CATALYZING GREEN FINANCE

A CONCEPT FOR LEVERAGING BLENDED FINANCE FOR GREEN DEVELOPMENT

ASIAN DEVELOPMENT BANK

50 YEARS

ADB

CATALYZING GREEN FINANCE

A CONCEPT FOR LEVERAGING BLENDED FINANCE FOR GREEN DEVELOPMENT

ASIAN DEVELOPMENT BANK

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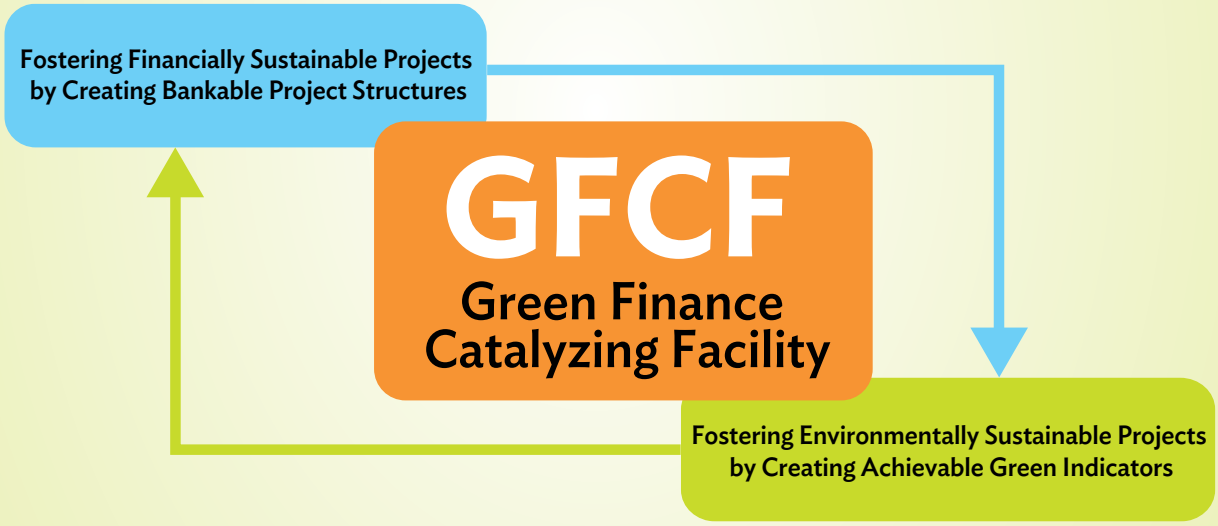
THE GREEN FINANCE CATALYZING FACILITY

Proposing a Conceptual Approach for Governments to Utilize for Unlocking Private and Commercial Finance into Green Projects

Leveraging 1...2...3



Key Messages from Reviewers

Simon Zadek, *co-director, United Nations Environment Programme Inquiry into the Design of a Sustainable Financial System, United Nations Environment Programme, Geneva, Switzerland*

Scaling green finance is a precondition for aligning financial systems with long-term needs of the real economy, integrating environmental risks, opportunities, and policy imperatives in decisions that drive lending, investment, and insurance. Improving this alignment requires developments across the real economy, the use of public finance, and the financial system itself. The People's Republic of China (PRC) has taken international leadership, working closely with the United Nations Environment Programme, in establishing a policy framework for catalyzing green finance, adopted by the State Council in August 2016, at the same time that the importance of green finance was embraced at the G20 (grouping of 20 major world economies) Leaders' Summit in Hangzhou. Accelerating private green investment flows in the short- to medium-term require blending in public finance to secure public goods, such as environmental benefits, that will not be paid for by private capital. The extent of such subsidies will depend on the features of the potential investment, and a vehicle is required to effectively and efficiently differentiate such potentials and associate the design of appropriate financing instruments. The Green Finance Catalyzing Facility (GFCF) is just such a vehicle, providing a basis for assessing the merits of blended financing based on the value of such environmental and associated economic cobenefits, and so the optimal financing instrument that catalyzes green investments that would not otherwise happen.

Dr. Ma Jun, *chief economist, Research Bureau, The People's Bank of China; co-chair of G20 Green Finance Study Group, People's Republic of China*

Turning the commitments of the 2015 United Nations Climate Change Conference (COP21) into actions require the private sector's contribution in transitioning to a green global economy. The public sector currently has a number of levers to pull in catalyzing the private sector within green finance, but innovative and scalable solutions are needed to speed up the transition. The GFCF provides exactly such a lever, and is therefore an initiative that should be warmly welcomed. First, the GFCF's combination of simultaneously focusing on bankability as well as on green targets makes it both an advantageous tool for policy makers and also an attractive instrument for private investors. Second, the potential scalability of the GFCF provides the prerequisite for the initiative to have a long-term global impact. Third, the timing is right for the initiative since global financial markets are undergoing transformation toward a low-carbon economy. Consequently, the GFCF is a universally relevant concept. As the PRC has taken a leading role in green finance, both within its domestic policy framework as well as through the G20, the GFCF additionally provides a timely contribution to this process, with particular relevance as green finance rapidly expands and policy makers and investors seek new and innovative tools. As such, the GFCF has the potential to play a role in the green economy both within the PRC and globally.

Atul Joshi, *founder and chief executive officer (CEO) of Oyster Capital Group; former CEO and managing director, Fitch Ratings, India*

The concept of the GFCF proposed by the Asian Development Bank (ADB) is a much-needed thought piece for all development banks to consider, because all sovereign funds need to be leveraged for much greater impact and this concept is exactly in that direction. I am especially appreciative of the fact that while the GFCF concept proposes an initial simpler approach of leveraging concessional finance from government and development agencies for green projects, it also identifies the need for a more sophisticated approach to the actual raising of finance from other nongovernment sources through capital markets—this leveraging of scarce government funds for accessing large pension, insurance, and other funds is likely to be even more critical for countries and projects to implement in endeavoring to meet the massive finance needs for green development.

Peter Zaman, *partner, Reed Smith, Singapore*
In the battle for shifting our growth toward a low-carbon trajectory, time is not humanity's friend, with unaddressed gaps in funding of sustainable infrastructure within the time frame required to achieve the below 2°C objectives of the Paris Agreement, causing a high price to be paid by future generations. Effective and significant catalysts are required to speedily ramp-up the optionality and sophistication of our green financing toolkit and create the necessary facilitative environment to mobilize private and public sources of capital but, with the right leverage ratios, not the usual small-scale achievements. Overcoming limitations in financing techniques requires innovation in skills and visionary leadership. It is in that vein I welcome ADB's efforts in this publication and congratulate them for the output and content. **Providing a comprehensive route map for green financing**, the publication captures, in a digestible and informative manner, the key challenges that need to be overcome and brings together, in a single place, the disparate themes and solutions that have yet been captured by experts and commentators in the separate segments of their respective fields of finance. As the publication recognizes the solutions do not lie just in the fields of banking, capital markets, insurance, sustainability, law or accounting as applied in the context of private capital but also in the role of public finance, governmental policy, dynamic use of multilateral resources, and ultimately, cooperation across each and every one of the multiple sectors.

The vision of the GFCF is the right one and a necessary one and the publication articulates both the needs and suggests the possible steps required to deliver on that vision. As with all good ideas, the real challenge will lie in their conversion and implementation and additional work will be needed to adapt the GFCF model for smaller countries where, perhaps, a more intergovernmental joint or pooled effort will be required. The temptation to take the tried and well-trodden approach and simply establish new institutions to manage green funds raised must be resisted as also the often seen dragging back of initially innovative-institutions back into traditional approaches toward finance. To succeed the GFCF must take a different path, with the key being to recognize the limitations of skills, talent, and resources that inevitably cannot be possessed by one government organ, institution or financial sector, whether in the public or private sector. I humbly submit that, just as large corporations invest in research and development in order to invent the next product that will offer them success, the GFCF too must consider similar investments to create appropriate and timely bridging tools between market sectors to overcome current obstacles to growth in green finance. Thought leadership is required to bring together the right skill set for solving the right solution; a think tank if you will, but not one that produces papers, reports or academic documents, but produces financial products to ensure or facilitate bankability of green infrastructure projects and financing. The leaders of finance, in their respective fields with the necessary skills to jointly overcome these challenges, will have to be incentivized to work together. Their contribution cannot be expected to be altruistic and their devotion to the cause cannot be divorced from commercial realities. GFCF must be capable of attracting the best of the best to be at their best to meet the scale of the challenge. As with all big challenges, someone has to start somewhere and do something. To date, here has been a lot of that, on smaller scales in various fields of finance. The GFCF provides the means to grow that into something that can be transformative, impactful and, most importantly, at a scale needed to boost our chances in the battle against the consequences of climate change. I welcome the concept of the GFCF envisaged by this publication and invite its rapid implementation.

Dr. Arvind Mayaram, *former finance secretary of India; chairperson, CUTS Institute for Regulation and Competition (CIRC), India*

Green infrastructure costs more than traditional infrastructure. Therefore, the cost of delivery is higher on account of two factors: (i) the cost of intellectual property rights (IPR), as technologies are new and (ii) adaptation costs as most of the auxiliary and ancillary systems are designed around traditional technologies (for example evacuation systems for renewable energy). India's Viability Gap Finance (VGF) approach worked well for levelling the delivery costs but the burden on the host public resources is higher than it would have been if infrastructure was traditional. Supporting revenues is also a tried and important approach in many successful public–private partnership projects for de-risking projects; it is however difficult to predict at the start of a project how the revenues would add up over the project lifecycle (typically 25–30 years). Hence, innovating revenue support mechanisms that could be linked with the classic India VGF scheme and together adapted for green financing such that the support is available in riskier or high technology adaptation periods but also in a way that allows part of the upside, when the project revenues start flowing eventually, to be ploughed back to the support facility could prove to be a truly good partnership between government or development entities and private sources of capital. We had, at the time, in India developed innovative concepts for revenue support schemes or 'annuity' structures such as the Provision of Urban Amenities in Rural Areas (PURA) as well as pooled finance structures such as Infrastructure Investment Trusts (INVITS). I am happy to note that the proposed GFCF has taken account of several of these and proposed an approach which will be a very strong toolkit for governments to utilize and adapt as necessary to framing their green finance approaches. I would strongly commend ADB for taking a lead in developing one of the first leveraged facilities for the 'blended finance' concept which is critical if we are to really ramp-up the much-needed financing from especially institutional private sector sources into green development.

Laurence Breton-Moyet, *executive director in charge of operations, French Development Agency (AFD)*

To contribute to a much-needed acceleration of green investments worldwide in a world of abundant private savings, International Finance Institutions—both multilateral and bilateral—are increasingly called upon to step up their efforts to increase the crowding in of private sector financing. The GFCF proposal from ADB is an innovative financial structure aiming to address this critical issue, and a welcome addition to the ongoing collective discussion around leverage and additionality of public funds.

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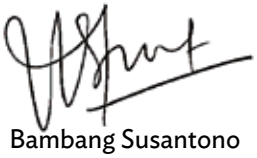
Foreword

Green Finance for a New Normal

A "new normal" for sustainability is emerging as Asian Development Bank (ADB) members rapidly move to middle-income status. Shared and balanced growth in Asia's dynamic economic and social landscape is challenged by aging populations, rapid urbanization, inequalities in incomes and opportunities, increased risks from climate change, severe environmental degradation, and natural disaster risks. A paradigm shift in infrastructure planning and design to ensure improved quality of life is therefore imperative. An impetus is provided by recent transformational global developments. These include (i) the Sustainable Development Goals (September 2015), which respond to the challenges of conserving natural and human capital; (ii) the Paris Agreement (December 2015) to reduce greenhouse gas emissions and limit global warming; and (iii) the United Nations Addis Ababa Financing for Development Action Agenda (2015). These outline a comprehensive development pathway toward a socially equitable, economically balanced, low-carbon and environmentally sustainable future. Integrated, cross-sector solutions, appropriate technology, and assured financing with improved governance are key to achieving these commitments.

Asia's infrastructure needs are large and continue to grow. ADB's report on *Meeting Asia's Infrastructure Needs* (2017) projected a need for about $1.7 trillion every year from 2016 to 2030, including costs of mitigation and adaptation to climate change. Asia's choices on bridging infrastructure gaps will have profound implications for their people and for the planet with respect to the sustainability of economic growth. A joint UNESCAP-ADB-UNDP (2017) report on *Eradicating Poverty and Promoting Prosperity in Changing Asia-Pacific* highlighted the need for augmenting public sector spending for infrastructure finance and diversifying sources to include concessional and private sector finance. Sustainable infrastructure development clearly requires coordinated planning across multiple sectors, provincial and national agencies, a joint effort by the public and the private sector and skillful combination of financial products including green bonds, green credit, green insurance, and green stocks. Innovative ways are required to bridge gaps and shortfalls, harness the entrepreneurial spirit of the region, and raise and direct finance toward clean and green practices.

This publication is timely in providing institutional solutions for enhancing financial systems of countries by gradually recalibrating infrastructure investments toward financially bankable and environmentally sustainable projects balancing quality and quantity of infrastructure services. The "new normal" in changing Asia is contextualized to successfully lead to the proposed Leveraged Financing Facility with defined principles and indicators of environmental and financial sustainability. The concessional finance available with MDBs, governments, and corporates will gradually be catalyzed to create bankable projects, attract financing from broader nonpublic sources and directly link finance to green results. The proposed facility would catalyze and mobilize funds toward investments with the desired combination of policy shifts, financial and technical solutions along with skill-enhancing programs. This would extend to the creation of a comprehensive green finance system of a country, centered around the strengths of governments and leveraged as best possible to catalyze financing from the private sector to green infrastructure development for resilient communities and improved social well-being.



Bambang Susantono
Vice-President for Knowledge Management and Sustainable Development
Asian Development Bank

Envisioning ADB's Role in Green Finance for Development

In a world beset by geographical, societal, and cultural differences, we are united by the vision for a world without hunger, with shared prosperity, with better chances for a better future for all our children. This common goal is underscored by that one already binding factor affecting us all, every day, without bothering about human or political boundaries—the natural capital, our environment. We as human beings are completely dependent upon our air, land, and water resources. And as is increasingly visible, depleting natural resources mean massive impacts on our lives and livelihoods.

Development work always has to be guided by the threefold prism of human capital, financial-economic capital, and natural capital. Integrating these will ensure that only those activities and strategies are undertaken which ensure mutual value maximization between all three aspects, and none undertaken that might give us a short-term gain or a cheaper project cost, but damage our environment irreparably in the long-term. The 2015 Paris Agreement and the Sustainable Development Goals already signify synonymous and unanimous concern and commitment by the global leaders in approaching this integrated development prism.

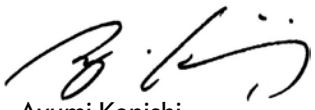
With infrastructure in the developing world arguably the biggest driver of development activities, and underscored by massive investment needs of an estimated 6.6% of gross domestic product on average, there is a risk for this enormous amount of spending to actually do more bad than good if projects do not address costs to our environment. A massive and urgent "greening" of finance is therefore needed—an incorporation of natural capital costs into project selection, financing, and implementation.

The People's Republic of China has already shown a fast-paced lead through its presidency of the G20 in making green finance a global topic, through the first ever G20 communiqué released in Hangzhou in 2016, highlighting green finance as a requirement for global sustainable growth. Countries like India, Indonesia, and Viet Nam, amongst others, are also developing approaches and guidelines for greening finance.

The Asian Development Bank (ADB) as a development partner to these countries has a critical role to play in guiding the mainstreaming of green finance into all financing—through supporting policy development, sharing knowledge from across the world, helping build capacities, and through its finance for projects. This will help us leverage our support manifold to ensure that not just funds from development partners but especially the larger required quantum of funds from the private sector are also "greened."

We work in a region considered as one of the world's most climate-vulnerable and a growing emitter of greenhouse gases, accounting for about 40% of the total. The Asia and Pacific region thus has a leading role in developing green finance approaches for sustainable development. As ADB President Takehiko Nakao has underscored in his September 2016 op-ed, ADB will double its climate financing to $6 billion by 2020, and in doing so we must assist countries to firmly couple together climate action with policy and structural reforms, to be a catalyst to drive private finance into green infrastructure projects, whether directly at project level or through capital markets such as ADB's recent $1.3 billion green bonds issuance.

This publication, which emerged as a concept in our discussions in Beijing with government in late 2016, has therefore been a rapid response to the needs for formulating possible approaches to the greening of finance. The Green Finance Catalyzing Facility (GFCF) concept has already created much interest in our meetings and combines concessional finance with policy conditions to catalyze private finance, with few other such approaches having yet been seen in the green finance space. ADB's East Asia Department is already working with the Government of the People's Republic of China to develop a first such pioneering pilot project on the lines of the GFCF which process, over 2017, should hopefully provide further practical inputs that can be shared for the design of other GFCF like facilities in the future. We hope, therefore, that this report informs much thought and creates debate in countries so as to create possible localized approaches for governments to use in forming their own green finance platforms, for eventually mainstreaming green finance into all development.



Ayumi Konishi
Director General
East Asia Department
Asian Development Bank

Key Perspectives from ADB

Striving for Bankability

Pipeline, perhaps the issue most quoted in any discussion on reasons for the mounting infrastructure financing gap in the region. That there is a financing gap facing infrastructure development in the Asia and Pacific region is incontrovertible—the Asian Development Bank (ADB) estimates $26 trillion needed until 2030. That this gap requires a massive scale-up of private sector financing and that public sector, including funding from multilateral development banks, is not sufficient, is also incontrovertible. Greening costs are a significant part of the traditional requirements.

ADB can play a crucial role in identifying solutions for the risks that make projects un-bankable and unattractive to private sector sources of finance. ADB's Strategy 2020 recognized the need for ADB to leverage its resources—direct financing, credit enhancement, and innovative new financial instruments—into better risk-bearing structures to act as a catalyst for private sector investments that might otherwise not happen; *from financier to resource mobilizer.*

This publication, with a focus on risk principles underlying the need for a Green Finance Catalyzing Facility (GFCF), provides one possible innovative financial instrument to address key risks essential to project bankability. ADB, governments, and other development partners could utilize this approach or its principles to create such financing vehicles at the ground level, which balance risk perceptions better in the markets and hence lead to that final goal: bankable green finance project pipelines able to access finance from the commercial and institutional investors and the capital markets.

Ramesh Subramaniam
Director General
Southeast Asia Department
Asian Development Bank

The Climate Change Imperative

September 2015 saw ADB President Takehiko Nakao announce a doubling of ADB's annual climate financing to $6 billion by 2020. ADB's spending on tackling climate change will rise to around 30% of its overall financing by the end of this decade reflecting our strategic emphasis on climate change. One of ADB's strategic pillars for 2030 is environmental sustainability and inclusion. Climate change is perhaps most crucial for the Asia and Pacific region with rising sea levels, melting glaciers, and extreme weather events like floods and droughts damaging livelihoods and lives.

To effectively address these challenges, technology, finance, and implementation efficiencies all need to work together. Infrastructure financing in general and green infrastructure financing in particular have to be understood in the context of both, "finance now," i.e., for capital expenditure, as well as "finance later," i.e., for operations and maintenance requirements. This becomes especially significant if climate change targets are to be set ambitiously, requiring regular upgrading of technology investments.

Concessional finance must then be used as an incentive—to "push" for technological and managerial advancements, and to "pull" in private sector funds, and efficiencies into climate change projects.

The proposed GFCF comes at a crucial point where the "green" imperative is understood but financing approaches less so. The GFCF provides a framework for an integrated Finance ++ approach of innovative financing, plus resource leveraging, plus knowledge collaboration as a possible solution to the urgent call for action under the Sustainable Development Goal for Climate Action (SDG 13) and the Paris Agreement (COP 21).

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Asian Development Bank

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Abbreviations

ADB	Asian Development Bank
ADBI	Asian Development Bank Institute
AF	Adaptation Fund
AfDB	African Development Bank
ASEAN	Association of Southeast Asian Nations
Bp	Basis point (one hundredth of a percent)
CAPEX	Capital expenditure
CBI	Climate Bonds Initiative
CDIA	Cities Development Initiative for Asia
CDM	Clean Development Mechanism
CERs	Certified emission reductions
CIFs	Climate investment funds
CO_2e	Carbon dioxide equivalents
CSR	Corporate social responsibility
DMC	Developing member country
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
EU	European Union
FAO	United Nations Food and Agriculture Organization
FCM	Federation of Canadian Municipalities
FICCI	Federation of Indian Chambers of Commerce
GAVI	Global Alliance for Vaccines and Immunization
GCF	Green Climate Fund
GDP	Gross domestic product
GEF	Global Environment Facility
GFCF	Green Finance Catalyzing Facility
GGCS	Green Growth Certification Standard
GGGI	Global Green Growth Institute
GHG	Greenhouse gas
GIB	UK Green Investment Bank
GIZ	German Development Corporation
IDBG	Islamic Development Bank Group
IFC	International Finance Corporation
ETFs	Exchange traded funds
IFFIm	International Finance Facility for Immunisation
InvIT	Infrastructure investment trust
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal rate of return
KfW	German Development Bank
KOICA	Korea International Cooperation Agency
LIBOR	London Interbank Offered Rate
MDB	Multilateral development bank
MRV	Monitoring, reporting, and verification
NDCs	Nationally Determined Contributions
NGO	Nongovernment organization
NPV	Net present value
OECD	Organisation for Economic Co-operation and Development
PAF	Pilot Auction Facility for Methane and Climate Mitigation
PPPs	Public–private partnerships
PRC	People's Republic of China
REITs	Real estate investment trusts
SDGs	Sustainable Development Goals
SDM	Sustainable Development Mechanism
SPV	Special purpose vehicle
UCCRTF	Urban Climate Change Resilience Trust Fund
UK	United Kingdom
UNDESA	United Nations Department of Economic and Social Affairs
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNFCCC	United Nations Framework Convention on Climate Change
UN-Habitat	United Nations Human Settlements Programme
UNISDR	United Nations Office for Disaster Risk Reduction
US	United States
UNEP	United Nations Environment Programme
VCS	Verified Carbon Standard
VERs	Verified emissions reductions
VFM	Value for money
VGF	Viability gap funding
WBG	World Bank Group
WRI	World Resources Institute
WTE	Waste-to-energy
WWF	World Wide Fund for Nature

Photo Credits: ADB.

Executive Summary

I. The Origins and Objectives

The origins of this publication can be traced back to discussions between an Asian Development Bank (ADB) team led by Ayumi Konishi, director general for East Asia Department, with officials from the Government of the People's Republic of China (PRC), and from the People's Bank of China, in Beijing in September 2016. These meetings highlighted the need for a product that could provide an impetus to the need for mainstreaming green finance to infrastructure financing in Asia and the Pacific. The PRC has been at the forefront of driving the green finance momentum through its leadership of the G20 in 2016. Besides being a global leader in the issuance of green bonds, the PRC has also led a Green Finance Task Force constituted in 2014 with the United Nations Environment Programme Inquiry into the Design of a Sustainable Financial System (UNEP Inquiry). This produced a comprehensive set of recommendations on the establishment of a green finance system in 2015.

