracking	~US\$ 6.56billion disbursed in green finance (FY17); 77.7% from private commercial banks. Green credit 7.1% of total FY17 credit¹⁰⁷ - Near 100% compliance by banks and FIs in setting own Green Banking Policy Guidelines - Bank reporting on green lending, carbon footprint and environment-related CSR activity flow into CAMELS rating¹⁰⁸	~US\$ 4.7million as of June 2017 disbursed towards green finance. 1.7% of total outstanding credit provided for green finance in 2017¹⁰⁹ - Quarterly reporting by banks on E&S risk management and green finance flows to central bank	- US\$ 1.37trillion (10% of all loans) in green credit (2019)¹¹⁰. Green credit >95% of green financing¹¹¹ - USD 289bn of green bonds outstanding (2018)¹¹² - Better asset quality: Non-performing loans (NPL) for green credit at 0.37% vs. 0.87% average NPL of major banks¹¹³	- Country issued its first sovereign green bond of US\$ 1.25billion in 2018 - Banks required to develop sustainable financing action plans and report green financing	Listed companies have to integrate sustainability reporting with financial reporting (or provide reason for non-compliance)	Disclosures to be aligned based on specifications by the Commission

*Performance numbers unavailable where green policy, definition was implemented recently or it is yet to be implemented

¹⁰⁷ BDT 548.6billion of green credit vs. BDT 7,723.40billion of outstanding bank credit in FY17

¹⁰⁸ CAMELS is a supervisory rating system used to classify a bank's overall condition

¹⁰⁹ <https://vietnamnews.vn/society/482531/viet-nams-efforts-for-green-growth-need-more-active-moves.html#7DXzG4b2OT9WBjri.97>

¹¹⁰ Latest numbers from The People's Bank of China

¹¹¹ Lu, Z.W. and Tang, W.Q (2017) An Overview of China's Green Financial Market in 2017. <http://greenfinance.xinhua08.com/a/20180108/1744086.shtml>

¹¹² https://www.climatebonds.net/system/tdf/reports/china-sotm_cbi_ccdc_final_en260219.pdf?file=1&type=node&id=35798&force=1

¹¹³ Notes on the Green Credit Statistics Information Disclosure, CBRC

Annexure 5: International Green Finance Landscape at a Glance

	Bangladesh	Vietnam	China	Indonesia	EU	S. Africa**
Definition						
Climate finance	X	X				
Green finance	X	X	X			X
Sustainable finance				X	X	
ESG finance						
Focus of Green Finance definition/ Initiatives*						
Climate Mitigation	X	X	X	X	X	X
Climate Adaptation	X	X	X	X	X	
Pollution prevention and control			X	X	X	X
Natural resource preservation			X		X	X
Biodiversity			X	X	X	X
Sectors						
Alternative energy (incl. renewable and clean energy)	X	X	X	X	X	X
Energy efficiency	X	X	X	X	X	X
Biofuels (biogas, biomass)	X		X	X	X	
Green buildings	X		X	X		X
Clean water supply			X		X	X
Waste treatment/ management	X	X	X	X	X	X
Sustainable/clean transportation	X		X	X	X	X
Sustainable management of natural resources^	X	X	X	X	X	X
Carbon capture and storage					X	
Pollution prevention and control			X		X	X
Sustainable / Green Agriculture		X	X	X	X	
Green Tourism			X	X		
Resilience to climate change			X	X		
Recycling & Recyclable Product	X		X	X	X	X
Market instruments, Incentives						
Fiscal incentives			X	X		X
Climate fund(s)	X	X	X			X
Green credit	X	X	X	X		
Green bonds		X	X	X		
Refinance scheme(s)	X		X	X		

	Bangladesh	Vietnam	China	Indonesia	EU	S. Africa**
Insurance products (environmental liability)			X			
Carbon pricing mechanisms			X			
Loan Subsidies	X	X	X	X		
Lower risk weightage to green				X		
Green equity			X	X		
Credit guarantee			X			
Penalties			X	X		X
Disclosure			X	X		X
Implementation Agency						
Central bank	X	X	X	X		X
Stock exchange		X	X	X		X
Financial Services Regulator			X	X		X
Rating agency			X			
Banks and Financial Institutions	X	X	X	X		X
Insurance Regulator			X	X		
Pension Regulator						X
Other Financial Regulator(s)						
Unique levers						
Low risk weightage to green				X		
Credit Quotas	X					
Green Refinance / on-lending windows	X		X			
Sector-specific guidelines and checklists for high-risk sectors	X	X				
Incorporation in risk management	X	X		X		X
Granular green selection guidelines		X	X			

* Definition based on Green Bond Principles (GBP)

** Focus on green finance initiatives in case there is no country definition

^ Includes Sustainable land management, Bio-diversity and Sustainable forestry





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