A focus on integrated design solutions for environmentally sustainable and inclusive growth was also at the core of the Infrastructure Roundtable held at ADB in May 2016.[1] This primarily discussed development trajectories of the three Asian giants—PRC, India, and Indonesia—and highlighted constraints and barriers to bankability of investments and continuity of project pipelines. The focus on social equity, financial and environmental sustainability for a green growth economic transformation was renewed and underscored by the Sustainable Development Goals (SDGs) and the Paris Agreement.[2]

A need to translate recommendations and ideas from multiple fora into a clear model for green finance is evident. Governments need to be informed regarding the creation of their own green finance systems, in line with green policy measures already being developed and implemented with varying results. Such a model would primarily be centered around the strengths of governments. Furthermore, given their larger risk-taking capacity, support by development agencies would help leverage this system as best possible. This would also catalyze financing of scale from the private sector toward green investments. Flows of large volumes of private sector finance are imperative for enabling the success of any attempt to mainstream green finance within existing institutional approaches. This outlines a path to leveraged and blended financing. Targeted linking of financing with performance and policy conditionalities to proactively lead to green results would leapfrog toward addressing the core problem of degrading ecosystems, constrained bankability, and discontinuous investment pipelines—adversly affecting the quality of growth. The Green Finance Catalyzing Facility (GFCF) was conceptualized as a result of this objective.

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[1] Infrastructure Provision in Developing Asia: Experiences and Lessons from the People's Republic of China, India, and Indonesia. 31 May 2016. Manila.

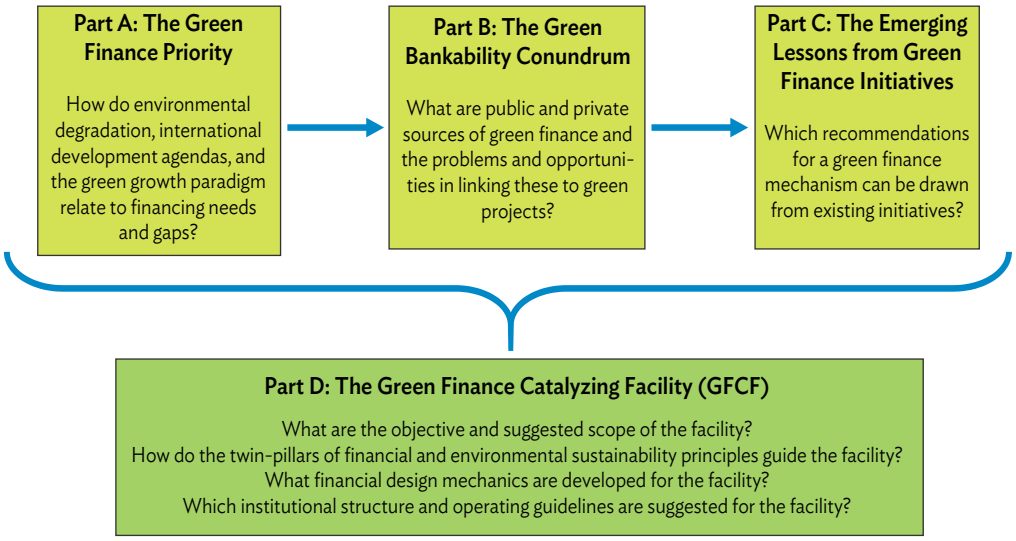
[2] The Paris Agreement: Agreement within the United Nations Framework Convention on Climate Change (UNFCCC) on greenhouse gases emissions mitigation, adaptation and finance, negotiated by representatives of 195 countries at the 21st Conference of the Parties of the UNFCCC in Paris and adopted by consensus on 12 December 2015.

The GFCF aims to be a practical and implementable tool, applicable to the context of the Asia and Pacific region with respect to the region's development demands, priorities, and institutional capacities. It imbibes lessons from green and leveraged finance approaches. No single tool can be an all-encompassing solution. Therefore, the GFCF should be regarded as a concept to motivate further thought, create localized green finance solutions and vehicles to drive green growth toward green economy transformations.

II. The Structure of the Publication

The publication is structured into four interrelated parts, illustrated in Figure 1, with each part aiming to identify key learnings based on an analysis of green finance literature and experiences from infrastructure financing especially in the Asia and Pacific region over the last decade. Each part aims to provide key building blocks toward the structure of the GFCF. Alongside constraints for green finance, several policy and project formulations aimed at mitigating either general infrastructure financing or specific green financing issues were of much interest in shaping the GFCF structure, especially from countries like the PRC (its green finance task force recommendations), India (through its Viability Gap Financing facility for public–private partnerships), Indonesia (through the recently launched Tropical Landscapes Finance Facility), and the UNEP (green finance policy papers), amongst others. Moreover, 16 examples of green finance initiatives and 34 examples of green finance projects are illustrated in the appendices.

Figure 1: Structure of the Publication



Source: Authors.

III. Key Takeaways

The key lessons that emerge from the first three parts of the publication are briefly summarized to provide an overarching context.

1. Disappearing Natural Capital: A Tipping Point for Business "Unusual"

Extreme weather-induced disasters in the Asia and Pacific region resulted in about $750 billion of losses from 2003 to 2013; an estimated 4.5 million to 5.3 million deaths *every year* projected for 2010–2030 attributed to carbon intensive energy practices and corresponding health impacts; an additional *annual* expected 400,000–700,000 deaths from climate change; these are some of the very visible results of unsustainable

development and growth patterns over decades, which have eroded the planet's natural capital—air, land, and water—resources to a tipping point of scarcity, pollution, and increased inaccessibility.[3] Lives and livelihoods in the Asia and Pacific region are particularly vulnerable with rapid economic growth, changing consumption impacts, massive population growth, and rapid urbanization trends; climate change impacts here are estimated to have a higher cost than global averages, with already visible shortages of water resources and air pollution, and 10 of the world's 18 most severely polluted megacities can be found in this region.[4]

The need therefore is for **all financing decisions** toward development, and especially infrastructure development with all its large-scale impacts, to be **greened**. This means that not just the prism of *direct* financial costs or economic benefits are incorporated in project financing decisions, but also the *indirect costs* and *cobenefits* from environmental impacts of a project. This would be crucial especially for the large segment of small and medium enterprises, so vital to developing economies, which need financial support mechanisms to incentivize them to rapidly shift to technological solutions for much greater green impacts. Indeed, all project selection decisions should be undertaken incorporating all integrated green costs and benefits.

A formal green growth strategy would avoid, or at least reduce, the footprint of human activity stamped on the natural resources of the planet. The Organisation for Economic Co-operation and Development (OECD) provided a blueprint for such a green growth strategy in 2011 suggesting a decoupling of economic growth from carbon emissions, unsustainable resource use, pollution and biodiversity loss, and unequal socioeconomic development.[5]

2. Greening ALL Finance

Numerous "green" products have emerged in financial markets in the past few years: green bonds, green credit, green insurance, green stocks, green standards are some of these, propelled by, among others, the Paris Agreement emerging from the United Nations Climate Change Conference (COP 21), the Agenda 2030 with the SDGs, and the United Nations' Addis Ababa Financing for Development Action Agenda, all adopted in 2015, which led to a major focus on green finance. Perhaps the most visible has been the green bonds issuance, with the PRC the largest issuer constituting some 33% of the world's total.[6] Green finance is therefore not just a single product or activity financing, rather an entire financial system which must use different instruments to finance a range of activities whether nonrevenue water reduction, forestry expansion, or transportation, but under the single goal of promoting a green economic transformation toward low-carbon, sustainable, and inclusive pathways. Green finance is therefore a "climate change plus" financing approach, linking financing to natural capital, societal, and financial sustainability (Figure 2).

3. Massive Needs: Finance Plus...More than Public–Private Partnerships

Greening all investments, especially the most crucial infrastructure investments, is a particularly challenging issue given the estimated $26.2 trillion infrastructure financing needs in developing Asia from 2016 to 2030, including climate mitigation and adaptation costs.[7] On the other hand, the global demand for implementing the SDGs is already at a high $5 trillion to $7 trillion per annum with a $2.5 trillion annual financing gap in developing countries for key infrastructure sectors and related areas, which means that there will be competing

[3] DARA and the Climate Vulnerable Forum. 2012. Climate Vulnerability Monitor 2nd Edition. A Guide to the Cold Calculus of a Hot Planet. Madrid. pp. 16–18.

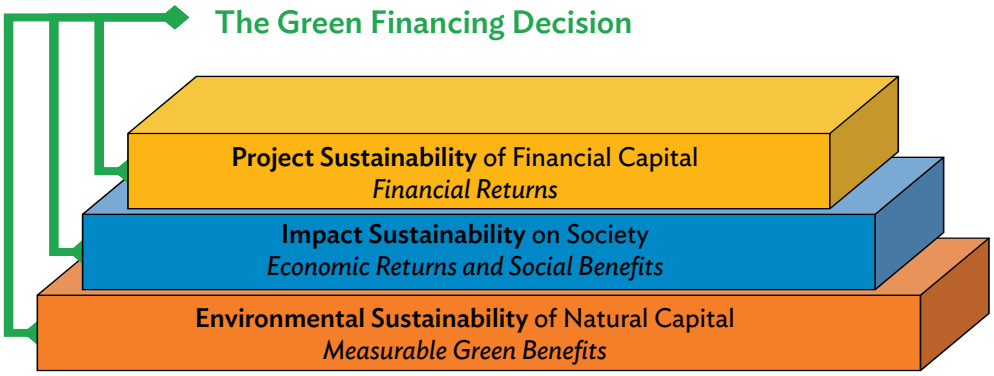
[4] ADB. 2016. *Key Indicators for Asia and the Pacific 2016*. 47th Edition. Manila; B.K. Sovacool. 2014. Environmental Issues, Climate Changes, and Energy Security in Developing Asia. *ADB Economics Working Paper* Series: No. 399. Manila.

[5] OECD. 2011. Towards Green Growth. Paris.

[6] Climate Bonds Initiative. 2016. Bonds and Climate Change. *The State of the Market in 2016*. London.

[7] ADB. 2017. *Meeting Asia's Infrastructure Needs*. Manila.

Figure 2: The Green Financing Decision



Source: Authors.

demand for global finance flows.[8] Given these finance requirements and an already growing financing deficit per year, the government/public spending approaches have to change—not just from the perspective of *quantity of funds* available, but also in terms of Technology innovation, Implementation improvements, and Management efficiencies—the T.I.M. paradigm—the cost impact of which should be measured over a project's entire lifecycle, not just its capital expenditure period (Figure 3). Green finance therefore has to be sought both from a larger number of sources and used more efficiently.

The private sector, critical to meeting the financing deficit, is estimated to contribute anything from 50% on average of the investment gap to almost 90% of green investment, as in the case of the PRC.[9] While a number of countries and development agencies have concentrated on public–private partnerships (PPPs) as the main "private" sector focus, these staggering requirements can only be met through a larger and more proactive effort to catalyze all private sources of finance, especially institutional and retail investors including pension and insurance funds, private debt and equity funds, corporate social responsibility funds, and commercial banks. Pension and insurance funds in Asia already hold about $10 trillion in assets, which will grow as the sector penetration gets deeper from a low base.[10] A liquid capital market for green financing is particularly required as it multiplies access to many institutional funds and investors through both debt and equity instruments, as has also been noted in the UNEP recommendations for building a green finance system in India.[11]

4. Leveraging 1...2...3: Bankability above All Else

Access to private sector funds will, however, continue to remain nascent if a pipeline of bankable green infrastructure projects does not emerge at scale and appropriate quality. This is considered one of the biggest impediments to private sector funds in the Asia and Pacific region, where many sectors are especially sensitive to social economic considerations—water supply, sanitation, mass transit systems, energy distribution, etc.

8 UNEP. 2016. *Green Finance for Developing Countries: Needs, Concerns and Innovations*. Nairobi.

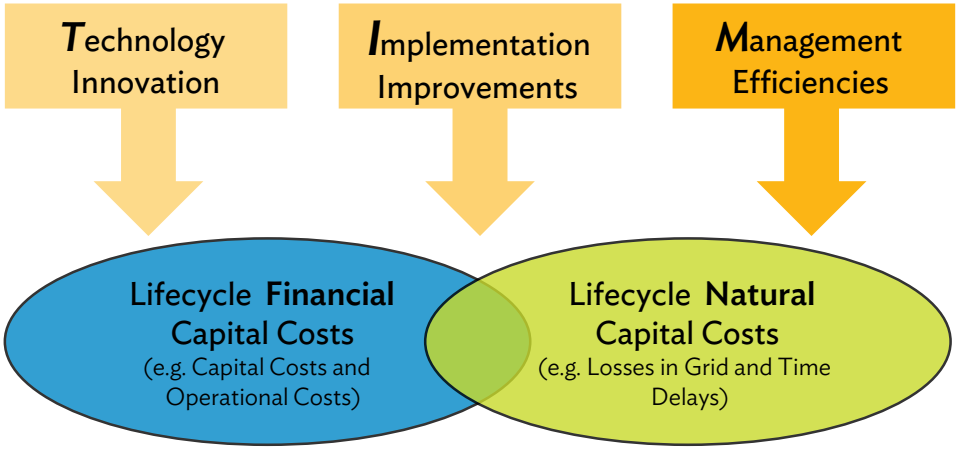
G. Schmidt-Taub. 2015. Investment Needs to Achieve the Sustainable Development Goals: Understanding the Billions and Trillions. Sustainable Development Solutions Network (SDSN) Working Paper: Version 2, 12 November 2015. Paris/New York (SDSN). http://unsdsn.org/resources/publications/sdg-investment-needs/

9 Green Finance Task Force. 2015. Establishing China's Green Financial System. Report of the Green Finance Task Force. Beijing (The People's Bank of China & UNEP Inquiry). p. 5.

10 G. Inderst. 2016. Infrastructure Investment, Private Finance, and Institutional Investors: Asia from a Global Perspective. *Asian Development Bank Institute Working Paper Series: No. 555*. Tokyo.

11 UNEP and FICCI. 2016. Delivering a Sustainable Financial System in India. UNEP Inquiry: Design of a Sustainable Financial System. Geneva.

Figure 3: The Technology Implementation Management Paradigm for a Finance Plus Approach to Project Development



Source: Anouj Mehta , ADB.

Bankability has been a constraint in much of the infrastructure sector due to the perceived risks of projects. Key risks identified by the private sector include: (i) unpredictability of revenues, especially in initial years of operations; (ii) land acquisition problems; (iii) environmental clearance delays; (iv) construction period delays; (v) cost increases; and (vi) nonavailability of long tenure financing. Further, institutional investors are also concerned about options for easy exit from projects, for which liquid capital markets are key.

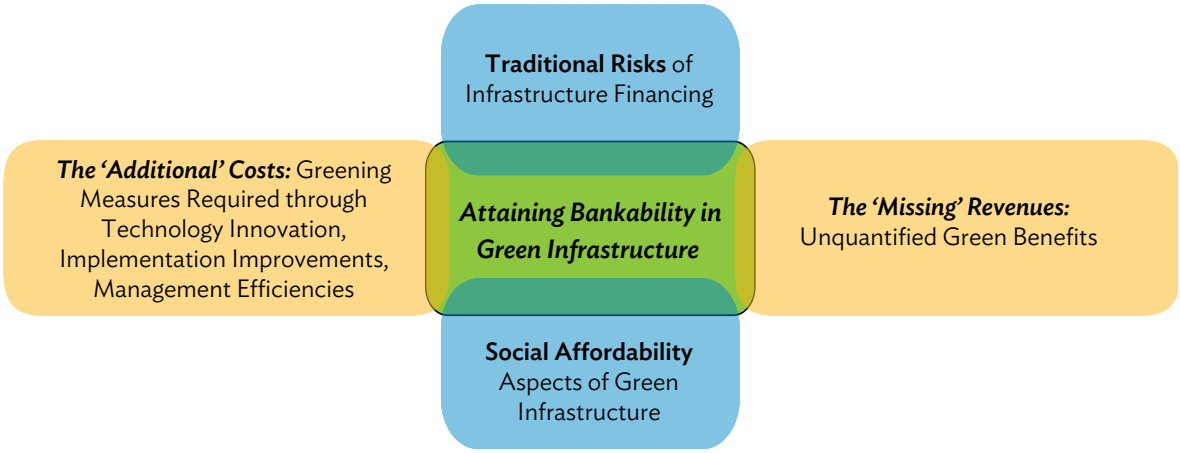
Greening infrastructure projects will likely add to the above risks through additional green costs, such as the need for more advanced technology to meet green targets, while the green benefits from projects often remain unquantified and thus do not get captured as direct revenue benefits to projects (Figure 4).

Mitigating such risks to create the much-needed **pipelines of bankable green projects** is therefore the role that governments and supporting multilateral development banks could undertake through the use of policy instruments and cheaper concessional funds, not as a mainline financier of a project, but as mitigants of risk or leverage providers—a crucially different mindset. The success of sovereign funds would thus be better measured not in the assets created but the amount and diversity of private sector funds catalyzed into projects.

Entities such as the Green Growth Action Alliance and national financing institutions have noted that public investment could, on the average, **leverage private finance by a ratio of 1:3** (*hence "Leveraging 1…2…3 !"*) or 1:5. Even a goal of achieving $1 of private sector fund for each $1 of public fund invested would be a good start for infrastructure in the Asia and Pacific region.

Finally, much of the green finance activity involves raising of finance using bonds, generally on the strength of corporate or government balance sheets, not by specific projects. However, a sizeable green growth momentum rests on a pipeline of green infrastructure projects with aggressive green targets being able to attract private sector green finance on a project basis. The strengths of governments and multilateral development banks should be leveraged to deliver this—considered the final goal post for really mainstreaming green finance into project financing.

Figure 4: Bankability in Green Infrastructure Financing



Source: Authors.

5. Green Initiatives and Funds: A Roadmap

Canada's Green Municipal Fund, the Indian Viability Gap Funding scheme, Indonesia's Tropical Landscapes Finance Facility, and the Global Green Growth Institute proposed the concept of national financing vehicles. The comprehensive series of recommendations from the Green Finance Task Force of the People's Bank of China and the UNEP provided inputs for possible approaches to catalyzing private sector funds. Approaches include combinations of levers that combine incentivizing concessional funds with policies to facilitate innovation in technologies, improvements in implementation, and efficiency gains in management for improving risk profiles in green finance projects (Figure 5).

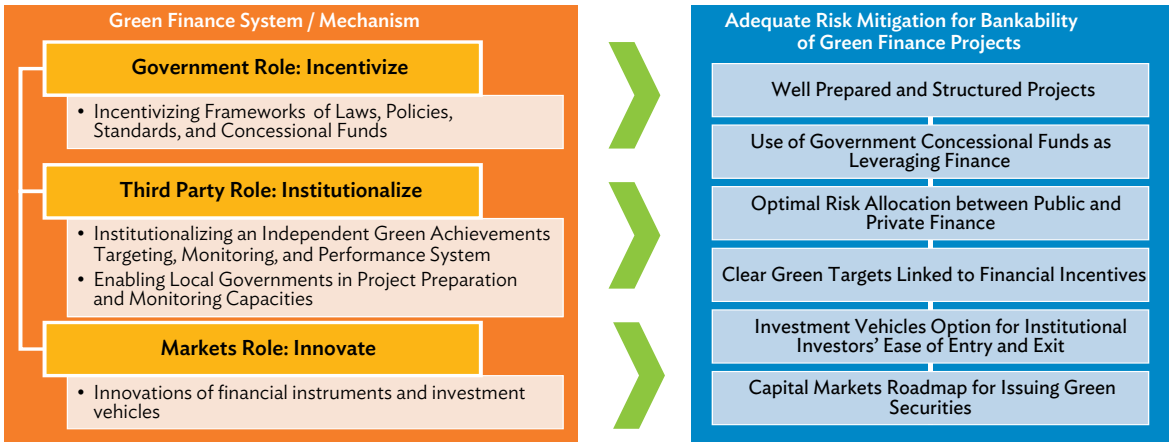
The various examples also identify the difference between a "fund" approach, focusing more on raising funds and then awaiting project applications for accessing this, versus a more hands-on approach through a "facility" that would actually help originate, structure, and develop projects, and then help access finance. Given capacities and challenges in the green infrastructure space, a hands-on facility would appear to be the right way for initially creating the green finance momentum.

IV. The Green Finance Catalyzing Facility

The Green Finance Catalyzing Facility (GFCF) has been conceptualized taking into account the above considerations to create a national or regional green finance vehicle which will:

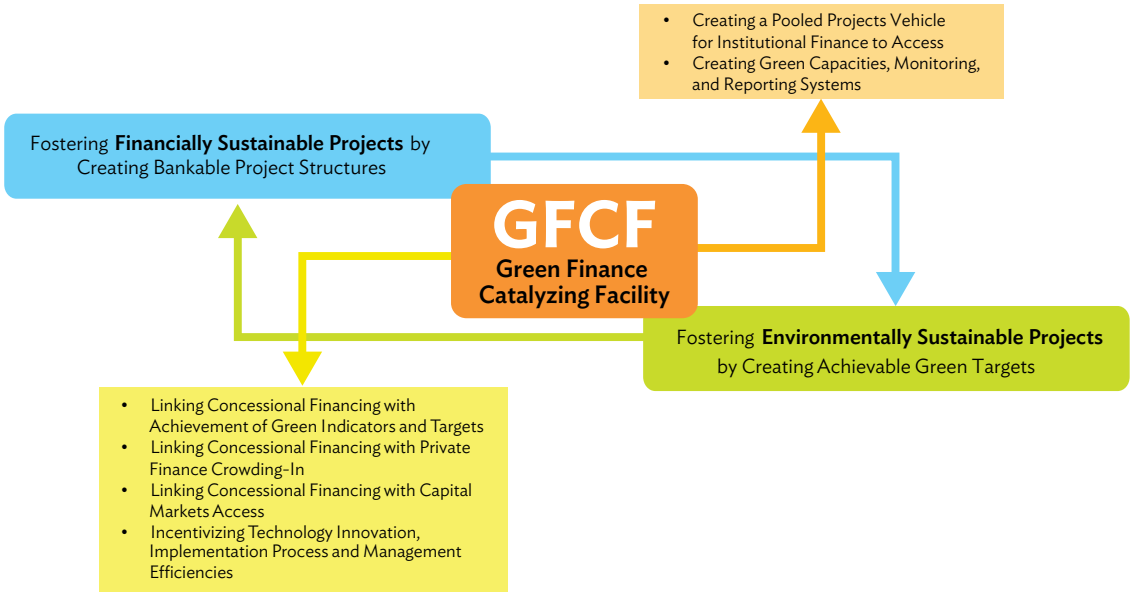
(i) Directly catalyze a pool of bankable green infrastructure projects in a specific country, *through*,
(ii) Assisting projects in creating both financially bankable as well as environmentally sustainable models, with timebound green targets, *by utilizing*,
(iii) Concessional sovereign and development finance to mitigate risks, *linked to*,
(iv) Clear conditionalities for both, achieving green indicators and crowding in a blend of private sector finance at the project level, *as well as*,
(v) Accessing private sector finance at the pooled GFCF vehicle level itself, *while*,
(vi) Strengthening the country's green growth policies and leveraging structures, allowing a gradual reduction on national level fiscal burdens from external debt.

Figure 5: Levers for Adequate Risk Mitigation of Green Finance Projects



Source: Authors.

Figure 6: Basic Rationale and Principles for the Green Finance Catalyzing Facility

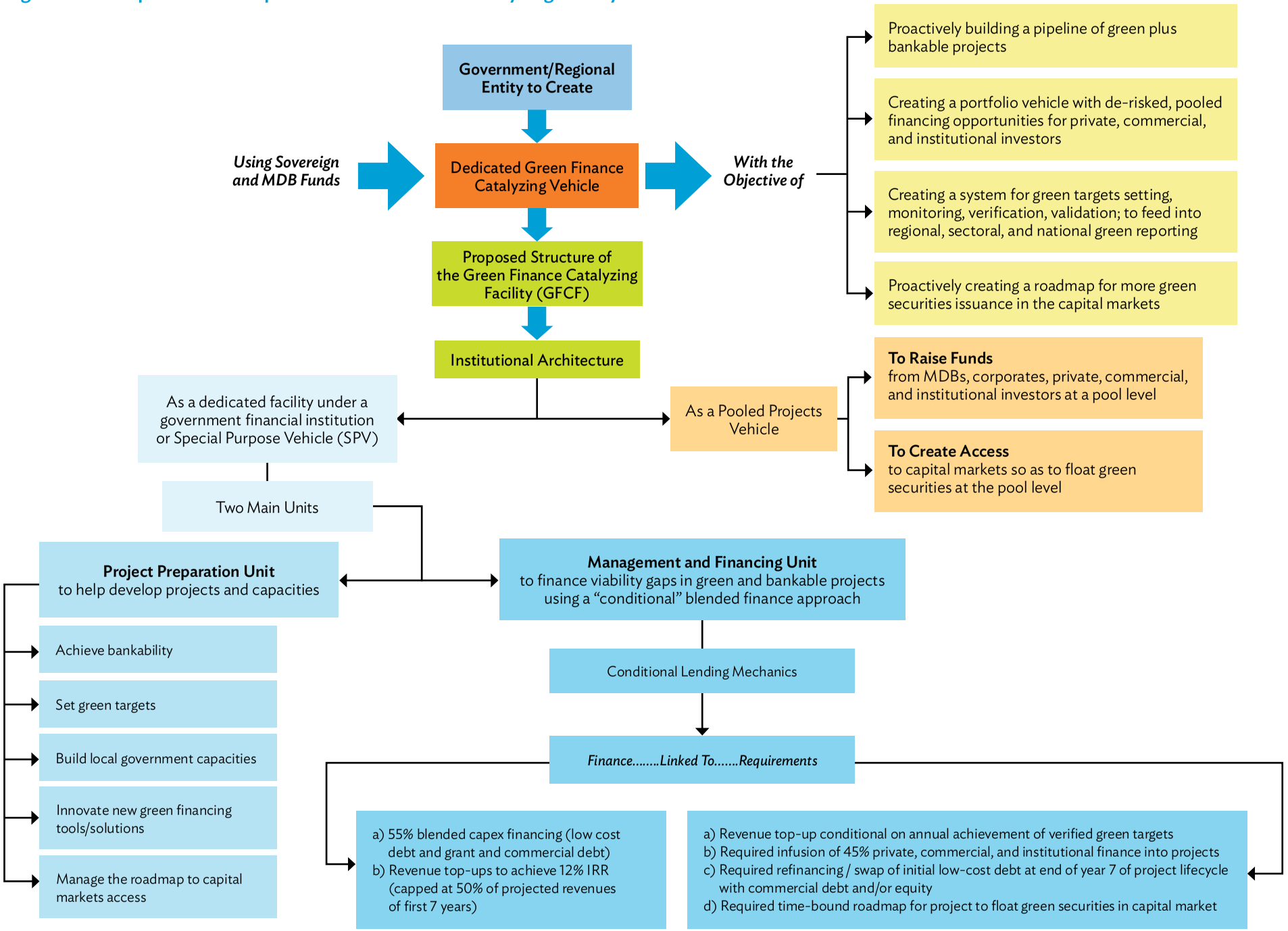


Source: Authors.

In contrast to common green finance approaches, the GFCF uniquely aims to incentivize aggressive green outcomes in projects, including those that can be retrofitted, through addressing the vacuum of bankability, hence linking the channeling of finance with both financial and environmental sustainability. The facility's corresponding rationale and principles are depicted in Figure 6.

The overall scope and scale of the facility is summarized in a conceptual mind map (Figure 7) with summary mechanics noted. All assumptions would likely need to be adapted to suit a country and sector context. The proposed facility in Figure 7 is not intended to be a solution for all green finance challenges. Aspects such as regulatory systems, monitoring mechanisms, and sector development goals and plans constitute a larger issue for government and development agencies to consider, which is not a focus of this publication.

Figure 7: Conceptual Mind Map of the Green Finance Catalyzing Facility



IRR = internal rate of return, MDB = multilateral development bank.

Source: Authors.

1. The Twin Pillars of Financial and Environmental Sustainability

The GFCF design is based upon consideration of some key principles grouped under the twin pillars for achieving green finance: financial sustainability and environmental sustainability (Figure 8).

Main considerations within this include:

(i) **Incentivize blended finance**: The use of concessional debt plus a small grant component has been considered necessary for reducing the cost of capital in upfront project financing, but limited to a cap of 50% of the total project costs and with a trigger for refinancing after reduction of risks.

(ii) **Quantify green benefits into project "revenues:"** A number of options were explored such as the Clean Development Mechanism and trading in Certified Emission Reductions. While an important long-term tool, given the collapse of the carbon market to $0.40 per ton of carbon dioxide equivalent (CO_2e), and more complex market structures in the Asia and Pacific region, a simpler principle has been proposed for the GFCF which would use a Minimum Revenue Guarantee approach of providing green benefits as "shadow revenues" or "revenue top-up" to assure a guaranteed 12% internal rate of return (IRR) for a project in the initial years of operations.

(iii) **Mitigate construction period risk**: Project construction risk is mitigated by allocating this mainly to the GFCF, providing for a larger share of finance during the construction and early operations phase (together an expected 7 years), and then being replaced by private sector refinancing at the end of year 7 in the project lifecycle.

(iv) **The leveraging principle**: Leveraging has been incorporated into the GFCF by proposing leverage upfront at the capital expenditure stage, of a minimum of 1:1 public funds for private funds, as well as ramping up this leverage by crowding in private sector through refinancing after a stabilizing period of operations (assumed at 7 years in the project lifecycle).

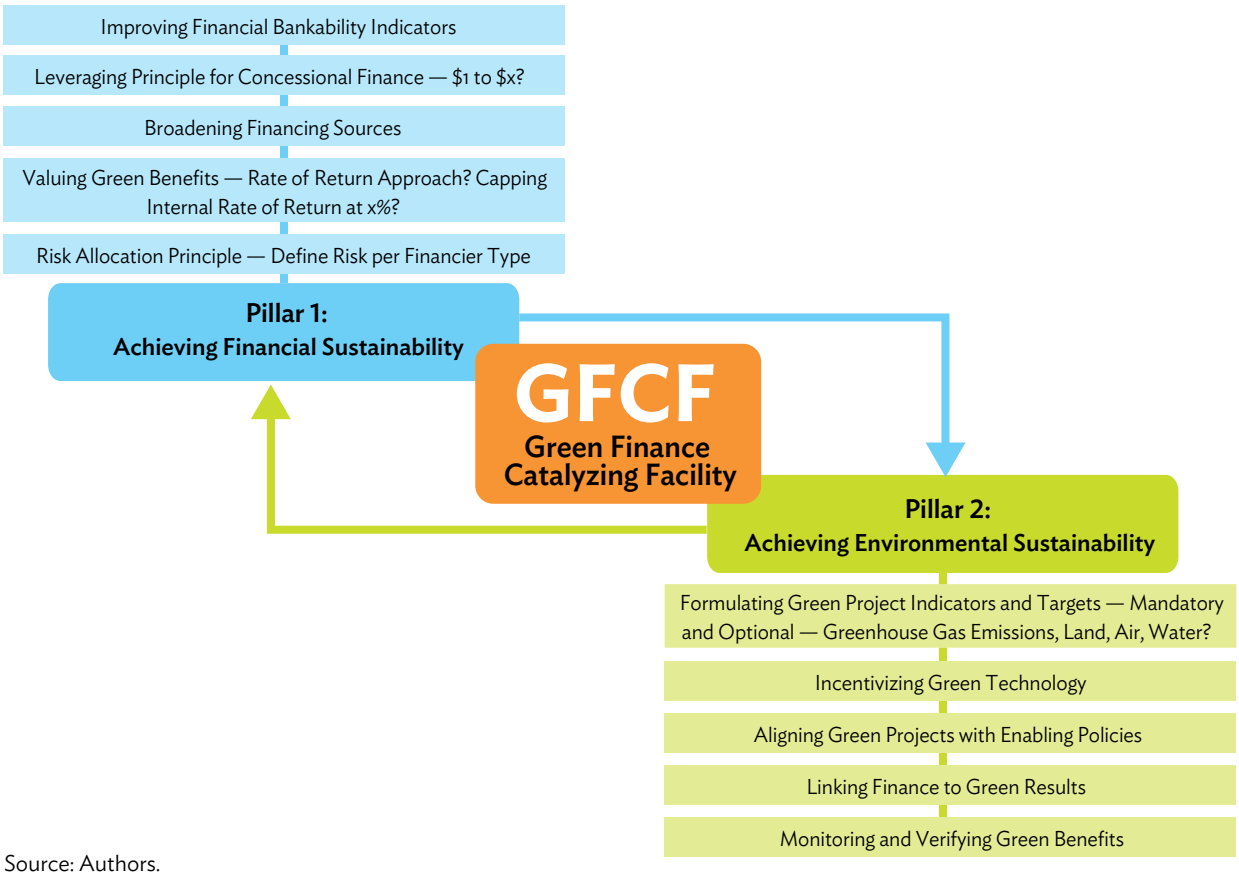
(v) **Blending and deepening finance**: Concessional debt, private debt and equity, grants, as well as funds raised through the capital markets are all included in the proposed blended finance approach for the GFCF. The facility functions as a portfolio vehicle for a pool of projects, thus diversifying and reducing risk. Participation can be at the portfolio level or through individual project/s. This should allow access to a greater spread of private sector funding through different channels offering different risk profiles.

(vi) **Capital markets access**: Capital markets access has been envisioned both through funds raised by the GFCF at its pooled vehicle level accessing capital markets, as well as at project level issuance of green equity, after a period of stabilization of operations.

(vii) **Green indicator targets**: The principle is for every GFCF financed project to include timebound indicators,
- At least one indicator for measuring the reduction of greenhouse gas emissions;
- At least two other indicators measuring the project's contribution to the sustainability of land, air, and/or water through improved environment and social impacts (e.g., minimize pollution or improve efficient usage of natural resources or enhance quality of life); and
- Link the payment of green benefit revenue top-ups to (a third-party verified) achievement of these above indicators.

(viii) **Project vs Pooled Vehicle:** Individual project risk as perceived by institutional investors can be moderated by vehicles allowing investment into a portfolio or "pool" of projects. Hence, the GFCF is proposed to be designed as a pooled (portfolio of projects) vehicle that can be funded by private, institutional, and commercial finance in addition to direct project level financing as deemed appropriate for the various funding sources.

Figure 8: The Twin Pillars of Financial and Environmental Sustainability



Source: Authors.

2. Green Finance Catalyzing Facility Mechanics at the Pooled Vehicle Level

At a vehicle level (Figure 9), the GFCF is proposed as a facility that can blend:

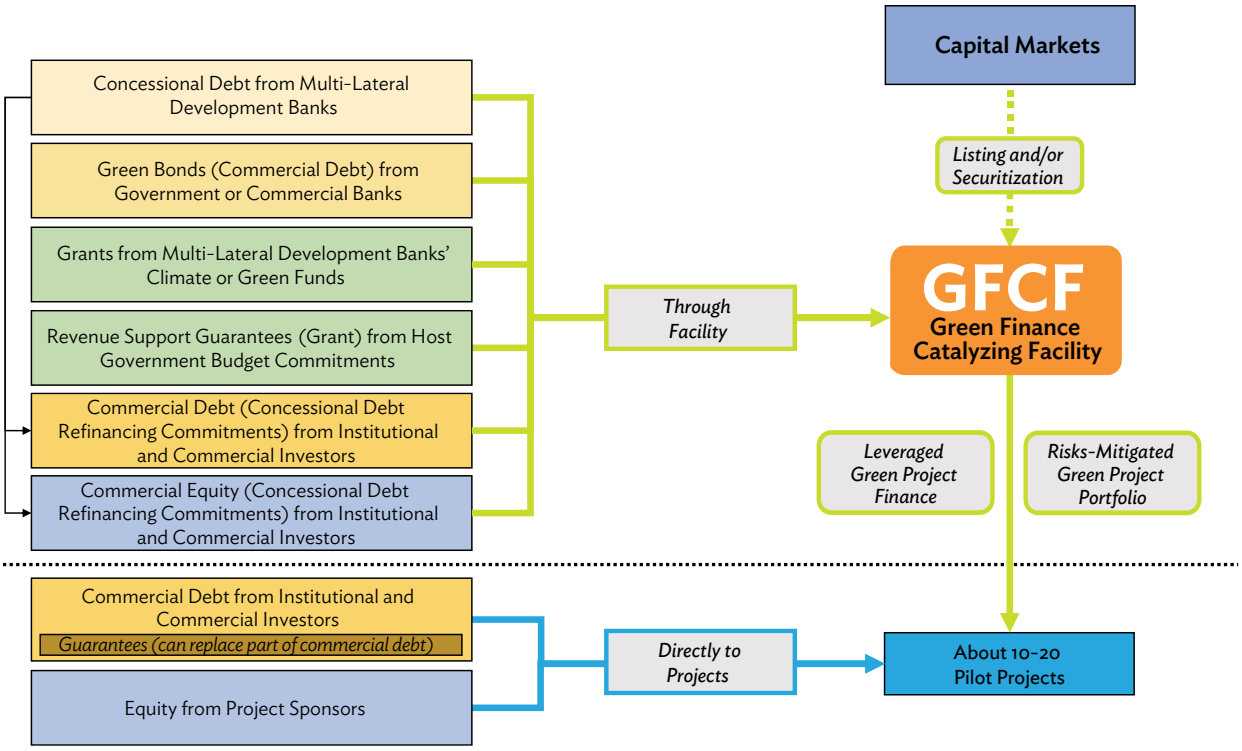
- Concessional finance from development banks and other green funds;
- Commercial finance raised through green bond issuances of government, banks, or directly by the GFCF itself;
- Commercial finance commitments or funds raised from institutional and commercial investors either to be targeted at specific projects or as general infusions into the GFCF vehicle itself; and
- Budgetary annual transfers from governments to meet green benefit revenue top-up needs in projects.

Upfront financing from national government is not included in the pool to allow fiscal space to governments and instead move their financing commitments to annual budget flows.

These funds are to flow through the GFCF to projects deemed eligible for financing (eligibility considerations to be framed based on the twin pillars and the timebound indicators noted above) in a predecided maximum of incentive financing per project, contingent upon the project also being able to raise the balance of financing directly from other commercial and private sources.

An estimated 10 to 20 pilot projects should be aimed at for development in the first phase of a GFCF to allow for impact and depending upon the base financing sources available to the GFCF in a specific country.

Figure 9: GFCF Mechanics at the Overall Pooled Vehicle Level



Note: Colored boxes on the left side: green = grant-related; blue = equity-related; yellow = debt-related; brown = guarantee-related.

Source: Authors.

3. Green Finance Catalyzing Facility Mechanics at the Project Level—Basic Approach

An initial basic or simple approach, as well as provisions for a more complex or second phase approach, to project level financing, have both been included in the design of how the GFCF can finance individual projects (Figure 10).

The mechanics under the basic or simple approach for GFCF support to an eligible project are suggested below; numbers suggested are only for illustration purposes and will need to be adapted for sector and country context:

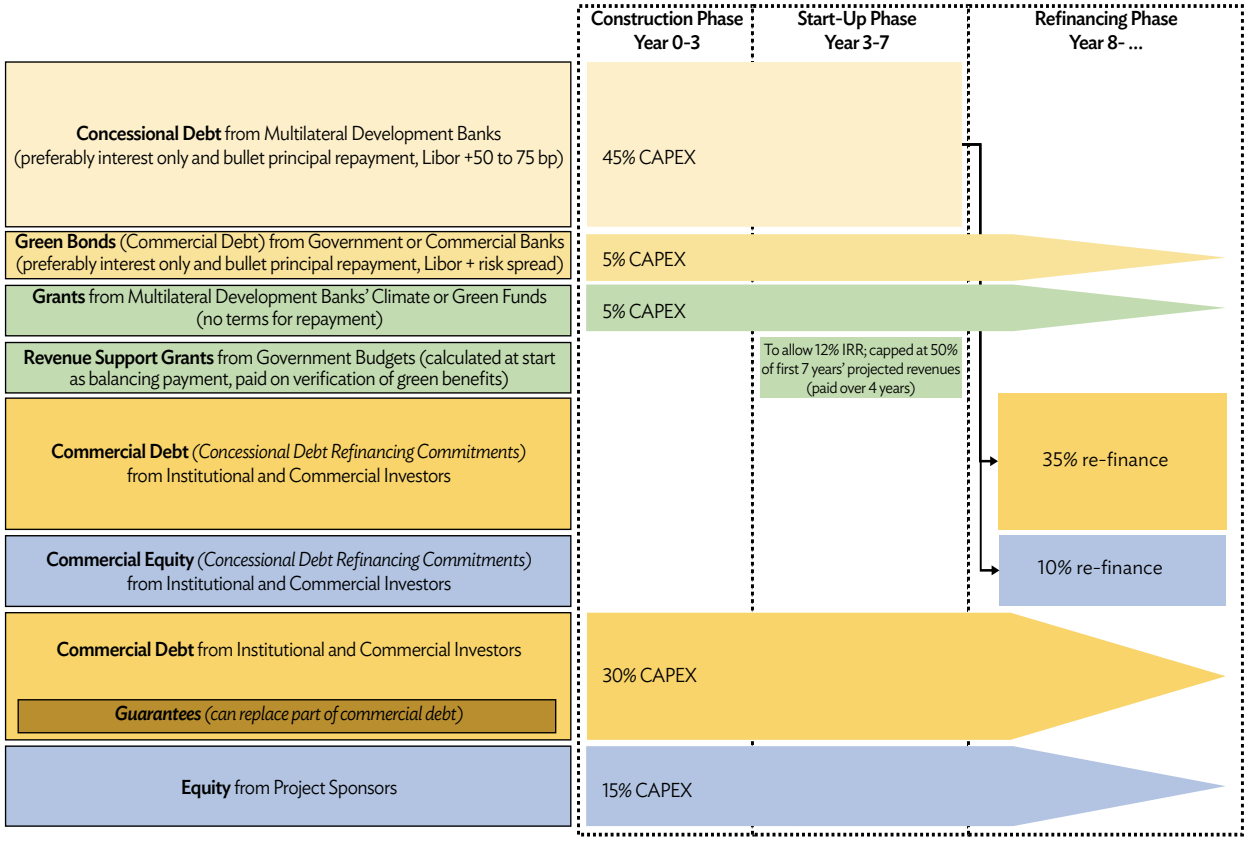
Firstly, the GFCF will provide funds for a project's capital expenditure in a predecided blend of:

- 50% concessional finance (45% concessional debt, 5% grant), subject to a maximum 12% project IRR, and
- 5% commercial finance (equity or debt), for example raised through green bond issuances.

Secondly, the GFCF will also support project operations by:

- Providing green benefit "shadow revenues" or revenue top-ups (grant) for the first 7 years of a project's operations aimed at assuring a 12% internal rate of return (paid over the first 4 years).
- Requiring that these top-ups be capped at a proposed 50% of projected revenues for the first 7 years operations.
- Link top-up payments to achievement of green indicators as established at the outset.

Figure 10: GFCF Mechanics at the Project Level



Note: CAPEX = capital expenditures, IRR = internal rate of return, LIBOR = London Interbank Offered Rate, bp = basis point (one hundredth of a percent)

Colored boxes: green = grant-related; blue = equity-related; yellow = debt-related; brown = guarantee-related.

Source: Authors.

The GFCF will link its financing to crowding in and refinancing triggers:

- Requiring a GFCF supported project to raise 45% commercial finance directly (30% debt and 15% equity).
- Requiring that at a reasonable period after commencement of operations (3 to 4 years operations period or 7 years in a project's lifecycle has been assumed as reasonable but would need to be adapted), the entire GFCF concessional debt of 45% be revolved out and replaced by nonconcessional finance so as to take the debt/equity capital structure to 70% commercial debt/25% equity;
- GFCF's initial 5% commercial finance and 5% grant finance would remain; and
- GFCF could continue its 45% financing support if the refinancing from the private sector does not materialize but with changes to lending terms at the refinancing point to reflect more commercial terms.

4. Green Finance Catalyzing Facility Mechanics at the Project Level—Complex or Second Phase Approach

In addition to the basic approach for GFCF project financing, mainly focused on blending sovereign finance with private and commercial finance, a more complex approach is suggested where the GFCF would itself, and also through projects, access capital markets for financing. This is considered feasible in more developed

markets or regions, or when the GFCF already has a bundle of projects at various stages of completion, hence a second phase of operations. The GFCF mechanics proposed would then additionally:

- Include a requirement for projects to raise funds through green issuances in the capital markets at a 3- to 4-year period after commencement of operations;
- Propose the GFCF itself to place green equity or debt in the capital markets to raise further institutional finance at the pool level for its portfolio of projects; and
- For the green benefit revenue top-ups to be in the form of equity infusions, which green equity can then be floated in the capital markets at a suitable juncture.

Based on suggestions from various market experts, a securitization structure for the more complex GFCF approach is proposed: (i) the pooling together of projects that are already operational with some in preconstruction stages; (ii) ensuring a steady stream of cash flow to the GFCF from these projects either as dividends or debt repayment flows depending upon the character of the initial funds infusion by the GFCF; (iii) creating a second line of revenue support from local or provincial government to the GFCF in the form of a say, 1% "green tax" on government revenues—the rationale being that the green projects would have an impact (though difficult to quantify) on government budgets through improved health and reduced pollution, for instance, and these savings, all else being equal, should be directed as additional "green revenues" for the projects; and (iv) for the GFCF to float a long-term bond that would be able to attain an appropriate credit rating given these revenue supports, for raising funds from institutional and social impact investors in the markets (Figure 11).

The GFCF approach in this way can help reduce the burden on government sources to finance large capital expenditures and instead leverage their annual budgetary funds better through innovative and tested securitization structures.

5. Institutional Structure

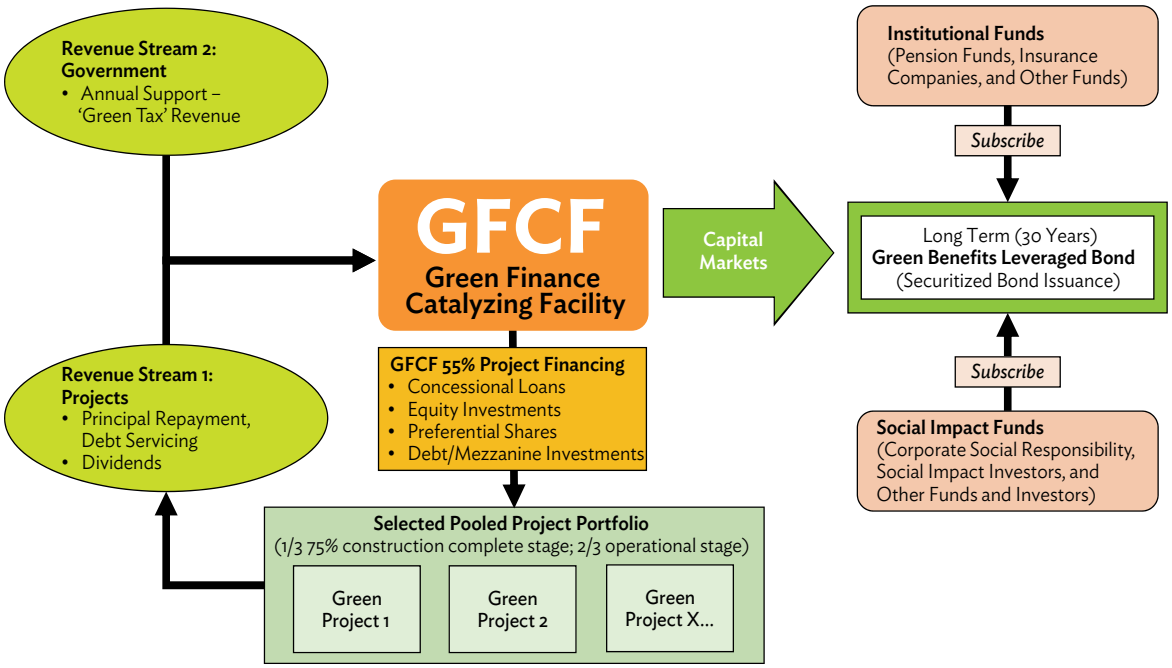
The GFCF has been conceptualized as a ring-fenced entity with government ownership and oversight, nonetheless a separate professional management team for operations management. Hence, a financial institution or a special purpose vehicle (SPV) is envisioned for the professional management of the GFCF. Crucially, both a separate project preparation unit and a financing unit are proposed for the GFCF vehicle to allow it a proactive project development role. Roles for steering committees and advisory boards are also conceptualized and further elaborated in the publication.

V. Taking the Concept Further: From "Cottage Industry" to the "New Normal"

The GFCF concept for the creation of catalytic vehicles to bridge the demand–supply gaps in private sector funding flows to green infrastructure will hopefully be used as an input for development of such vehicles by governments at national or regional levels, or even for groups of smaller countries. A government would need to develop and adapt the concept further, localized under country and sector considerations. While the publication does not aim to go into the depth of larger policy conditionalities, each country would need to address and conform to good practices for policy, safeguards, regulatory, and enforcement mechanisms impacting green growth development, without which financing mechanisms would be rendered less effective. A country-specific workshop drawing together policy and private sector professionals to debate the GFCF contours suggested in this publication would likely be a good start to frame a GFCF approach for a particular country.

A number of GFCF financing approaches to allow easy adaptation according to the needs and capacities of different governments and countries have been suggested. In some, a very simple approach may be needed, perhaps an initial 40% to 50% concessional debt or grant for projects; in others, a smaller facility size; others allowing for a more sophisticated approach focusing on capital markets access at the outset would

Figure 11: Green Benefits Leveraged Bond



Source: Authors.

be appropriate. Hence, any effort to create a GFCF at a regional (within country or for groupings of smaller countries), country, or sector level will need to be accompanied by: (i) an assessment of the local context; (ii) an identification of which GFCF financing options are appropriate; and (iii) a capacity building program to improve the systems, institutions, skills, and understanding of officials and investors for the chosen mechanism, approaches, and financing options.

While the exact contours of such vehicles may be different in relation to the needs of local circumstances, the GFCF principles and rationale (Figure 6) will continue to be relevant. The need to proactively build pipelines of bankable green infrastructure projects is now urgent, given the long gestation and major impact that infrastructure has on the region and the planet's resources. Better leveraging of sovereign funds to catalyze large volumes of private finance is therefore the key to building momentum for a green finance system and for moving green finance, a "cottage industry" according to the UNEP Inquiry into the Design of a Sustainable Financial System, to mainstream financing—becoming the "new normal" for sustainable infrastructure and economic development.[12]

[12] UNEP et al. 2016. Green Finance—A Growing Imperative. *A Briefing*. Geneva.

Photo Credits: ADB, *(except for Indian farmer)* Anouj Mehta.

Photo Credit: ADB.

PART A

The Green Finance Priority

1. The World's Natural Capital at the Tipping Point

The accumulated impacts from years of development activities globally have led to an over exploitation and inefficient management of the world's natural capital—its environmental resources are now considered at a tipping point and its continued usage patterns are unsustainable. As a result, people's livelihoods are at risk, countries' economic and social development are destabilizing, and there is a visible negative impact on the overall quality of life, especially in developing countries.

A global snapshot reveals:[13]

- From 1990 to 2015, deforestation resulted in 129 million hectares (ha) of **forest** lost, about the size of Thailand deforested every decade.
- More than half of all **wetland** types have been lost since 1900.
- An estimated 30% to 40% of global **land** area is affected by land degradation and desertification, with 10 million ha lost each year.
- By 2025, 48 countries and 35% of the projected global population will experience **water** stress or scarcity.
- **Air** quality limits are exceeded in 98% of monitored cities in low- and middle-income countries with more than 100,000 inhabitants, increasing the risk of lung cancer, heart disease, stroke, and respiratory diseases.
- The rate of **species** loss is estimated to be 1,000 to 10,000 times higher than its natural rate, at least 200 (low estimate) and up to 100,000 (high estimate) species becoming extinct every year.
- Of the global **coral reefs** 27% have been lost, and 58% are potentially under threat by human activity.
- Overfishing threatens more than 85% of **fisheries** globally, with 53% being fully exploited and 32% either overexploited, depleted, or recovering from depletion.

Critical thresholds have been or are going to be crossed, particularly in relation to the over exploitation of natural capital. Such environmental change is largely dependent on population growth and economic development, specifically impacted by energy and transport demand, as well as pressures from urbanization and globalization. Understanding the growth patterns in these major economic drivers and their interrelations helps to address their collective impact and find possible solutions for preserving the environmental benefits on which human societies and economies depend.[14]

There are other emerging environmental issues, such as the increasing amount of plastics—in particular the role played by the effect of microplastics on environments, with an estimated 4.8–12.7 million tons in the ocean.[15] Looking at agriculture, concern is increasing about the impact of climate change on weather patterns and resulting production losses that affect livelihoods and human well-being. At the same time, increasingly concentrated chemical compounds can cause a threat to human, plant, and animal health.[16]

In many areas, environmental degradation and climate change are linked to the destruction of natural habitats, with consequences of species loss, extreme weather events, and rising sea levels leading to environmental insecurity and destabilization. It can also result in displacement and forced migration, air, land, and water pollution, corresponding food insecurity and health issues.

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[13] WHO. 2016. Air Pollution Levels Rising in Many of the World's Poorest Cities. News Release: 12 May 2016. http://www.who.int/mediacentre/news/releases/2016/air-pollution-rising/en/

WWF. 2016. About Our Earth. http://wwf.panda.org/about_our_earth/

[14] UNEP. 2012. GEO 5 – Global Environment Outlook. Environment for the Future We Want. Nairobi. pp. 1–30.

[15] UNEP. 2016. UNEP Frontiers 2016 Report. Emerging Issues of Environmental Concern. Nairobi. pp. 32–43.

[16] UNEP. 2016. UNEP Frontiers 2016 Report. Emerging Issues of Environmental Concern. Nairobi. pp. 54–62.

About 400,000 to 700,000 additional deaths annually are estimated to result from the effects of climate change. Carbon-intensive energy practices and corresponding health impacts are expected to cause 4.5 to 5.3 million deaths annually from 2010 to 2030. In monetary terms—although these figures have to be treated with caution—the combination of such harmful practices with climate change impacts are estimated to result in a loss of 1.7% to 3.2% of global gross domestic product (GDP) annually from 2010 to 2030—with the least developed countries and the poorest populations hit the hardest.[17]

Looking specifically at the Asia and Pacific region, the situation is even more aggravated. Greenhouse gas emissions have grown at a higher rate than the global average, with excessive fossil fuel use and related air quality problems. More than half a million people are estimated to die in the region each year due to outdoor air pollution—over half of which are in the People's Republic of China (PRC). Of the 18 megacities worldwide with severe levels of total suspended particulate matter emissions, 10 are in Asia. Renewable freshwater resources in the region are one third of the global total, although more than half of the world's population live in the Asia and Pacific region. Biofuel production and fuelwood collection have taken their toll on deforestation, particularly in Southeast Asia, with rates 10 times higher than other Asian regions and 5 times higher than the global average.[18]

Asia and the Pacific exhibits growth dynamics and patterns that lack sustainability in many regards, and the potential cost of climate change impact on countries' GDP could go far beyond the global averages, such as for the PRC, India, Indonesia, the Philippines, Thailand, and Viet Nam. These predicted costs of climate change impacts have to be seen in light of an already high burden on the region with regard to, for instance, floods, storms, droughts, and earthquakes. Such natural disasters have resulted in 85% of global deaths and 38% of global economic losses from 1980 to 2009 in the region.[19]

The current design and characteristics of most financial systems exacerbate environment and social impacts which arise from production and consumption of natural capital. This is because these foster short-termism and excessive leveraging aiming at fast profits from investments. This distorts not only financial but also other markets, generating instabilities, for example, in food commodity markets, and making investments in carbon-intensive, inefficient industries profitable. Such behavior by market actors is founded in limited sustainability perspectives, weak policy and regulatory frameworks, and the fact that environmental and social externalities are not yet sufficiently priced in.[20]

Globally and in Asia and the Pacific, the challenges are manifold and their scale is massive. This requires swift institutional action for the development of comprehensive green growth strategies which would lead to innovative and sustainable investments that preserve natural capital and directly contribute to climate change adaptation and mitigation actions.[21]

As an umbrella concept, green growth is emerging therefore as one of the key development strategies if these challenges are to be met and a more sustainable future is to be ensured. Correspondingly, the following section introduces the green growth approach and illustrates its interlinkage to the concepts of green economy and green finance.

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17 DARA and the Climate Vulnerable Forum. 2012. Climate Vulnerability Monitor 2nd Edition. A Guide to the Cold Calculus of a Hot Planet. Madrid. pp. 16–18.

18 ADB. 2016. Key Indicators for Asia and the Pacific 2016. 47th Edition. Manila. B. K. Sovacool. 2014. Environmental Issues, Climate Changes, and Energy Security in Developing Asia. *ADB Economics Working Paper Series: No. 399*. Manila.

19 ADB. 2016. Key Indicators for Asia and the Pacific 2016. 47th Edition. Manila. B. K. Sovacool. 2014. Environmental Issues, Climate Changes, and Energy Security in Developing Asia. *ADB Economics Working Paper Series: No. 399*. Manila.

20 UNEP. 2016. UNEP Frontiers 2016 Report. Emerging Issues of Environmental Concern. Nairobi. pp. 6–16.

21 ADB. 2013. Environment Operational Directions 2013–2020. Promoting Transitions to Green Growth in Asia and the Pacific. Manila.

2. The Green Growth Path to Business "Unusual"

In an ever more populated world, increased living in urban centers, and with fast changing (and demanding) consumption patterns, the pressure on the world's natural resources are immense. However, the planet no longer has the luxury of focusing on a single objective—economic growth—while ignoring its impacts on the environment. Environmental impact objectives must now become visibly more interlinked into every economic decision made and in every strategy formulated. This is the green growth approach, which should be the underpinning for a new business "unusual" development scenario, fully integrating green into a sustainable development strategy.[22]

In a 2011 presentation of its Green Growth Strategy to heads of state and ministers from over 40 countries, the Organisation for Economic Co-operation and Development provided a blueprint for green growth: green growth supports the decoupling of economic growth from carbon emissions, unsustainable resource use, pollution, biodiversity loss, and unequal socioeconomic development.[23] It aims to synergize the objectives of both environmental protection and economic growth, together with reducing poverty, as well as ensuring equitable outcomes in terms of human well-being. As shown in numerous case studies, inclusive low-carbon green growth captures **the triple-bottom line benchmark of enabling economic competitiveness, environmental sustainability, and social equity** (Insert 1: Spotlight on Green Innovations across the Globe).[24] Green growth policy recognizes the nexus between the key natural resources of land, air, and water, and identifies and uses their interlinkages with political, economic, and social systems.[25] This can catalyze innovation in how an economy produces goods, provides healthy living conditions for its people, and manages consumption patterns, leading to renewed investment opportunities.

It is important to emphasize that green growth is not an add-on policy choice for highly developed countries. Green growth, instead, is a paradigm of transformative change toward sustainable development, driven by clear leadership and broad-based ownership.[26] There are several levers to support green growth development (Figure 12) guided by four key elements:

(i) **Productivity gains**: increase natural resource efficiency, support local and regional economies and resource networks, and promote sustainable consumption patterns;
(ii) **Improved management**: develop green business models, encourage cross-sectoral collaboration, promote pilots and peer-to-peer mentoring, build resilience capacities, and incorporate system-wide asset management;
(iii) **Intelligent systems**: develop innovative technologies, use ecosystem-based services, climate-proof urban infrastructure and services, and green infrastructure designs; and
(iv) **Targeted enablers**: unlock green finance, define standards and certifications, offer technical vocational education and training, deploy incentivizing policy instruments, and promote corporate social responsibility.

22 World Bank. 2012. Inclusive Green Growth. The Pathway to Sustainable Development. Washington, D.C.

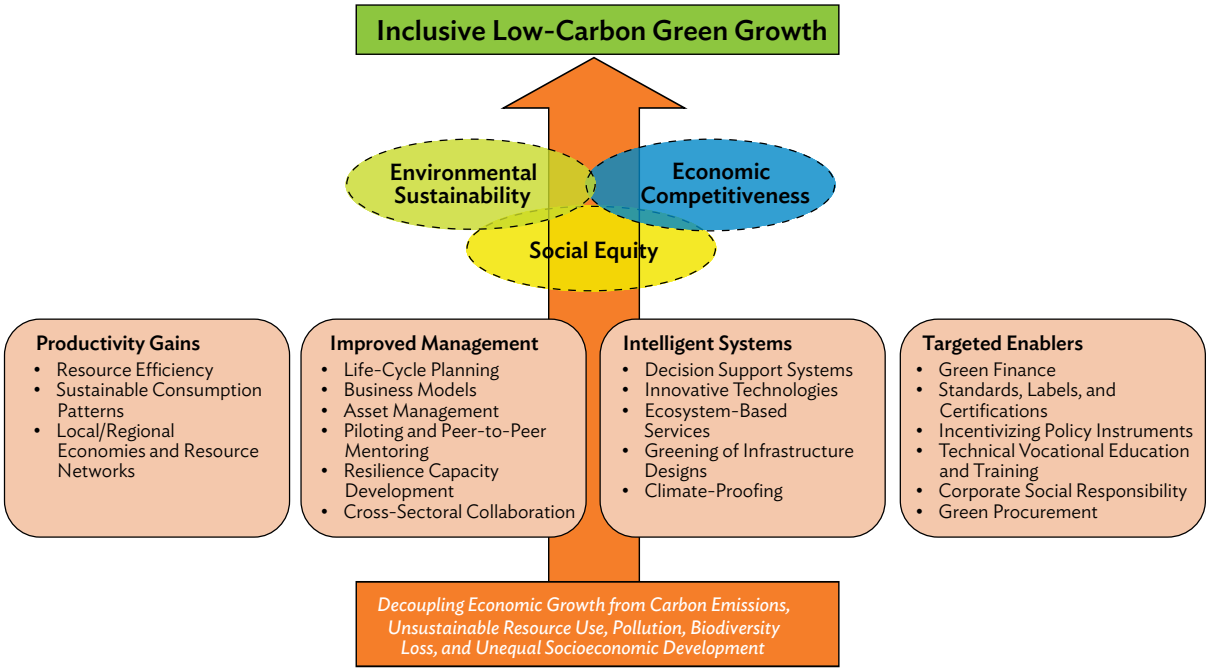
23 OECD. 2011. Towards Green Growth. Paris.

24 Green Growth Best Practice Initiative. 2014. Green Growth in Practice: Lessons from Country Experiences. Seoul (Global Green Growth Institute).

25 GIZ and ICLEI (Local Governments for Sustainability). 2014. Operationalizing the Urban NEXUS: Toward Resource Efficient and Integrated Cities and Metropolitan Regions. Eschborn (GIZ).

26 ADB. 2016. GrEEEn Solutions for Livable Cities. Manila; UNESCAP, ADB, UNEP. 2012. Green Growth, Resources and Resilience: Environmental Sustainability in Asia and the Pacific. Bangkok (United Nations).

Figure 12: Levers of Inclusive Low-Carbon Green Growth



Sources: Authors.

ADB and ADBI. 2012. Policies and Practices for Low-Carbon Green Growth in Asia. Highlights. Study on Climate Change and Green Asia. Manila.

OECD. 2014. Towards Green Growth in Southeast Asia. Solutions for Policy Makers. Paris.

Also see: ADB. 2016. GrEEEn Solutions for Livable Cities. Manila.

These green growth elements face a multitude of constraints: (i) inadequate infrastructure; (ii) low human capital; (iii) inadequate institutions; (iv) insufficient property rights; (v) regulatory uncertainty; (vi) distorting subsidies or incentives; (vii) environmental externalities; (viii) information asymmetries and barriers to fair competition; (ix) low returns on research and development; (x) lack of capabilities and innovation; (xi) limited technology transfers; and (xii) lack of green finance.[27]

Green finance shall be the focus of this publication and how it can be made available and linked to sustainable investments. However, clearly defining the concept of green finance and differentiating it from climate finance should come first.[28]

[27] OECD. 2011. Towards Green Growth. Paris.

[28] UNEP. 2016. Definitions and Concepts. Background Note. UNEP Inquiry: Design of a Sustainable Financial System. Inquiry Working Paper 16/13. Geneva.

3. The Green Finance Concept

Green finance is finance for a sustainable planet. It covers the gamut of financial services, institutional arrangements, country initiatives and policies, and products (debt, equity, insurance, or guarantees) designed to promote the flow of finance towards economic activities and projects. These would actively promote environmental improvement, climate change mitigation and adaptation, and improve efficiencies in natural capital preservation and resource mobilization.

A number of products would fit into this arena including green lending guidelines, green bonds, green banks, carbon finance, green insurance, green initial public offerings (IPOs), green stock indices, green credit, green asset securitization, and green banks. Economic activity areas would include projects in diverse areas such as (i) nonrevenue water reduction, (ii) environmental protection, (iii) forestry expansion, (iv) clean energy, (v) energy savings, (vi) green buildings, and (vii) green transport. While much effort is being made in these areas by different governments, a comprehensive green finance system with a systematic policy and funds framework is still not evident in most developing countries.

Some of the most active steps about developing and promoting a green finance system have been taken under the lead of the People's Republic of China (PRC), leading up to the establishment of a Green Finance Task Force in 2014, conceptualized and convened by Ma Jun, chief economist, People's Bank of China, along with Simon Zadek, co-director, United Nations Environment Programme (UNEP) Inquiry into the Design of a Sustainable Financial System. The PRC also made green finance a priority during its presidency of the G20 in 2016, leading to the first ever inclusion of green finance as a critical topic in the annual communiqué of the summit issued in September 2016. It recognized the importance of scaling up green finance and the need to consider options for increasing private capital for green investment.[29] A G20 Green Finance Study Group was also set up under this thrust in January 2016 and is likely to continue under the German G20 presidency in 2017. Before the 2016 G20 summit, PRC President Xi Jinping launched a set of green guidelines to create a green finance system for the country, including a green financing mechanism to facilitate the economy's transition to sustainable growth, one of the first to take such an initiative. The PRC has also quickly established itself as the largest issuer of green bonds, and its issued green bonds constitute 33% of the world's total.[30]

Addressing the issue of climate financing versus green finance: **green finance** is seen by the G20 as a broader umbrella definition for the major flows of financing needed from all players, whether government, private sector, or capital market investors, which would support more projects beneficial to environment and society, and lead to an overall change in financing making the green impact of a project becomes integral to every financing decision.

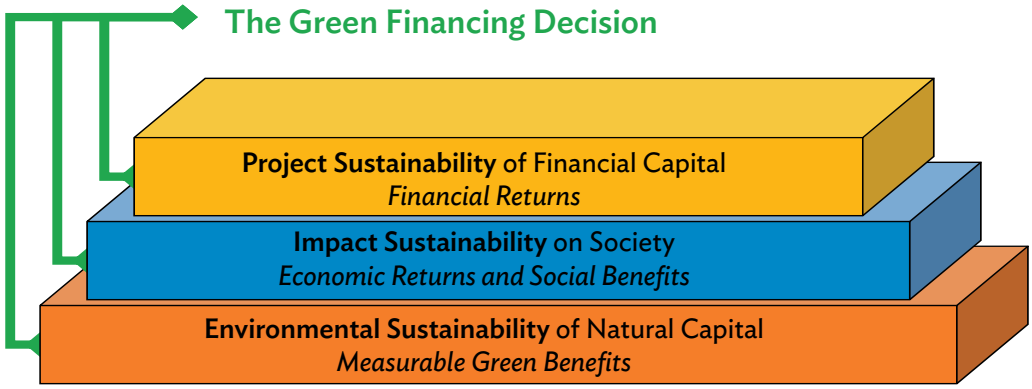
Climate finance can be considered a component of green finance, focusing on financial resources invested into actions for mitigating and adapting to the impacts of climate change. It is still mainly characterized by public finance or public leveraged finance that promotes multilateral efforts to combat climate change through the United Nations Framework Convention on Climate Change (UNFCCC), although it goes beyond solely public sector-led activities. The 2015 Paris Agreement on Climate Change states that financial flows should generally be made "consistent with a pathway toward low greenhouse gas emissions and climate-resilient development."[31] As a subset, mitigation finance relates to projects reducing greenhouse gas emissions, i.e.,

[29] Government of the People's Republic of China, Ministry of Finance. 2016. Communiqué: G20 Finance Ministers and Central Bank Governors Meeting, 26–27 February 2016, Shanghai, China. Beijing. http://www.mof.gov.cn/zhengwuxinxi/caizhengxinwen/201602/t20160227_1795400.html

[30] Climate Bonds Initiative. 2016. Bonds and Climate Change. The State of the Market in 2016. London.

[31] UNFCCC. 2016. The Paris Agreement. http://unfccc.int/paris_agreement/items/9485.php

Figure 13: The Green Financing Decision



Source: Authors.

investments into low-carbon technologies. Adaptation finance, the second subset often interlinked with the concept of resilience, caters for investments into projects that can strengthen communities and infrastructure systems in withstanding impacts of natural disasters and extreme weather events, as well as longer term, often subtle negative changes due to climate change that can lead to a deterioration in living standards. [32]

Correspondingly, climate finance is not identical to green finance, as it does not account for other environmental risks or development objectives.[33] In that sense, green finance covers a broader range of topics that concern environmentally sustainable practices. For instance, the decision on different energy supply sources and technologies, such as wind energy farms, hydropower dams, nuclear power plants, or waste-to-energy facilities, are related to aspects of reducing greenhouse gas emissions, but also raise questions of their construction and operational effects on land, air, and water, related lifecycle costs, as well as risks due to malfunctioning, system independence, and retirement. Another concern for green finance beyond the climate lens relates to the sustainable use of natural resources, which acknowledges the vulnerability of livestock, freshwater, or forests to current practices of linear production and consumption patterns resulting in air pollution, soil degradation, or groundwater exhaustion undermining the foundations of a functioning environment necessary to sustain livable conditions.

Green finance can therefore be regarded as an all-encompassing paradigm shift toward future financing decisions. These extend to the sustainability of the entire ecosystem by fostering green growth through re-calibrating sector investments and job creation to benefit larger groups of people (Figure 13).

Thus, green finance pays off in economic, environmental, and social terms.[34] As the following section will explain, it is this interlinkage that embeds green finance in the broader international development agenda and makes it an important conduit to address development needs.

[32] UNEP. 2016. Definitions and Concepts. Background Note. UNEP Inquiry: Design of a Sustainable Financial System. Inquiry Working Paper 16/13. Geneva.

[33] UNEP. 2016. Definitions and Concepts. Background Note. UNEP Inquiry: Design of a Sustainable Financial System. Inquiry Working Paper 16/13. Geneva.

[34] New Climate Economy. 2016. The Sustainable Infrastructure Imperative: Financing for Better Growth and Development. The 2016 New Climate Economy Report. Washington D.C./London (World Resources Institute/Overseas Development Institute).
UNEP. 2011. Towards a Green Economy. Pathways to Sustainable Development and Poverty Eradication. A Synthesis for Policy Makers. Nairobi.

INSERT 1

Spotlight on Green Innovations across the Globe

While large green infrastructure play a major role in shifting economies to more sustainable pathways, smaller-scale initiatives can also catalyze models of technological, economic, and social approaches to transformative change—which can be critical inputs for innovation by related industries and sectors, private sector and civil society.

Ocean Cleanup: Floating system powered by ocean currents acts as artificial 100-meter coastline catching and concentrating debris of the Great Pacific Garbage Patch
http://www.abc.net.au/news/2016-07-06/ocean-cleanup-technology-aims-to-tackle-pacific-garbage-patch/7573326

Factory-Made High-Rise: At a speed of three stories per day 100% pre-fabricated off-site modules assembled to 57-story skyscraper with more than 800 apartments and office space for 4,000 workers
http://edition.cnn.com/2015/06/26/asia/china-skyscraper-prefabricated/

Udaipur: Leading smart cities in 100% LED street lights deployment
http://www.udaipurkiran.com/udaipur-leads-smart-cities-in-led-street-lights-deployment/

Vertical Greenhouse: Construction of Plantagon vertical greenhouse planned in Linköping as international model plant to present methods, symbiotic systems and technologies to enable large cities produce their own food through urban agriculture
http://www.hortidaily.com/article/26957/Sweden-Construction-of-Plantagon-vertical-greenhouse-planned-for-2017

Eco-Design Computer: iameco PC using 98% recyclable materials and copper piping system as heat sinks reducing carbon footprint by 70% over typical PC models
http://www.dailymail.co.uk/sciencetech/article-2185360/A-chip-old-block-Meet-environmentally-friendly-planet--WOOD.html#ixzz4WCY7DsIN

Efficient Cooking Stoves: Intuitive-use firewood stoves for Rwandan households with subsidy and installment scheme saving 80% energy, reducing deforestation, and saving 40,000 tons of carbon dioxide per year
https://www.atmosfair.de/en/energieeffizienz/rwanda

Water-Saving Toilets: Yiyuan Environmental Group patented technology for toilets saving up to 83% of water compared to conventional 6-liter models
http://www.makingitmagazine.net/?p=8090

Radbahn: Proposed five-and-a-half mile protected bike lane under street-level subway bridge to connect east and west sides of Berlin
http://www.citylab.com/commute/2016/07/why-a-city-wide-bike-lane-might-be-a-piece-of-copenhagen-in-berlin/491534/?utm_source=SFFB

Flexi-Pave: Using porous, 'thirsty', concrete made from stones and recycled tires in walkways throughout Yellowstone national park to absorb 50 gallons of water per minute that absorbs 50 gallons of water a minute
http://www.businessinsider.com/thirsty-concrete-yellowstone-national-park-2016-10

Safe Water Books: Combined safe water instruction manual and recyclable, biodegradable bacteria-killing silver and copper nanoparticles water filter cleaning dirty water into 99.9% pure drinking water without head, electricity, or pumping needs
http://www.secondwavemedia.com/southwestmichigan/innovationnews/Paper-produced-a-WMU-used-n-drinkable-book-1117.aspx

Big Cleaning Day: Nationwide cleanup campaign with more than 50,000 volunteers use specific software to map illegal waste in Estonia and then clean up 10,000 tons with support of more than 40 waste management companies
http://www.eco-innovation.eu/index.php?option=com_content&view=article&id=148:gps-based-map-helps-50000-volunteers-in-cleaning-illegal-garbage-dumps&catid=56:estonia

Compostable Stretch Fabric: Regionally sourced blend of linen, hemp, and modal made into 100% compostable, biodegradable fabric and garments with thread and selvage
http://www.triplepundit.com/2014/12/swiss-company-develops-sharp-looking-compostable-fabric/

Portugal: Electricity consumption fully covered by solar, wind, and hydro power in 4 consecutive days
https://www.theguardian.com/environment/2016/may/18/portugal-runs-for-four-days-straight-on-renewable-energy-alone

Radiant Cooling Technology: Infosys piloted 30% more efficient radiant slab and radiant panel based cooling system piloted in first commercial building in India, becoming biggest worldwide.
http://www.eeb-toolkit.com/index.php/modal-skanksa-modal?id=164

ByFusion: Low-emission and non-toxic transformation of all types of plastic waste into a 100% recycled building material alternative with modular technology platform
https://www.indiegogo.com/projects/transforming-plastic-to-save-our-planet#/

Nanjing: Rehabilitation project improves water quality of Qinhuai River, dredging water way of sludge, constructing sewage pipelines and pumping stations, and transforming flood-prone villages into scenic wetlands
https://www.adb.org/news/videos/rehabilitation-efforts-bring-key-nanjing-river-back-life

Wattway: Polycrystalline silicon solar panel material on top of pre-existing roads planned as solar road with one household powered for every 4 meters of Wattway
http://www.huffingtonpost.ca/2016/02/11/france-solar-road-wattway_n_9190024.html

Joint-Use Schoolyards: Benefits of opening schoolyards up to the local community shown with increased civic and private investment in joint-use programs in San Francisco and New York City show benefits of
http://www.theatlantic.com/education/archive/2016/04/playgrounds-for-all/480453/

Sources: As indicated in the boxes.

For further material on the private sector's contribution to green growth see: Donor Committee for Enterprise Development. 2017. Green Growth. http://www.enterprise-development.org/implementing-psd/green-growth/

4. Road Maps from International Development Agendas

Green growth and green finance are the conduits to achieving ambitious road maps and targets outlined by recent global agreements for sustainable development. These include:

- The **Sustainable Development Goals** capture 17 cross-sectoral goals with 169 targets as the overarching development framework for the coming 15 years.[35]
- The **United Nations Climate Change Conference (COP 21)** resulted in the Paris Agreement, limiting global temperature rise to less than 2°C over preindustrial levels.[36]
- The **Third International Conference on Financing for Development** advanced the 2002 Monterrey Consensus to guide international development cooperation under the premise of financing for development.[37]
- The **Sendai Framework for Disaster Risk Reduction** outlines priority actions and global targets to advance disaster preparedness and risk reduction.[38]
- The **Habitat III Conference** produced the New Urban Agenda toward sustainable urban development and cities for all.[39]

Looking at the context of the Asia and Pacific region, achieving many of the goals flowing from the above is a particularly complex task, where the development challenges remain daunting in light of a dynamically changing development landscape and a keen demand for economic growth for alleviating poverty over all else in many instances.

In the context of the Asia and Pacific region, achieving many of the goals outlined by the above agreements is a complex task. Prioritizing and balancing basic development needs continues to remain a daunting challenge. In Asia and the Pacific, close to half a billion people lack access to electricity, 700 million people cannot access clean water, and 1.7 billion people do not have access to basic sanitation.[40] More than half a billion people in the region live in urban slums with insufficient basic services and livelihood opportunities.[41] Needs are vast and increasing, as population growth continues, while natural disasters and climate change impacts are aggravating these issues.[42]

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35 UNDESA. 2016. Sustainable Development Goals. Sustainable Development Knowledge Platform. https://sustainabledevelopment.un.org/?menu=1300

United Nations. 2015. Transforming Our World: The 2030 Agenda for Sustainable Development. Resolution adopted by the General Assembly: 25 September 2015. New York.

36 UNFCCC. 2016. The Paris Agreement. http://unfccc.int/paris_agreement/items/9485.php
UN. 2015. Paris Agreement. New York.
For latest developments: UNFCCC. 2016. Marrakech Climate Change Conference – November 2016. http://unfccc.int/meetings/marrakech_nov_2016/meeting/9567.php

37 UN-DESA. 2016. Financing for Development. http://www.un.org/esa/ffd/
UN. 2015. Addis Ababa Action Agenda of the Third International Conference on Financing for Development. New York.

38 UNISDR. 2016. Sendai Framework for Disaster Risk Reduction. http://www.unisdr.org/we/coordinate/sendai-framework
UN. 2015. Sendai Framework for Disaster Risk Reduction 2015 – 2030. Geneva

39 UN-Habitat. 2016. The New Urban Agenda. http://habitat3.org/the-new-urban-agenda
United Nations. 2016. Draft Outcome Document of the United Nations Conference on Housing and Sustainable Urban Development (Habitat III). New York.

40 World Bank. 2016. World Development Indicators. Database. http://data.worldbank.org/data-catalog/world-development-indicators

41 UN-Habitat. 2016. State of the World's Cities 2016. Urbanization and Development. Nairobi.

42 ADB. 2013. The Economics of Climate Change in the Pacific. Manila.
ADB. 2013. The Economics of Climate Change in East Asia. Manila
ADB. 2009. The Economics of Climate Change in Southeast Asia: A Regional Review. Manila.
ADB. 2014. Assessing the Costs of Climate Change and Adaptation in South Asia. Manila.
Note: ADB report for Central and West Asia is forthcoming.

The key trends that define the region's development agenda include:

- **Rapid Urbanization**: Asia and the Pacific is rapidly undergoing a shift to a dominantly urban region (Box 1) leading to the development of several megacities, requiring serious paradigm shifts in institutional decision making for improving livability. Cities face a continuous influx of citizens from rural to urban areas, increasing stress on natural resources resulting from skewed planning processes, inefficiencies in energy use, transport systems and industrial practices, leading to significant health impacts and degrading quality of life.
- **Population and Demographic Changes**: Demographic changes due to increasing lifespans, leading to ageing populations that demand responses of equal importance to those of youth employment.[43]
- **Changing Societies and Consumer Demand Patterns**: With societal changes come changing consumer demand patterns, driven by rapid growth in countries in the region to middle income status, and a shift to knowledge based economies, rapid digitization, and e-commerce. The increasing demand for mobile and fixed broadband infrastructure could be a strong enabler for catalyzing faster and more efficient institutional solutions beyond traditional boundaries.
- **Reliance on Resources-Driven Growth**: Growth patterns of many emerging economies in Asia and the Pacific region have been resource-intensive, requiring innovation and strategies for a shift to more environmentally efficient and less resource-dependent industries, services and economies.[44]
- **Rising Awareness of Inequalities**: Income and opportunity inequality have been rising and widening since the early 1990s. This weakens the support for growth-enhancing reforms and dampens the impact of growth on poverty reduction, resulting in less inclusive and less pro-poor growth compared to Asia's past.[45]
- **Volatility in Input Factors**: The Asia and Pacific region is highly vulnerable to fluctuations in energy and food prices, with disastrous impacts on peoples' livelihood. At the same time, the market for green technologies is vast and growing and presents a mitigating opportunity. Many countries have the advantage of creating new green jobs through investments into the knowledge sector and workforce training, which will provide for the competitive edge in a green marketplace.[46]
- **Climate Change**: Climate change and risks from natural disasters continue to be significantly on the increase, with many Asian countries among the most vulnerable with regard to risks from flooding, droughts, damage to ecosystems and biodiversity, and losses in labor productivity due to higher temperatures.[47]
- **Regional Cooperation**: Based on green growth activities and strengthening forms of coordination and collaboration across borders, Asia and the Pacific region has several subregional commissions, economic zones, and connective corridors that also encourage knowledge sharing and peer-to-peer mentoring.[48]

Green growth financing strategies which integrate policy shifts toward low-crbon and integrated cross-sector development, innovative instruments for financing and technology advancement, would provide a timely response to the challenges outlined above. These would help to bridge economic growth and environmental sustainability extending to poverty alleviation. The outlook for countries in the region in promoting green finance for a green economy is clearly promising.[49]

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43 ADB. 2016. Key Indicators for Asia and the Pacific 2016. 47th Edition. Manila.

44 UNESCAP and KOICA. 2012. Low Carbon Green Growth Roadmap for Asia and the Pacific. Turning Resource Constraints and the Climate Crisis into Economic Growth Opportunities. Bangkok (United Nations).

45 ADB. 2016. Key Indicators for Asia and the Pacific 2016. 47th Edition. Manila.

46 UNESCAP and KOICA. 2012. Low Carbon Green Growth Roadmap for Asia and the Pacific. Turning Resource Constraints and the Climate Crisis into Economic Growth Opportunities. Bangkok (United Nations).

47 L. A. Reis et al. 2016. Theme Chapter Background Paper—The Economics of Greenhouse Gas Mitigation in Developing Asia. In: ADB. 2016. Asian Development Outlook 2016 Update: Meeting the Low-Carbon Growth Challenge. Manila.

48 See for instance: ADBI. 2016. Connecting Asia. Infrastructure for Integrating South and Southeast Asia. Cheltenham/Northampton (Edward Elgar).

49 UNESCAP and KOICA. 2012. Low Carbon Green Growth Roadmap for Asia and the Pacific. Turning Resource Constraints and the Climate Crisis into Economic Growth Opportunities. Bangkok (United Nations).
ADB and ADBI. 2012. Policies and Practices for Low-Carbon Green Growth in Asia. Highlights. Study on Climate Change and Green Asia. Manila.

Box 1: The Green Growth Necessity for Sustainable Urbanization

It is no coincidence that green growth and sustainable urban development often appear in tandem in the debate about future development challenges and solutions. Cities generate more than 80% of global gross domestic product, but they also consume two-thirds of global energy supply and emit more than 70% of the world's greenhouse gas emissions. In a predominantly urban world, Asia's rate of urbanization stands out. The region is estimated to add another 1.3 billion urban dwellers by 2050, then hosting more than half of the world's urban population with 3.3 billion people.

Cities are the centers of political, economic, and social life. Their resource consumption requires policies steered toward green growth. They also offer productive grounds to make green growth happen. This concerns regional supply chain networks, agglomeration economies, or new green jobs for instance in businesses specializing in the manufacturing of alternative energy modules or in policy programs for energy-efficient retrofitting of buildings. Cities are also culturally important as they influence how people consume and behave in everyday life, for instance, with regard to environmentally friendly behavior or the conscious consumer decisions in favor of recycled materials. In cities, research and training institutes are concentrated in large numbers and provide the capacity building in disciplines needed to innovate technologies, and bridge the gap between research and development and practical application. Cities with more green space, permeable surfaces, and disaster-resilient infrastructure also emit fewer emissions, thereby benefitting residents' health and well-being and incrementally increasing populations' and businesses' resilience against extreme weather events. The density and multitude of different actors from government, the private sector, and civil society make cities a hotbed for collaboration on green growth initiatives.

Furthermore, a policy advantage of the city level is that municipal governments often have some leeway in trying out new approaches and piloting innovative mechanisms to support green growth initiatives. Nevertheless, it requires an upscaling of corresponding successful green growth programs and mainstreaming of related approaches into national-level strategic planning, policymaking, and budgeting. Attention is required for both: putting in place enabling policies and funding, as well as realigning existing mechanisms and regulations, to incentivize greener investments and practices.

Sources:

ADB. 2016. GrEEEn Solutions for Livable Cities. Manila.

OECD. 2011. Towards Green Growth. Paris.

OECD. 2013. Green Growth in Cities. Paris.

New Climate Economy. 2016. The Sustainable Infrastructure Imperative: Financing for Better Growth and Development. The 2016 New Climate Economy Report. Washington D.C./London (World Resources Institute/Overseas Development Institute).

UNDESA. 2014. World Urbanization Prospects: The 2014 Revision. New York.

UN-Habitat. 2016. State of the World's Cities 2016. Urbanization and Development: Emerging Futures. Nairobi.

For Asia and the Pacific region to embark on such integrated green growth strategies would require enabling frameworks and institutional systems to catalyze finance, without which the region would increasingly struggle.[50] The quantum of financial requirements underscores the scale of the challenge. The following section will illustrate three different perspective on finance needs for development.

[50] Nakao, Takehiko. 2017. ADB's New Strategy in Asia: Helping Build Quality Infrastructure at Scale. Op-Ed: 10 January 2017. Manila (ADB). https://www.adb.org/news/op-ed/adbs-new-strategy-asia-helping-build-quality-infrastructure-scale

5. The Financing Needs and Gaps

The quantum of the huge finance investment needs of governments, especially in Asia and the Pacific, varies. This need for financial investment can be viewed from different perspectives: (i) general infrastructure investment needs to fulfill shortfalls in development; (ii) the additional finance costs associated with climate change mitigation and adaptation, for which green growth investments play a crucial role; and (iii) the needs to achieve global agreements for sustainable development. Such perspectives are not mutually exclusive, nor can they be added up. They indicate the extent of investment needed in business-as-usual scenarios compared to sustainable development scenarios. Together they provide an illustration of the scale of green finance needed in the Asia and Pacific region.

One can combine baseline estimates (business-as-usual needs to sustain economic growth projections) with additional finance required to meet climate change targets under the 2°C scenario in accordance with the Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC).[51] The Asian Development Bank's most recent analysis concluded that baseline estimates with climate change mitigation and adaptation costs amounts to about $1.7 trillion annual infrastructure investment needs for developing Asia from 2016 to 2030—significantly higher than previous estimates (Figure 14).[52]

With regard to sectoral distribution, energy accounts for about 56.3% of these investment needs, transport has a share of 31.9%, telecommunications require 8.7% of these investments, while water and sanitation investment needs are tagged at 3.1%.

With reference to regional distribution, countries in the Pacific are estimated to require 9.1% of their gross domestic product (GDP) in climate-adjusted infrastructure investments, followed by South Asia with about 8.8%, Central Asia with 7.8%, Southeast Asia with 5.7%, and East Asia with 5.2%. However, in absolute terms, this would translate in the largest investment needs to be found in East Asia, with an annual average of about $1.1 trillion—or 61.4% of all climate-adjusted investment needs from 2016 to 2030.

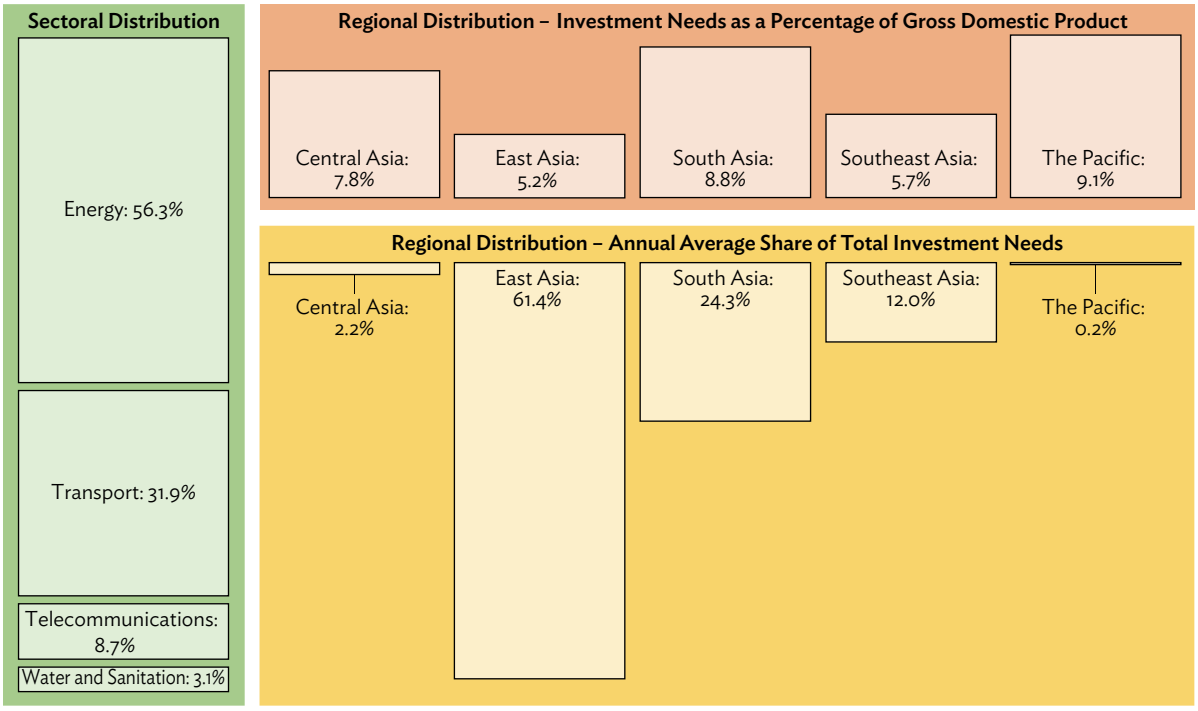
An analysis of these investment needs begs for a comparison with current investment levels to identify the gap in between. Looking at the period from 2016 to 2020, it is estimated that this gap will increase by about 2.4% of projected GDP across developing Asia. However, taking out the People's Republic of China from that equation, other countries will rather face a gap of about 5% of their projected GDP.

In relation to a discussion of these investment needs and gaps is the question about benefits from mitigation and adaptation-related investments, which can have significant cobenefits. If carbon markets worked effectively, mitigation policy costs for developing Asia will be reduced due to efficiency gains from better technologies, smaller investments in less sustainable infrastructure, and cobenefits from reduced secondary impacts to

[51] UNFCCC. 2016. The Paris Agreement. http://unfccc.int/paris_agreement/items/9485.php
UN. 2015. Paris Agreement. New York.

[52] ADB. 2017. Meeting Asia's Infrastructure Needs. Manila.
In comparison to previous estimates in:
ADB and ADBI. 2009. Infrastructure for a Seamless Asia. Manila and Tokyo.
B.N. Bhattacharyay, M. Kawai, R. Nag. 2012. Infrastructure for Asian Connectivity. Manila (ADBI/ADB and Edward Elgar).
Green Growth Action Alliance. 2013. The Green Investment Report: The Ways and Means to Unlock Private Finance for Green Growth. Geneva (World Economic Forum).
McKinsey & Company. 2016. Financing Change: How to Mobilize Private-Sector Financing for Sustainable Infrastructure. Detroit. pp. 12, 24, 25.

Figure 14: Estimated Climate-Adjusted Infrastructure Investment Needs in Developing Asia (2016–2030)



Source: ADB. 2017. Meeting Asia's Infrastructure Needs. Manila. p. xiv.

environment, economy, and society (Box 2).[53] However, these effects can only be achieved when swift actions are taken and the systems are in place to advance low-carbon technologies, provide green finance, and develop mechanisms and markets for carbon markets.

With regard to adaptation, extreme weather-induced disasters in the Asia and Pacific region have resulted to $750 billion in losses from 2003 to 2013.[54] Recovering from disasters and losses, as well as climate-proofing existing infrastructure will result in additional costs (Figure 14).[55] However, despite the costs, most infrastructure-type adaptation provides a net benefit over later operation and maintenance and replacement costs for infrastructure whose design has not been climate proofed. Overall, building resilience into existing systems will provide net benefits over inaction and unmitigated climate change impacts.[56]

[53] L.A. Reis et al. 2016. Theme Chapter Background Paper—The Economics of Greenhouse Gas Mitigation in Developing Asia. In: ADB. 2016. Asian Development Outlook 2016 Update: Meeting the Low-Carbon Growth Challenge. Manila.

[54] UNEP. 2015. Aligning the Financial Systems in the Asia Pacific Region to Sustainable Development. UNEP Inquiry: Design of a Sustainable Financial System. Geneva. P. 12.

[55] ADB. 2013. The Economics of Climate Change in East Asia. Manila.
ADB. 2013. The Economics of Climate Change in the Pacific. Manila.
ADB. 2009. The Economics of Climate Change in Southeast Asia: A Regional Review. Manila.
ADB. 2014. Assessing the Costs of Climate Change and Adaptation in South Asia. Manila.
Note: ADB report for Central and West Asia is forthcoming.

[56] IPCC. 2014. Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II, and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva.
World Bank. 2010. The Costs of Adapting to Climate Change for Infrastructure. Discussion Paper: No. 2, August 2010. Washington, D.C.

Box 2: Economic Benefits from Climate Change Mitigation

The economic benefits of climate change mitigation (avoided damages due to less climate change and cobenefits) will exceed mitigation costs by 2025 in an "optimal" scenario of early action. In gross terms, the optimal 2°C scenario leads to policy costs for developing Asia that reach nearly 2% of gross domestic product by 2030, peak in 2035, and then decline to 1.7% of gross domestic product by 2050. At the same time, mitigation leads to substantial cobenefits from improved air quality, even when measured against improving air pollution control through end-of-pipe measures. By 2050, up to 600,000 additional deaths from particulate matter and ozone pollution are averted annually, and nearly 7 million tons of crops are not destroyed under the 2°C scenario. Over the longer term, avoided economic losses from climate change—such as avoided losses in agriculture and labor productivity, avoided increases in storm damage, and losses from lower tourism—become the dominant source of benefits. Benefits and cobenefits collectively exceed policy costs of the 2°C scenario by the early 2020s, and policy costs involved generate a 11–22% internal rate of return (without or with functioning international carbon market trade), which is far above most public investments.

Source: L.A. Reis et al. 2016. Theme Chapter Background Paper—The Economics of Greenhouse Gas Mitigation in Developing Asia. In: ADB. 2016. *Asian Development Outlook 2016 Update: Meeting the Low-Carbon Growth Challenge.* Manila.

Taking another perspective, the above estimated investment needs could be complemented by other estimates that take into account the implementation costs of measures related to, for instance, the Sendai Framework for Disaster Risk Reduction or the New Urban Agenda.[57]

Focusing on the major guiding agenda for the coming years—the SDGs—it is hard to calculate precise figures, as a myriad of methodological considerations needs to be taken into account.[58] It is estimated that $5 trillion to $7 trillion will be needed annually for the implementation of the SDGs. However, developing countries are not likely to meet these investment requirements, with a potential annual gap of $2.5 trillion in key infrastructure sectors and related areas.[59] Limited approximations for low- and lower-middle-income countries estimate the development investment needs at about 11% of projected GDP per year from 2015 to 2030 and the incremental climate mitigation and adaptation investment needs at more than 1% of GDP, totaling the overall needs at 12% to 13% of GDP, of which private commercial financing is estimated at 39% to 45%.[60]

Although different sources come up with widely different estimates, it can be stated that energy and transport are the two major areas requiring significant additional investment related to the SDGs—which is in line with

[57] UNISDR. 2016. Sendai Framework for Disaster Risk Reduction. http://www.unisdr.org/we/coordinate/sendai-framework
UN. 2015. Sendai Framework for Disaster Risk Reduction 2015–2030. Geneva.

[58] A detailed discussion and set of data is provided by the Sustainable Development Solutions Network: Schmidt-Taub, Guido. 2015. Investment Needs to Achieve the Sustainable Development Goals: Understanding the Billions and Trillions. SDSN Working Paper: Version 2, 12 November 2015. Paris/New York (SDSN). http://unsdsn.org/resources/publications/sdg-investment-needs/
UNDESA. 2016. Sustainable Development Goals. Sustainable Development Knowledge Platform. https://sustainabledevelopment.un.org/?menu=1300
United Nations. 2015. Transforming Our World: The 2030 Agenda for Sustainable Development. Resolution adopted by the General Assembly: 25 September 2015. New York.

[59] UNEP. 2016. Green Finance for Developing Countries: Needs, Concerns and Innovations. Nairobi.

[60] G. Schmidt-Taub. 2015. Investment Needs to Achieve the Sustainable Development Goals: Understanding the Billions and Trillions. Table B.3: Annual incremental investment needs by investment area in LICs and LMICs as % of projected GDP expressed in market prices. Sustainable Development Solutions Network (SDSN) Working Paper: Version 2, 12 November 2015. Paris/New York (SDSN). http://unsdsn.org/resources/publications/sdg-investment-needs/

the baseline and climate-adjusted infrastructure investment needs discussed above.[61] While these figures provide a ballpark estimate of finance needs, caution is required as they focus on low-income and lower middle-income countries globally and do not yet account for all investment needs related to the various (infrastructure) subsectors, as well as additional expenditures for certain climate change adaptation and mitigation measures.

These perspectives focus attention on crucial issues, such as:

- What will be the additonal sources of funding to meet the $5 trillion to $7 trillion annual investment needed to implement the SDGs globally, given that there is a $2.5 trillion annual investment gap already visible in developing countries in areas such as infrastructure, clean energy, water and sanitation, and agriculture?
- How will the needs of the startling $1.7 trillion per year for climate-adjusted investments in developing Asia from 2016 to 2030 be served? The Asian Development Bank has estimated that from 2016 to 2020 fiscal reforms in developing Asia could provide about 40% to closing the infrastructure investment gap, which leaves 60% (or about $250 billion per year) for the private sector.

These issues frame the "green bankability conundrum", discussed in Part B of this publication, with regard to the extended role of the private sector, available green finance sources versus challenges and constraints.

[61] Development Finance International and Oxfam. 2015. Financing the Sustainable Development Goals: Lessons from Government Spending on the MDGs. Table 2.2: Additional Public Spending for the SDGs.p. 30. London.

Photo Credits: ADB.

Photo Credit: ADB.

PART B

The Green Bankability Conundrum

1. Sourcing Green Finance: From Public to Private

Closing the green financing gap, specifically concentrating on infrastructure in developing countries, will require a significant change in the pattern of financing such infrastructure, which traditionally has been a largely public (this means government or government-backed) financed domain. While vast differences exist in the patterns of financing between countries, infrastructure financing in Asia and the Pacific region in general is broadly estimated to be 70% from public funding (government budgets and national development banks), 20% from private funding, and about 10% from multilateral development banks, official development assistance, and other sources.[62] However, in 2011 public share was estimated as above 99% in the People's Republic of China, about 90% in Indonesia, and 57% in India.[63] This pattern of funding is often identified as a central reason for the accelerating infrastructure financing gap in many countries, with governments simply unable to meet their basic financing needs.

The Rising Private Sector Need. Various projections have been made in terms of the amount of financing needed from the private sector, with McKinsey (focusing on "sustainable infrastructure investments") suggesting an equal required share of financing from government (and their national development banks) and the private sector both at about 45.5% of the investment gap, 6% from multilateral development banks, and 3% from official development assistance.[64] The Green Growth Action Alliance, focusing on "green investment," proposes that public investment could on average leverage private finance by a ratio of 1:4 or 1:5, thus tagging the public share of the investment gap at about 20% and the private share at about 80%.[65] Some country-specific estimates see this ratio to be even sharper, as in the case of the People's Republic of China, where the overall private share of green investment is tagged at 85% to 90%.[66] Regarding the type of private finance, an equity share of 30% to 40% to a debt share of 60% to 70% appears common.[67] All these show an almost complete reversal in financing, with heavy dependence on the private sector to finance nearly 80% of infrastructure in many countries.

The T.I.M. Paradigm. However, two other interlinked aspects are increasingly, perhaps even more than finance alone, critical in considering why public sector cannot meet the needs of green infrastructure development: ***T***echnology innovation and paradigm shifts in ***I***mplementation improvements and ***M***anagement efficiencies are now critical in optimizing resource management— the **T.I.M. Paradigm**. Responding to demands for improved quality of life, it is imperative to shift from unilateral approaches to multisector, prioritize projects to scale rightfully service provisions and benchmark to international good practices, so that projects, such as in water supply and sanitation, can be benchmarked to international standards. In a vicious spiral, for instance, outdated technology usage might be cheaper for initial capital investment, but both highly inflationary for subsequent operational costs and inefficient in usage of the natural capital, broadly encompassing land, air, and water resources of the project. Management efficiencies in curbing transmission and distribution losses in an energy project might be seen to be even more fundamental to a project than simply investing in new assets

62 G. Inderst. 2016. Infrastructure Investment, Private Finance, and Institutional Investors: Asia form a Global Perspective. ADBI Working Paper Series: No. 555, January 2016. Tokyo. p. 9.

63 ADB. 2016. Infrastructure Needs in Asia: Bridging the Gap. Manila.

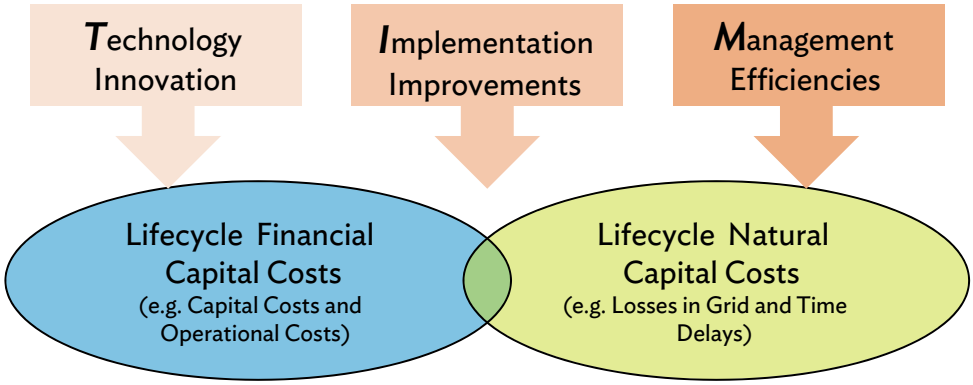
64 McKinsey & Company. 2016. Financing Change: How to Mobilize Private-Sector Financing for Sustainable Infrastructure. Detroit. p. 7.

65 Green Growth Action Alliance. 2013. The Green Investment Report: The Ways and Means to Unlock Private Finance for Green Growth. Geneva (World Economic Forum). p. 18.

66 Green Finance Task Force. 2015. Establishing China's Green Financial System. Report of the Green Finance Task Force. Beijing (The People's Bank of China & UNEP Inquiry). p. 5.

67 UNEP. 2014. Demystifying Private Climate Finance. Geneva.
Green Growth Action Alliance. 2013. The Green Investment Report: The Ways and Means to Unlock Private Finance for Green Growth. Geneva (World Economic Forum).

Figure 15: The Technology Implementation Management Paradigm for a Finance Plus Approach to Project Development



Source: Anouj Mehta, ADB.

under a poor management structure. Hence, the triple impetus—technology innovation, implementation improvements, management efficiencies—along with money, or "Finance Plus," is especially critical for greening infrastructure financing, and requiring a greater private sector participation in financing (Figure 15).

The Current Private Sector Focus: Globally, private sector financing for infrastructure accounts for half of all infrastructure investments, and is most active in the energy sector, with water and sanitation sector having the lowest total investments (Table 1).[68] Overall, East Asia and the Pacific ranked second after Latin America and the Caribbean in terms of private sector participation in infrastructure projects during 1990–2015.[69]

However, in the Asia and Pacific region, there is considerable need for an increase in the private sector flows especially in high priority subsectors which continue to face investment shortfalls, for instance neglected subsectors such as water supply, sanitation, non-national road networks, railways, and energy distribution, amongst others. Any increase in this flow of private funds is highly dependent on two main considerations: tapping a deeper subset of private sector financing sources, and tailoring project pipelines to offer different risk profiles that match the requirements of different private sector financing sources.

Table 1: Private Participation in Infrastructure (1990–2015)

	Projects Reaching Financial Closure		Investment in Projects ($ million)	
Sector	Global	East Asia and Pacific	Global	East Asia and Pacific
Energy	3,433	976	899,487	177,117
Transport	1,711	396	558,666	99,893
Telecoms	869	83	1,040,370	120,859
Water and Sanitation	967	517	84,083	32,124

Note: Table provides summary values for energy (electricity and natural gas) and transport (airports, ports, railways, and roads).

Source: Adapted from World Bank. 2016. Private Participation in Infrastructure Database. http://ppi.worldbank.org/

[68] McKinsey & Company. 2016. Financing Change: How to Mobilize Private-Sector Financing for Sustainable Infrastructure. Detroit. p. 7.

[69] World Bank. 2016. Private Participation in Infrastructure Database. http://ppi.worldbank.org/

2. More than Public–Private Partnerships

"Private sector financing" can be mistakenly thought of as simply public–private partnerships (PPPs), which includes a strategic deployment of the private sector in a project along with finance. However, PPPs are only a part of the various financing sources available. In some sectors and countries, it can be difficult to implement, given political or end user perceptions which may take time to address. All sources of finance that are not from government budgets or sovereign guarantees should be considered as "private sector finance," which would then include commercial bank debt, private equity funds, capital markets, corporate social responsibility (CSR) funds, nonbank financial institutions, and especially institutional and retail investor funds.

Commercial Banks and Institutional Investors: The large pools of bank commercial debt in Asia and the Pacific saw major declines in flows to infrastructure in recent years due to a number of factors—project implementation and political risks, often replaced by development bank financing. Again, they need to be tapped for infrastructure, perhaps more at project rather than corporate finance level. Commercial banks also face the conundrum of maturity mismatch with short-term bank deposits versus long-term project financing needs. This is a major constraint in channeling Asia's historically high savings into infrastructure (Box 3).[70]

There is a need for both institutional investors and capital markets to be better utilized for financing infrastructure, both of which can provide the much-needed longer term financing for infrastructure. Institutional investors have been comparatively absent from infrastructure investment, and should especially be incentivized to play a much larger role in light of their vast assets under management, if infrastructure projects of sufficient risk and bankability profiles are made available.

The need for utilizing capital markets for infrastructure financing is similarly vital, not just for raising funds through green bonds, but also as a mechanism which allows institutional and retail investors liquidity, i.e., the ability to trade in and especially exit from infrastructure projects invested in, a crucial consideration for such financing sources.

Green Bonds: Green bonds have also been much discussed as a solution for green finance and have seen an increase in annual activity from 2014 to 2016 when almost $100 billion worth of bonds globally were issued.[71] However, while green bonds will raise funds from institutional and retail investors—if they have been mostly placed in the markets by governments, banks, or corporates on the strength of their sovereign or corporate balance sheets rather than the strength of underlying projects—then their ability to channel funds to green development is limited by the fact of a limited bankable pipeline of green projects.

[70] C. Kaminker et al. 2013. Institutional Investors and Green Infrastructure Investments: Selected Case Studies. OECD Working Papers on Finance, Insurance and Private Pensions: No. 35. Paris (OECD).

McKinsey & Company. 2016. Financing Change: How to Mobilize Private-Sector Financing for Sustainable Infrastructure. Detroit.
UNEP. 2014. Demystifying Private Climate Finance. Geneva.

[71] Climate Bonds Initiative. 2016. Bonds and Climate Change. *The State of the Market in 2016*. London.

Box 3: The Savings Treasure of Institutional Investors in Asia

Although comparatively smaller than other regions, pension and insurance funds in Asia have an increasing volume of assets under management, with about $10 trillion in 2010 (18% of the global share). Of this, **pension funds** hold $4.4 trillion and insurance funds $5.1 trillion, with 69% to 75% of assets located in Japan, and 11% to 12% in the People's Republic of China. With regard to insurances, developing countries in Asia lag behind with less than 20% of gross domestic product (GDP) share versus 50% to 70% for advanced countries in the region. Although amounting to about $1.8 trillion, pension plan assets in Asia capture a much lower GDP share than the OECD average of 84% of GDP. In addition, there are public pension and social security reserve plans of up to $2.5 trillion in Asia. These large savings pools are often invested in long-term, low-risk investments, such as government bonds.

Insurance companies are somewhat different in this regard, as some sizable institutions have larger-scale infrastructure investments, although predominantly in more advanced Asian economies. The challenge will be to tap these resources and other infrastructure-dormant savings for green finance if projects can be correspondingly de-risked. Moreover, sovereign wealth funds play an important role in Asia, which captures 40% of the global share. They do invest in infrastructure using both direct and indirect (fund) modalities, whereas the share of Asian sovereign wealth funds account for about 29% of global infrastructure investments. However, similar to insurance companies' infrastructure investments, the focus is on advanced economies. And with only a few funds dominating the asset allocation, the scale of additional finance attracted to green infrastructure will very much depend on convincing these selected few large-scale institutional investors.

Sources:
G. Inderst. 2016. Infrastructure Investment, Private Finance, and Institutional Investors: Asia from a Global Perspective. *Asian Development Bank Institute Working Paper Series: No. 555*. Tokyo (ADBI).

B. N. Bhattacharyay. 2012. Modes of Asian Financial Integration: Financing Infrastructure. In: B. N. Bhattacharyay, M. Kawai, and R. Nag, eds. Infrastructure for Asian Connectivity. Manila (ADBI/ADB and Edward Elgar). pp. 349–401.

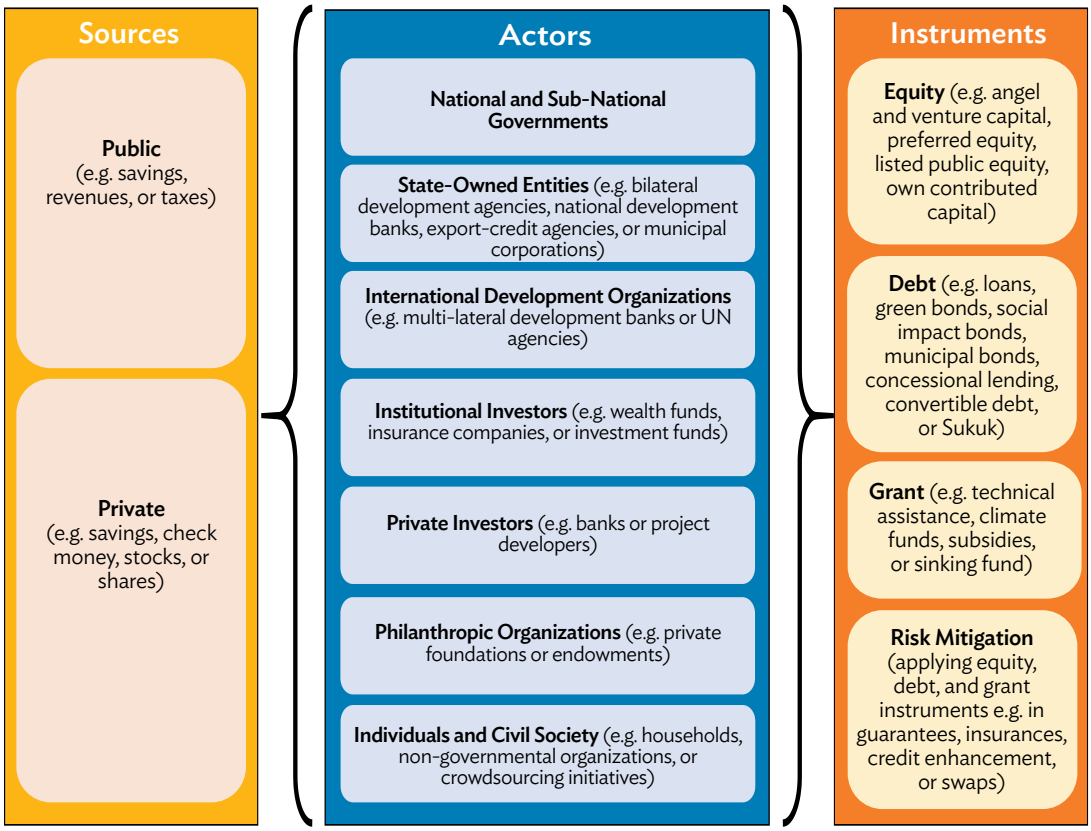
Institutional investors and commercial banks can both extensively contribute to closing the investment gap, particularly for green infrastructure, with their long-term investment perspective, strong environmental and social investment principles, and vast pools of capital as estimated below:[72]

- Banks ($40.2 trillion),
- Investment companies ($29.0 trillion),
- Insurance companies and private pensions ($26.5 trillion),
- Public pensions and superannuation plans ($10.9 trillion),
- Sovereign wealth funds ($6.3 trillion),
- Infrastructure operators and developers ($3.4 trillion),
- Infrastructure and private equity funds ($2.7 trillion), and
- Endowments and foundations ($1 trillion).

Attracting various financing sources to fund projects require provision of appropriate risk, return, and exit structures matching their risk appetites. Government and public sector agencies have a critical role in understanding these risks and mitigating them with appropriate government policies, instruments, and project structures (the interface of such public and private financing flows is in Figure 16).

[72] McKinsey & Company. 2016. Financing Change: How to Mobilize Private-Sector Financing for Sustainable Infrastructure. Detroit. p. 14.

Figure 16: Simplified Overview of Public and Private Infrastructure Finance



Source: Adapted from New Climate Economy. 2016. The Sustainable Infrastructure Imperative: Financing for Better Growth and Development. The 2016 New Climate Economy Report. Washington D.C./London (World Resources Institute/Overseas Development Institute). Figure 5: Sources of Infrastructure Finance. p. 30; UNEP. 2014. Demystifying Private Climate Finance. Geneva.

Country-specific analysis also provides useful suggestions for the role of different public and private actors in infrastructure investment, particularly with regard to green finance. Insert 2 includes examples from the People's Republic of China, India, and Indonesia. Careful attention also needs to be given to differentiate green finance from more specific types, such as public or public–private climate funds and initiatives, where public actors and international and multilateral development organizations play leading roles (section on Funding Sources in Appendix 2: Comparative Analysis of Green Finance Initiatives).[73]

[73] C. Polycarp et al. 2013. Raising the Stakes: A Survey of Public and Public–Private Fund Models and Initiatives to Mobilize Private Investment. *World Resources Institute Climate Finance Series: Working Paper, November 2013*. Washington, D.C. (WRI).

Country Cases for Infrastructure Investment Needs, Sources, and Instruments

People's Republic of China

Implementing the 13th Five-Year Plan (2016–2020) in the People's Republic of China is estimated to require investments of about $320 billion per year (more than 3% of gross domestic product (GDP) in clean energy (10%), energy efficiency (25%), clean transportation (25%), and environmental protection (40%). Although, public sector share in infrastructure investment is estimated at above 99% (2011), lower spending by the government is projected to bring down its share of future investment needs to only 10% to 15%, while the private sector is expected to shoulder 85% to 90%.

A large private sector share will require significant expansion of private investment in green projects. For that, the role of green banks or dedicated green divisions in banks will be important, due to their leveraging abilities. Potential finance instruments could include discounted green loans, low-interest refinancing, green bonds, asset-backed securitization, and foreign currency-dominated products—all under green investment principles.

In addition to green finance institutions focusing on debt instruments, other types, such as green industry funds, could cater to the equity side, although low returns on investment would likely require corresponding government support. Increasingly, the public listing of green enterprises will also become important, and specified mechanisms for initial public offerings may be conducive to encourage greater private sector participation. Another element would be a green stock index, as Indonesia has introduced (Insert 3). On the side of development cooperation, multilateral development banks can also cater to demand for green finance by further "greening" their portfolios through targeted projects or programs.

Recognized in studies on the economics of climate change adaptation, effective carbon markets, as well as other pollution trading mechanisms are of prime importance to offset the additional investments needed to green the economy. Thus, attention is needed for getting monitoring and evaluation right to allow for correct calculation and pricing.

Compulsory green insurance for particular industries in the People's Republic of China, combined with restoration support funding, can be a means to adopt environmental pollution into corporate operations. Mandatory environmental disclosure for publicly listed companies and bond issuers could further incentivize a shift to green investments. A next step could be to hold lenders to environmentally critical projects responsible for environmental impacts.

Trust in transparent and rigorous green investment opportunities will require that government, through its participation in different finance institutions, promote stringent environmental and social safeguards, as well as related procurement and governance principles that can help make green infrastructure investments a highly recognized asset class. This is interlinked with the idea of establishing a green rating system, which can help reduce financing costs of green projects. What is currently absent is a common set of methodologies and standards that allow for readily accessible information and comparison. This could directly influence how cost–benefit analyses are undertaken and inform the formulation of environmental cost analysis to correctly account for these in corporate operations.

In addition, bringing different actors—particularly potential new investors in green projects—together in a network for sharing experiences, committing

INSERT 2

to common goals, and promoting green policies and practices is promising. All these options have found their way into the Green Finance Task Force recommendations to establish a green financial system in the People's Republic of China (Insert 3).

Sources: Green Finance Task Force. 2015. Establishing China's Green Financial System. Report of the Green Finance Task Force. UNEP Inquiry: Design of a Sustainable Financial System. Beijing (The People's Bank of China and UNEP).

A. Abiad and R. Teipelke. 2017. Infrastructure Provision in Developing Asia's Giants: A Comparative Perspective on China, India, and Indonesia. Journal of Infrastructure, Policy and Development. 1 (1). pp. 23–43.

India

Implementing India's 12th Five-Year Plan (2012–2017) would have required infrastructure as gross capital formation beyond 10% of GDP, or close to $1 trillion per year, with energy and telecoms receiving much investment, while transport and water and sanitation fell behind. Government budget only has an annual budget of about $250 billion. Given the limits of public sector funding and based on the revitalized public–private partnership model, the private sector has picked up on infrastructure investment, now contributing about 40% to 43%.

However, extending bank lending will be limited due to their excessive exposure norms, exhaustion of capital adequacy requirements, and a risky asset–liability mismatch. The easing of capital market regulations has allowed for real estate and infrastructure investment trusts. Nevertheless, putting aside the well-established banking sector, other private sector finance instruments remain limited, with pension and mutual funds, or insurances playing only a minor role, despite high rates of household savings.

There is a multitude of initiatives and programs conducive to green finance and green infrastructure. Estimates peg the investment needs related to these initiatives at $834 billion, for which international green and climate finance is of utmost importance. However, capacities among the Government of India and financial institutions to access these green funds are limited. Furthermore, India has graduated to the status of lower-middle income country, thus concessional lending through multilateral development banks will increasingly be phased out, making credit more expensive.

Nevertheless, policy programs such as the Smart Cities initiative will promote access to other financing instruments, for instance liquidizing the Indian bond market for green urban infrastructure. Ratings and indices based on environmental and social concerns are increasingly penetrating the Indian equity market, energy trading schemes have been introduced, and innovative insurance schemes have addressed shortcomings in climate change-affected sectors, such as agriculture. Market depth, access, and liquidity, remain major hindrances in providing sufficient scope and functionality to these instruments.

Extending finance to green infrastructure also has to be seen in light of the priority sector lending norms in the banking sector and the burden of nonperforming assets, particularly in the concerned sectors. Fiscal viability of infrastructure projects, for instance in energy and water, remains a challenge, and distorting subsidy schemes undermine projects further—both in their development and structuring, as well as their operation. While a number of legal and regulatory reforms have promoted sustainable infrastructure investment, reforms pertaining to the overall functioning of infrastructure subsectors and reduced political risks are required to sufficiently attract other investors (Box 4).

Sources: UNEP and FICCI, 2016. Delivering a Sustainable Financial System in India. *UNEP Inquiry: Design of a Sustainable Financial System.* Geneva.

A. Abiad and R. Teipelke. 2017. Infrastructure Provision in Developing Asia's Giants: A Comparative Perspective on China, India, and Indonesia. *Journal of Infrastructure, Policy and Development*. 1 (1). pp. 23–43.

Indonesia

Implementing Indonesia's National Long-Term Development Plan (2005–2025) is estimated to require about $300 billion per year in 2015, and $530 billion in 2019—in line with the aim to increase economic growth from about 6% to 8%. A predominant share of these investments will be required in the infrastructure sector. Estimating investment needs based on Indonesia's climate change commitments, its reduction in greenhouse gas emissions would require about $9 billion from the government and about $18 billion from international funding, although the Indonesian Ministry of National Development Planning has pegged mitigation costs to a significantly higher business-as-usual scenario, arriving at estimated costs of $69 billion. Sector wise, energy would incur the bulk of the costs, followed by waste and transport, industrial processing and agriculture, and forestry. However, agencies' estimates and scenarios differ significantly, making it difficult to draw a clear picture.

What can be said, nevertheless, is that current funding commitments and contributions by the government are far behind investment needs. Also, international climate finance has remained extensively undisbursed, pointing toward a bottleneck with regard to project readiness and finance linkage (Box 4). With the current share of public infrastructure investment close to 90% (2011), it will to be seen how private sector's share can be significantly scaled up.

On the side of financial institutions, Indonesia's system is dominated by banks, whose asset share is nearly 80% (2014), while insurers capture about 11%, finance companies about 6%, and pension funds about 3%. While equity markets have experienced a stunning 18-fold growth (2000–2013), the bond market has remained limited. However, this market, especially local currency bonds, is increasingly emerging as a key player to offer longer-term funding for green investments in Indonesia's finance market, which is otherwise characterized by short-termism.

Taking stock of green financing in 2012, it reached only about 1.3% of total lending by banks in Indonesia, with most green finance being dedicated to renewable energy projects (about 54%), followed by environmentally-efficient machineries and sustainable agriculture with about 20% each. It is worthwhile to note that basically all sustainable investment in Indonesia complies with Islamic financing principles. Also, the Indonesian Stock Exchange IDX saw the launch of the SRI-KEHATI Index for environmentally and socially responsible companies, having led to the SRI-KEHATI exchange-traded fund (ETF). Thus, recent innovation emerges from the Indonesian financial sector, even though corresponding investment amounts remain comparatively small as of now (Box 4). Related project preparation and regulatory hurdles are increasingly addressed, such as through the government's Committee for Acceleration of Priority Infrastructure Delivery, the state-owned financing company PT Sarana Multi Infrastruktur, and the Indonesia Infrastructure Guarantee Fund.

Sources: UNEP, Association for Sustainable and Responsible Investment in Asia, and International Finance Corporation. 2015. Towards a Sustainable Financial System in Indonesia. UNEP Inquiry: Design of a Sustainable Financial System. Geneva.

A. Abiad and R. Teipelke. 2017. Infrastructure Provision in Developing Asia's Giants: A Comparative Perspective on China, India, and Indonesia. *Journal of Infrastructure, Policy and Development*. 1 (1). pp. 23–43.

3. Challenges for Green Bankability

Based on project design and investment preparation experiences to tap private sector finance for green infrastructure, key emerging messages from developing member countries include: *Capital markets financing for greenfield infrastructure projects is basically nonexistent; institutional investors are reluctant to finance infrastructure; bank lending for road projects has been stalled for some time; the possible speed of growth of green bond markets is constrained by insufficient pipelines of bankable and standardized green projects; simply branding an infrastructure project green does not make it attractive as market returns matter.*

The issue therefore is that of "bankability" of the underlying infrastructure projects on offer, and of a sizeable scale of the pipeline, to attract the required large volumes of private sector finance. This has led to the sustained message from most sources, being the insufficient preparation of a sizable project pipeline, most often in relation to national government development planning.[74]

Risk assessment underlies the bankability perception by different providers of private finance and therefore understanding the risk factors affecting a financier's perception of a project's bankability is crucial. These risks would not be universally similar for all types of financing sources and would need to be adapted to specific sectors and regions. While this paper does not intend to replicate the many studies on risks and infrastructure, it is useful to focus on some of the key risks arising in green infrastructure projects.

Greening finance for infrastructure might broadly be seen as adding to the bankability-related risks in infrastructure projects (Box 4).

In addition to the traditional financing risks in an infrastructure project (Figure 17), three other aspects are likely to arise in greening infrastructure:

Green Costs versus Green Revenues: Incorporating green targets to be met in infrastructure projects are most often perceived as additional costs (as compared to a business-as-usual project) for a project in at least three ways: (i) through requiring more advanced technology; (ii) through requiring optimization (during implementation) of the most scarce natural resources; and (iii) through better management quality and systems to attain, monitor, and report on green targets (the T.I.M. paradigm noted earlier, see Figure 15). At the same time, the context ("societal nature") of most infrastructure projects in developing countries precludes major increases in end user tariffs, whether greener or not, and are limited by local affordability considerations.

Moreover, the key issue in green infrastructure is that of the unquantified or indirect green benefits resulting from a project. These benefits, such as reduced air pollution, improved ground water qualities, or faster traffic flow rates, would not lead to direct revenues for the project. Only in a larger analysis of, for instance, regional budgets for health costs in the project-impacted areas could some inference on costs saved due to the project be inferred. While studies are underway to capture these "lost green revenues" through valuations of carbon credits, ecosystem services, cobenefits and contributions to SDGs etc., there is no definitive solution at the moment. As noted by the United Nations Environment Programme, green infrastructure is not yet widely

[74] McKinsey & Company. 2016. Financing Change: How to Mobilize Private-Sector Financing for Sustainable Infrastructure. Detroit. p. 30.

New Climate Economy. 2016. The Sustainable Infrastructure Imperative: Financing for Better Growth and Development. *The 2016 New Climate Economy Report*. Washington D.C./London (World Resources Institute/Overseas Development Institute). p. 34.
G. Inderst. 2016. Infrastructure Investment, Private Finance, and Institutional Investors: Asia from a Global Perspective. *Asian Development Bank Institute Working Paper Series: No. 555*. Tokyo (ADBI). p. 26–28.

Box 4: Challenges in Financing Infrastructure Projects

Challenges persist in financing infrastructure projects—disregarding the lack of green features. These challenges concern a lack of capacities in project identification, prefeasibility, and selection, as well as the further preparation, structuring, and implementation of infrastructure projects. From insufficient planning capacities often follow incomplete or inaccurate assessments of the environmental, social, and economic benefits and risks related to a project. This can render the short- and long-term viability of investments useless. In addition, this often also impacts on sustaining the value of infrastructure through intelligent management systems (e.g., for traffic flow or electricity network load) and proper asset management, for which both capacities and dedicated resources are lacking.

With regard to management aspects, public entities—which in many cases are responsible for large-scale infrastructure development projects—are not incorporating a collaborative style of cross-sectoral coordination and planning, which can increase inefficiencies in the implementation of projects and the use of scarce resources. Also, there is much room for capital productivity gains in infrastructure projects, where delays and cost overruns are a common phenomenon.

On the financial side, public entities in many countries are burdened with fiscal deficits, low credit ratings, and generally limited access to different financing instruments, often due to shallow and illiquid domestic finance markets and legal and regulatory frameworks that discourage investors and potential private sector partners to join forces in project types such as public–private partnerships. Furthermore, asset-generating financing options (e.g., land value capture, user fees, and property taxes) are often underexplored, legally not applicable/allowed, or politically unfavorable, which further weakens the financial viability of many infrastructure projects.

Sources:
KPMG. 2010. Linking Cities to Finance: Overcoming Bottlenecks to Financing Strategic Urban Infrastructure Investments. Background Paper for CDIA conference 27-29 September 2010, Shanghai, People's Republic of China. Manila (CDIA & InWEnt).

McKinsey & Company. 2016. Bridging Global Infrastructure Gaps. Brussels/San Francisco/Shanghai.

perceived as an asset class and the nonmonetization of externalities in environmental and social terms prevent green finance projects that have more competitive standing against other, more traditional projects.[75]

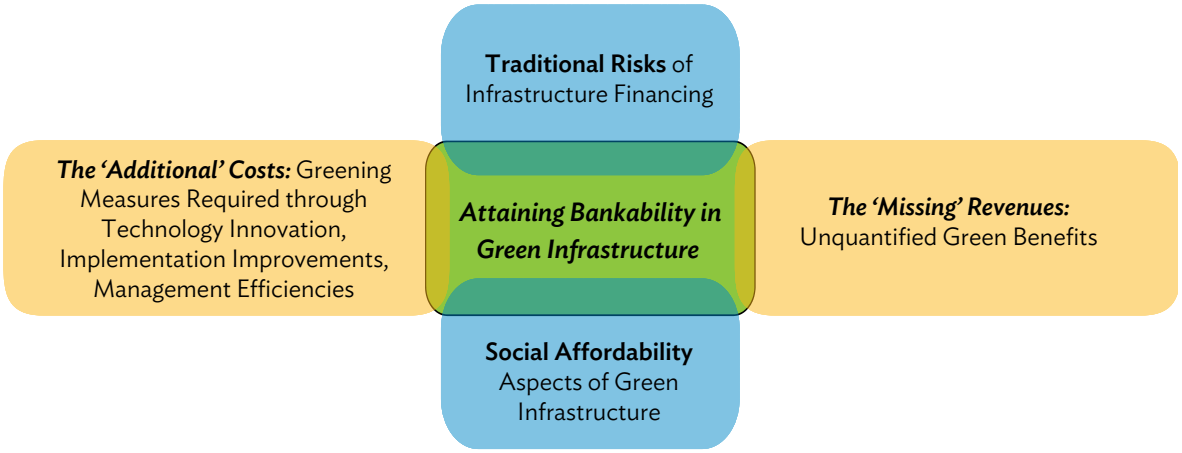
Other traditional risks would also continue to apply to green infrastructure projects, these are grouped together in Figure 18 as green finance constraints. Some of the major themes impacting green project bankability are discussed further in this section.

The Cost of Bad Preparedness: The above mentioned green bankability aspects are compounded by the common perception of poorly prepared projects by, and a lack of capacity and/or awareness of (generally local) government agencies tasked with preparing infrastructure projects. In such a scenario, the already delayed procurement and implementation processes, slow land acquisition processes, slow social and environmental clearances might be compounded by unrealistic or badly set green targets to be achieved in projects, and poor incentive or penalty mechanisms in monitoring systems. Hence, development and transaction costs in green finance projects are often perceived as too high in comparison to traditional projects.[76]

[75] UNEP and Global Infrastructure Basel. 2016. Sustainable Infrastructure and Finance: How to Contribute to a Sustainable Future. UNEP Inquiry: Design of a Sustainable Financial System. Inquiry Working Paper: 16/09, June 2016. Geneva (UNEP). P. 27-30, 33-34.

[76] McKinsey & Company. 2016. Financing Change: How to Mobilize Private-Sector Financing for Sustainable Infrastructure. Detroit. p. 32.
New Climate Economy. 2016. The Sustainable Infrastructure Imperative: Financing for Better Growth and Development. The 2016 New Climate Economy Report. Washington D.C./London (World Resources Institute/Overseas Development Institute). p. 36–37.

Figure 17: Bankability in Green Infrastructure Financing



Source: Authors.

Financial Structuring Capacity: The lack of experience of many public sector authorities has meant an inability to structure sophisticated lifecycle-based financial models for green projects with leveraged financing plans (aimed at catalyzing finance from private or institutional investors, or risk-adjusted returns and end user demands) from which revenue calculations and refinancing plans could be reasonably based. In relation to this, project owners need to develop more viable funding plans and business models that will differ from traditional projects.[77]

The Impact of Poor Institutional Frameworks: Investors interested in green finance would be concerned about uncertain political environment, where stability and assurance of a continued green growth agenda might be absent.[78] Potential finance for green projects is often confronted with national systems where subsidies and tariff setting lead to market distortions in favor of environment-unfriendly practices.[79] Certain sectors or subsectors are still not sufficiently regulated and much-needed reforms have been blocked, preventing legally binding regulations that could have sent clear signals to industries, consumers, and financial markets.[80] Particularly in Asia, state-owned institutions continue to dominate the infrastructure sector, making the entrance of other actors into the market difficult.[81] In other cases, such entry is prevented by regulatory barriers limiting the scope and type of instruments or projects potential financing actors can invest in (Box 29).[82]

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77 New Climate Economy. 2016. The Sustainable Infrastructure Imperative: Financing for Better Growth and Development. The 2016 New Climate Economy Report. Washington D.C./London (World Resources Institute/Overseas Development Institute). p. 35–36.
McKinsey & Company. 2016. Financing Change: How to Mobilize Private-Sector Financing for Sustainable Infrastructure. Detroit. p. 33–36.
G. Inderst. 2016. Infrastructure Investment, Private Finance, and Institutional Investors: Asia from a Global Perspective. Asian Development Bank Institute Working Paper Series: No. 555. Tokyo (ADBI). p. 26–28.

78 New Climate Economy. 2016. The Sustainable Infrastructure Imperative: Financing for Better Growth and Development. The 2016 New Climate Economy Report. Washington D.C./London (World Resources Institute/Overseas Development Institute). p. 34–34.

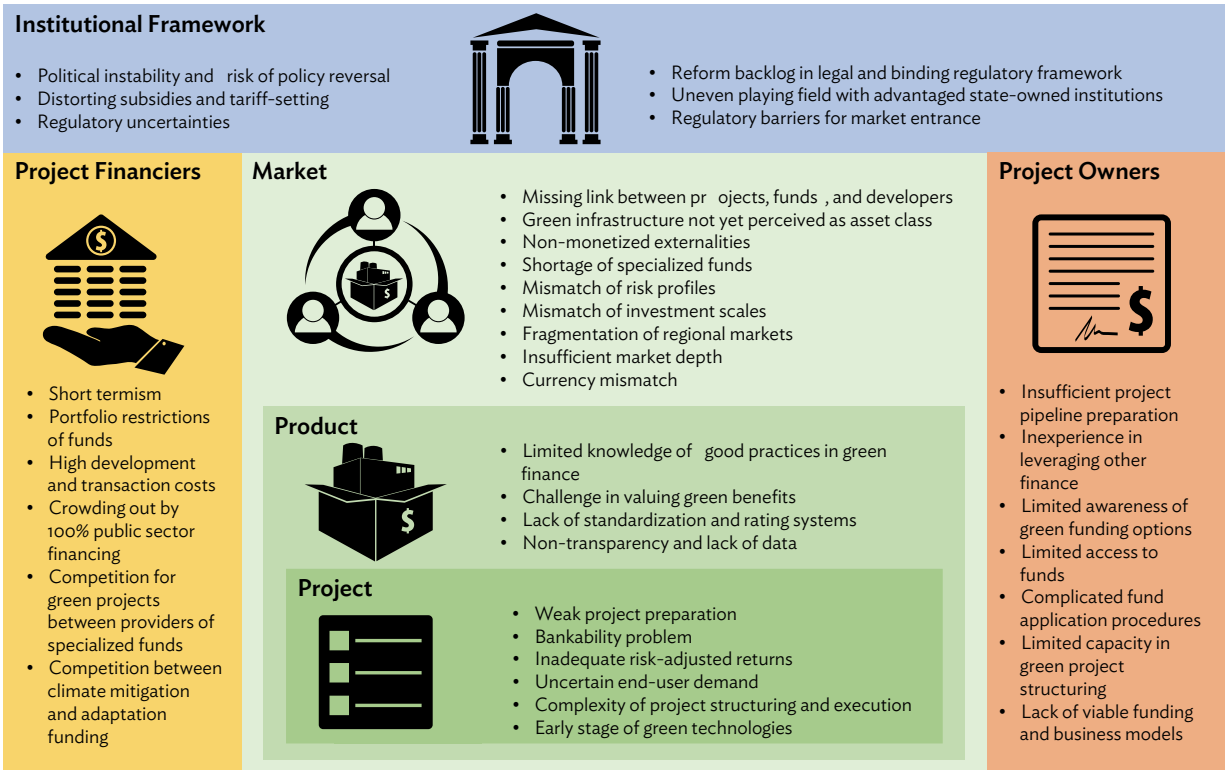
79 New Climate Economy. 2016. The Sustainable Infrastructure Imperative: Financing for Better Growth and Development. The 2016 New Climate Economy Report. Washington D.C./London (World Resources Institute/Overseas Development Institute). p. 38.

80 UNEP and Global Infrastructure Basel. 2016. Sustainable Infrastructure and Finance: How to Contribute to a Sustainable Future. UNEP Inquiry: Design of a Sustainable Financial System. Inquiry Working Paper: 16/09, June 2016. Geneva (UNEP). p. 20.

81 A. Abiad and R. Teipelke. 2017. Infrastructure Provision in Developing Asia's Giants: A Comparative Perspective on China, India, and Indonesia. Journal of Infrastructure, Policy and Development. 1 (1). pp. 23–43.

82 McKinsey & Company. 2016. Financing Change: How to Mobilize Private-Sector Financing for Sustainable Infrastructure. Detroit. p. 34.
UNEP and Global Infrastructure Basel. 2016. Sustainable Infrastructure and Finance: How to Contribute to a Sustainable Future. UNEP Inquiry: Design of a Sustainable Financial System. Inquiry Working Paper: 16/09, June 2016. Geneva (UNEP). p. 20.

Figure 18: Green Finance Challenges and Constraints



Source: Authors, based on:
McKinsey & Company. 2016. Financing Change: How to Mobilize Private-Sector Financing for Sustainable Infrastructure. Detroit.

UNEP and Global Infrastructure Basel. 2016. Sustainable Infrastructure and Finance: How to Contribute to a Sustainable Future. UNEP Inquiry: Design of a Sustainable Financial System. Inquiry Working Paper: 16/09, June 2016. Geneva (UNEP).

G. Inderst. 2016. Infrastructure Investment, Private Finance, and Institutional Investors: Asia from a Global Perspective. Asian Development Bank Institute Working Paper Series: No. 555. Tokyo (ADBI).

New Climate Economy. 2016. The Sustainable Infrastructure Imperative: Financing for Better Growth and Development. The 2016 New Climate Economy Report. Washington D.C./London (World Resources Institute/Overseas Development Institute).

Precompletion Period Risk: The construction period and the initial 1 to 3 years of operations are often considered the riskiest investment period for private finance—beset by delays and uncertainties. With often unclear technical baselines used for setting green targets linked to performance payments for instance, this risk would likely be amplified in a green infrastructure project.

Technology Risk: Due to an often innovative nature, green projects are not easily structured, require much scrutiny and coordination, and can be more difficult in their execution.[83] Deployment of green technology in the early stages of development, would require more thorough assessment and qualification.

A Lack of Exit Routes: Without a highly liquid capital market and efficient tax structures, institutional investors would also be constrained to invest in green infrastructure projects where the ability to exit is lacking.

[83] New Climate Economy. 2016. The Sustainable Infrastructure Imperative: Financing for Better Growth and Development. The 2016 New Climate Economy Report. Washington D.C./London (World Resources Institute/Overseas Development Institute). p. 34.

Box 5: Measuring Green Infrastructure Performance

As an instance of the complexity, various approaches to deriving green infrastructure indicators have been conceptualized in recent times, such as by focusing in on key information concerning ecosystem structure, function and services. Ely and Pitman (2014)[a] tabulated the ecosystem services that can be provided by green infrastructure based on the "triple bottom line" of sustainable development, which represents the benefits of green infrastructure across the environmental, social and economic categories. Another approach, by Austin (2014)[b] explained the contribution of green infrastructure to ecosystem services by demonstrating the interlinkages between ecosystem health, human health, and well-being, which framework was further developed by Pakzad and Osmond by adding the natural processes (energy, carbon, water etc.) as supporting functions and fundamental elements in providing services to humans and nature.

Based on previous concepts and expert interviews, Pakzad and Osmond derived nine major concepts and themes classified in three categories: economic growth; environmental sustainability; and health and well-being (concepts: climate change adaptation and mitigation, human health and well-being, healthy ecosystem, biodiversity, economic benefits, alignment with political issues and city strategies, an active travel network, water management, and food production). Based on this, a set of 30 indicators in 4 categories (ecological indicators, health indicators, sociocultural indicators, and economic indicators) were then proposed for the sustainability performance assessment of green infrastructure.

[a] Ely, M., & Pitman, S., (2014). Green Infrastructure;Life support for human habitats, Adelade: Botanic Gardens of Adelaide, Department of Environment, Water and Natural Resources.
[b] Austin, G. (2014). Green Infrastructure for Landscape Planning: Integrating Human and Natural Systems. New York: Routledge. Bauman, A., C. Rissel, et al. (2008). Getting Australia Moving: Barriers, Facilitators and Interventions to Get More Australians Physically Active Through Cycling., Cycling Promotion Fund, Melbourne.

Source: P. Pakzad and P. Osmond. 2016. Developing a Sustainability Indicator Set for Measuring Green Infrastructure Performance. *Procedia – Social and Behavioral Sciences.* p. 68–79. http://www.sciencedirect.com/science/article/pii/S1877042815061893

Setting and Measuring Realistic Green Infrastructure Performance Indicators: Ideally, a green infrastructure project would link together financial incentives and penalties with green targets to be achieved (Box 5). However, translating green concepts into technical baselines and realistic time-based targets is complex in the developing country context and could create additional risk and cost perception for private finance.

This chapter identifies overall that the large needs for green finance, especially in infrastructure, need major flows of private capital from institutional investors, commercial banks and capital markets, which are predicated on creating bankable pipelines of projects by governments. The traditional risks associated with infrastructure projects, critical for their social impact potential especially in the Asia and Pacific region, will likely get compounded by greening requirements in most sectors. Addressing and mitigating these risks to satisfy the different sources of private sector finance will be crucial in determining whether the required scale of private capital flows to green projects or not. Several green finance initiatives have been developed recently, and Part C provides a comparative overview of these and possible lessons that can be drawn in addressing bankability risks in green infrastructure financing. Part D brings the two perspectives of challenges and solutions together in outlining the Green Finance Catalyzing Facility model.

Photo Credits: ADB.

Photo Credit: ADB.

PART C

The Emerging Lessons from Green Finance Initiatives

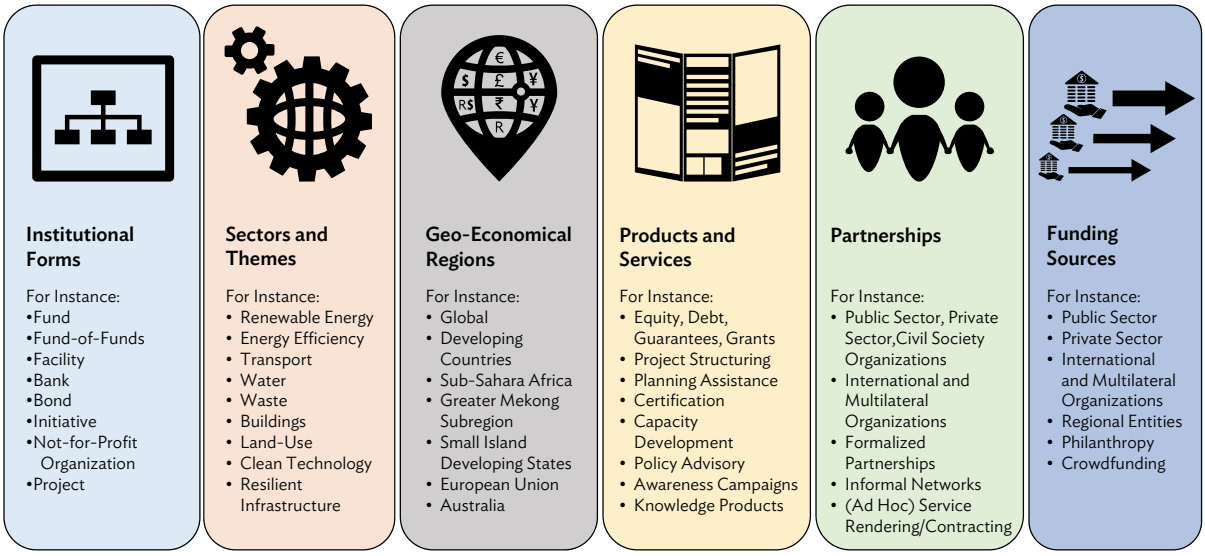
1. Learning from Green Finance Initiatives

Bankability underscored by appropriate risk mitigation is the fundamental issue constraining the flow of a sizeable scale of private sector capital into green projects. Although investment in selected areas such as renewable energy is visibly growing, and a number of green finance initiatives have emerged such as the Green Investment Bank in the United Kingdom or the Green Climate Fund—designated by the United Nations Framework Convention on Climate Change (UNFCCC) as an operating entity of the financial mechanism of the Convention—a comprehensive approach to a green finance system at developing country level is yet to happen.

Such a green finance system is needed, so as to pull together policies, funds, and institutions at the government level to address the bankability constraints in green finance projects and thereby catalyze innovation and funds flow of scale from commercial banks, capital markets, and other private sources into green infrastructure projects. This is the key underpinning for bringing green finance into the mainstream of finance for infrastructure, or as the United Nations Environment ProgrammeInquiry puts it, for "industrialization" of green finance.[84]

Several green finance initiatives and policy suggestions that emerged recently were recognized by this publication to understand possible approaches suggested to enable accelerated green finance.[85] Key details for 16 green finance initiatives have been summarized in Appendix 1: Overview of Green Finance Initiatives. Based on this overview, an analysis of the various green finance approaches taken, whether sectoral, geographic, by funding source, etc., (Figure 19), was undertaken in Appendix 2: Comparative Analysis of Green Finance Initiatives, resulting in a gap analysis which is included in Appendix 3: Gap Analysis and Recommendations on Green Finance Initiatives.

Figure 19: Categorizing Green Finance Initiatives



Source: Authors.

[84] UNEP et al. 2016. Green Finance—A Growing Imperative. A Briefing. Geneva.

[85] Also refer to the list of references of this publication for further sources on the topic, as well as, for instance, the bibliography in Green Growth Action Alliance. 2013. The Green Investment Report: The Ways and Means to Unlock Private Finance for Green Growth. Geneva (World Economic Forum). p. 35–37.

Key Lessons: While every additional green finance initiative might be seen as helping to further the sector (and many strengths do exist in these) there may appear to be a danger of several initiatives not achieving optimal results. Some of the key lessons emerging from the analysis of initiatives and approaches are noted below:

- **Balance Sheet Green Finance Raising**: Raising green finance from capital markets on a corporate or government balance sheet's strength is of limited value if the application of these funds is unclear and when project pipelines are nonexistent.
- **Competition**: Creating several green funds could lead to them competing against each other for raising funds from the same pool of sources.
- **Unmatched Instruments**: Offering financial instruments which might not address the core bankability issue of projects in a sector would be of limited value.
- **Sectoral Differences**: The mixture of political agenda-setting, agreements (e.g., codified in international conventions), and defined standards and selection criteria (e.g., codified in the International Standards Organization or the Climate Bond Initiative) put some sectors, especially energy, at the forefront of green finance. Others sectors, such as water supply, and, even more so, cross-cutting themes, such as resilient infrastructure, are currently less covered by green finance initiatives, as the eligibility and monitoring mechanics are still debated and the monetization of benefits into revenue streams remains underdeveloped.[86]
- **Linkages with Projects**: The core danger arising in many initiatives is when these fail to link up finance with projects and measurable green targets, leading to many financing sources remaining unutilized and a continued lack of bankable green project pipelines. In such a scenario, the bankability gap remains unfulfilled.[87]
- **Missed Leveraging Potential**: Many finance professionals point to the strong leveraging potential of public finance for catalyzing private finance, with potential ratios mentioned of 1:4 or even 1:6 (public to private finance). However, the current situation looks different. [88] National governments, their development banks, or their other fully-owned entities (e.g., public pension funds, etc.) have so far been key players in green finance initiatives. Combining such government funds with development finance through United Nations programs and multilateral development banks can play a significant role in creating better leveraged financing mechanisms through a mixture of concessional funds and green reforms and policy actions through dedicated public or public–private climate funds and initiatives.[89] Such public sources of finance combine key elements conducive for green project investors, providing a long-term investment perspective, an access to large funds to scale corresponding initiatives, and hence the ability to crowd in other finance.[90]
- **Green Technology Financing:** A relevant role is also played by riskier equity funds that deploy venture capital (and other financing instruments) to support early stage development of innovative green technologies before they become market-ready. Nevertheless, even these funding sources (including small-scale instruments such as crowdfunding) are not yet sufficiently meeting the demand for "innovation financing." New financing forms should be scrutinized to accelerate progress in the initial phase of green

86 UNEP. 2014. Demystifying Private Climate Finance. Geneva.

87 ADB. 2015. Making Money Work: Financing a Sustainable Future in Asia and the Pacific. Manila.

88 Green Growth Action Alliance. 2013. The Green Investment Report: The Ways and Means to Unlock Private Finance for Green Growth. Geneva (World Economic Forum). p. 21.
Green Finance Task Force. 2015. Establishing China's Green Financial System. *Report of the Green Finance Task Force.* Beijing (The People's Bank of China & UNEP Inquiry). p. 5.

89 ADB. 2015. Making Money Work: Financing a Sustainable Future in Asia and the Pacific. Manila. p. 37.
New Climate Economy. 2016. The Sustainable Infrastructure Imperative: Financing for Better Growth and Development. The 2016 New Climate Economy Report. Washington D.C./London (World Resources Institute/Overseas Development Institute). pp. 62–64.

90 G. Inderst. 2016. Infrastructure Investment, Private Finance, and Institutional Investors: Asia from a Global Perspective. *Asian Development Bank Institute Working Paper Series: No. 555.* Tokyo (ADBI).

technologies.[91] This becomes clear when the investment criteria of many green finance initiatives are studied, since they often exclusively fund green projects that deploy technologies that have sufficiently proven their market readiness, while other projects with newly emerging solutions remain unbankable.

- Preconstruction Green Project Risk and Refinancing Vehicles: Discussions with project financiers and institutional investors showed that the perceived risk of green infrastructure projects would be especially high in the preconstruction and construction phases, and perhaps the first and second year of operations of a project, especially in countries in Asia and the Pacific. This was due to risk perceptions from delays in government clearances, land acquisition issues, green technology usage, asymmetry in project technical data, and unrealistic green target setting. Investment channels or vehicles that would allow refinancing entry options to institutional investors in less risky periods, for instance, postcompletion of construction, are being developed and considered attractive.
- Green Bonds Initiatives: Green bonds have increasingly emerged as a vehicle for raising finance from the private sector for green projects, with proceeds of bonds to be used for green assets and projects. Proceeds can be allocated to new projects, for refinancing existing green projects, or a mix of both. Green bonds can tap into international capital at scale with demand from international institutional investors, such as pension funds and insurance companies, outstripping supply. Globally, bond issuance has increased from $36.6 billion in 2014 to nearly $100 billion in 2016.[92] The momentum of green bond issuance has also led to more standardization in the use of green bonds, leading to a consensus on green bond definitions, standards, and criteria for green projects or activities. The Green Bond Principles published in June 2016 by the International Capital Market Association provide standards for use of proceeds, eligibility of project categories, disclosure and transparency requirements for the green bond market. Asia and the Pacific has also seen a rapid increase in green bonds issuance with the People's Republic of China (PRC) being the largest, going from no green bonds to an over 40% share of the green bonds market and an issuance of over $17 billion of green bonds in 2016 alone, though with some localized green bond standards applying. The PRC has also launched its own country-specific guidelines for green bonds.[93]

  While considered an ideal way to tap international flows of private capital for green infrastructure, the growth of the green bonds, especially in the Asia and Pacific region will be constrained by a number of factors including underdeveloped domestic bond markets, a lack of internationally harmonized green standards and definitions, cost–benefit mismatches, and most especially the lack of a sizeable pipeline of bankable green projects, where these funds can be applied.
- The Need for National Financing Vehicles: The Global Green Growth Institute has also focused in on the need for governments to create national vehicles that can combine funds with policy actions to incentivize private capital for green projects, as noted in Box 6.

[91] New Climate Economy. 2016. The Sustainable Infrastructure Imperative: Financing for Better Growth and Development. The 2016 New Climate Economy Report. Washington D.C./London (World Resources Institute/Overseas Development Institute).

[92] Climate Bonds Initiative. 2016. Bonds and Climate Change. The State of the Market in 2016. London.

[93] Climate Bonds Initiative. 2016. Bonds and Climate Change. The State of the Market in 2016. London.

Box 6: National Financing Vehicles Closing the Finance Gap for Green Projects

The Global Green Growth Institute (GGGI) hosted a side event during the Marrakech Climate Change Conference COP 22 in November 2016, discussing the role of National Financing Vehicles in linking green funds to green projects. The panel discussion underscored the critical role domestic institutions play in implementing the Nationally Determined Contributions (NDCs) to which countries have committed in achieving the greenhouse gas emission reduction targets established in the Paris Agreement from 2015. The case was made that it requires green finance, the linkage to green projects, policy and regulatory reform, as well as institutional and technical capacity building for governments in developing countries to build much-needed domestic systems for the access, management, and deployment of green finance. This includes different financial instruments beyond the common grant money, and the challenge is to build up the platform and expertise for national finance institutions to combine public and private finance with international green funds. On the other hand, without a ready pipeline of well-developed, bankable projects, National Financing Vehicles will not be able to bring green finance to actual projects. Correspondingly, GGGI has initiated the concept development for National Financing Vehicles in Costa Rica, Indonesia, and—prospectively—Colombia, the Philippines, Rwanda, and Senegal. Lessons learned can be expected from the GGGI co-developed National Financing Vehicles in the start-up stages in Jordan, Mongolia, and Vanuatu.

Source: Global Green Growth Institute. 2016. GGGI Hosts COP22 Side-Event on Closing the Finance Gap through National Financing Vehicles. http://gggi.org/gggi-hosts-cop22-side-event-on-closing-the-finance-gap-through-national-financing-vehicles/

2. Three Key Country Initiatives

In addition to the several initiatives studied from which lessons have been drawn above, three government initiatives stand out and are briefly presented here. These examples provide useful lessons for designing green finance mechanisms to accelerate green financing into developing country infrastructure.

2.1 India: Viability Gap Funding Scheme

The use of government and government-guaranteed public funding as linked financing to catalyze private sector funds into projects has been demonstrated in the Viability Gap Funding (VGF) scheme launched in 2004 for public–private partnerships (PPPs) projects in infrastructure, designed by the Government of India (Box 7). Using a 20% to 40% concessional finance incentive, provided as capital subsidy to bridge bankability

Box 7: Government of India to Use Viability Gap Funding for 5,000 Megawatt Solar Power Projects

In the wake of dropping solar tariffs and increasing capacity addition, the government approved the use of Viability Gap Funding (VGF) for setting-up 5,000 megawatts of grid-connected solar photovoltaic power projects. VGF provides the government grant funds to support infrastructure projects that are economically justified but fall short of financial viability.

Source: Government of India , Ministry of New and Renewable Energy. 2016. Approval of Guidelines for Implementation of Scheme for Setting Up of Over 5000 MW Grid-Connected Solar PV Power Projects with Viability Gap Funding (VGF) under Batch-IV of Phase-II of the National Solar Mission. New Delhi.

gaps in PPP projects, the mechanism is shown to have catalyzed a large number of infrastructure projects and could also be used in the green finance sector. This aspect is emphasized by Organisation for Economic Co-operation and Development Secretary General Angel Gurría: *"Government policies can play a central role in influencing how private capital is mobilised and shifted. It will only be green if the investment landscape is supportive. Coherent climate policies and good framework conditions for investment are essential."*[94]

2.2 Canada: The Green Municipal Fund

The Green Municipal Fund in Canada has many useful design aspects for green finance mechanisms, combining funds provision for both project preparation and capital asset financing, and offering capacitating services to project applicants (Box 8).

Box 8: The Green Municipal Fund of the Federation of Canadian Municipalities

Endowed with $414 million from the Government of Canada, the Green Municipal Fund of the Federation of Canadian Municipalities supports both public and private sector-led initiatives for innovative municipal infrastructure solutions with clear environmental benefits, public value, and model business cases and technologies.

The fund provides support for plans, feasibility studies and pilot projects, as well as capital projects in the areas of planning, brownfield, energy, transport, waste, and water. The support is a package of grant money and low-interest loans, where grants are capped at a maximum of 50% of the costs for plans, feasibility studies and pilot projects (maximum of $132,000 for plans and feasibility studies, $263,000 for pilot projects), and low-interest loans are capped at a maximum of 80% of the costs for capital projects (maximum $3.8 million, grant amount at 15% of loan, maximum of $564,000). The loan amount can be increased for particularly innovative projects to $7.5 million together with a grant for 15% of the loan amount (maximum of $1.1 million).

While the financial support package is attractive for pursuing green projects, its embeddedness in a broader assistance structure makes the Green Municipal Fund an effective mechanism. Interested actors can access the peer network of the fund and be connected with other municipalities, inform their project designs with latest good practices, as well as use tools for capacity building and practical training in green infrastructure. Clear forms, templates, and sample letters provide guidance through the application process where applicants use a project scorecard to check if their proposal aligns with the fund's eligibility criteria. They receive feedback from an independent reviewer, upon which they can revise their applications before submission.

Since its inception in 2000, the Green Municipal Fund has approved 1,045 projects for plans, feasibility studies, and pilots with a grant amount of about $60.2 million and a total project value of about $181 million (ratio of 1:3). The total amount of the 298 approved capital projects reached about $64 million in grants and $461 million in loans for a total project value of about $2.6 billion (ratio 1:5). In 2016, the Government of Canada has provided an additional $94 million to the original endowment to strengthen the focus on low-carbon, resilient municipalities and improved asset management.

Note: Canadian dollars from original source have been converted into US dollars.

Sources: Federation of Canadian Municipalities. 2016. Raising the Bar. Annual Report 2015–2016: Green Municipal Fund. Ottawa.

Federation of Canadian Municipalities. 2016. Green Municipal Fund–About GMF. http://www.fcm.ca/home/programs/green-municipal-fund/about-gmf.htm

[94] OECD and Bloomberg Philanthropies. 2015. Green Bonds. Mobilising the Debt Capital Markets for a Low-Carbon Transition. Policy Perspectives. Paris (OECD). p. i.

2.3 People's Republic of China: Green Finance Task Force

The People's Republic of China has been at the forefront of innovation in the green finance sector driving the momentum for green bonds as well as crucially leading a Green Finance Task Force constituted in 2014 and cosponsored by the Research Bureau of the People's Bank of China, and the United Nations Environment Programme Enquiry into the Design of a Sustainable Financial System (Box 9). With more than 40 experts, the task force proposed a comprehensive establishment of a green finance system with a systematic policy framework for the PRC with a set of 14 specific recommendations for "building China's green finance system," the key principle underpinning which is a move to green financing primarily from the private sector through an efficient capital markets system, fostered by well-leveraged government funds and policies. Key characteristics of the proposed green finance system are:[95]

- Institutional mechanisms and incentive measures to encourage green investments;
- Favorable fiscal and financial measures to steer private capital to the green industry through market mechanisms;
- Establishment of green lending and investment institutions;
- Ushering in of a multitude of new green financing channels and diverse financial products including green bonds, green stocks, green funds, green insurance, carbon trading;
- Leveraging of public funds most efficiently so as to invite private capital equaling several times—"or even ten–fold"—the amount of government seed funding provided, and alleviate the government's enormous fiscal pressures caused by environmental issues; and
- Developing green financial infrastructure such as green credit ratings, disclosure rules, methodologies etc., to help make available full information on green projects to market investors.

In addition to these initiatives, others that try to address the challenges and constraints of green finance exist, both at a global scale (Part B) and on the national level, as the cases from India, Indonesia and Viet Nam illustrate in Insert 3: Country Cases for Green Finance and Development.

[95] Green Finance Task Force. 2015. Establishing China's Green Financial System. Report of the Green Finance Task Force. UNEP Inquiry: Design of a Sustainable Financial System. Beijing (The People's Bank of China and UNEP).

Box 9: Recommendations for Building a Green Finance System in the People's Republic of China

Cosponsored both by the Research Bureau of the People's Bank of China and the United Nations Environment Programme Inquiry into the Design of a Sustainable Financial System, the Green Finance Task Force identified three broader policy measures to advance green investment:

(i) Increase the return on investment of green projects;
(ii) Reduce the return on investment of polluting projects; and
(iii) Enhance investor, business, and consumer awareness and responsiveness to these signals.

Following from these mechanisms, the task force formulated 14 recommendations in 4 thematic areas to build a green finance system in the People's Republic of China:

Specialized Investment Institutions

(i) Green Banks—Sponsor the creation of the China Ecological Development Bank and encourage the creation of local green banks.
(ii) Green Funds—Promote the development of green industry funds through public–private partnership arrangements.
(iii) Green the Development Banks—Adopt environmental policies for overseas development institutions.

Fiscal and Financial Policy Support

(iv) Discounted Green Loans—Improve the system for providing discounted interest rates on green loans.
(v) Green Bonds—Develop the green bonds market by issuing industry guidelines, permitting and encouraging banks and enterprises to issue green bonds and providing incentives.
(vi) Green initial public offering—Improve the mechanism through which environmental performance is communicated and recognized in equity markets.

Financial Infrastructure

(vii) Carbon Markets—Accelerate the formation of markets for emission trading.
(viii) Green Ratings—Establish a green rating system to bring down the financing costs for green enterprises and projects.
(ix) Green Stock Indices—Promote the creation and use of green stock indices that orient the capital market to green industry.
(x) Environmental Cost Analysis—Create a public nonprofit environmental cost analysis system and database.
(xi) Green Investor Network—Create a green investor network to foster the expertise and capabilities of institutional investors in investing in green industries.

Legal Infrastructure

(xii) Green Insurance—Implement compulsory green insurance for key industries.
(xiii) Lender Liability—Identify and clarify environmental liabilities of banks.
(xiv) Compulsory Disclosure—Establish mandatory environmental disclosure requirements for listed companies.

Note: Also see Insert 2 on the People's Republic of China.

Source: Green Finance Task Force. 2015. Establishing China's Green Financial System. Report of the Green Finance Task Force. UNEP Inquiry: Design of a Sustainable Financial System. Beijing (The People's Bank of China and UNEP).

Country Cases for Green Finance and Development

India: Recommendations for Building a Green Finance System

Under the United Nations Environment Programme Inquiry into the Design of a Sustainable Financial System in partnership with Federation of Indian Chambers of Commerce, recommendations were formulated that cover six thematic areas to build a green finance system in India.

(i) Developing a sustainable capital markets strategy—upscaling of green bonds market through credit enhancement, adjustment to risk weightings, and fiscal incentives in combination to recent Securities and Exchange Board of India market guidelines;

(ii) Strengthening keystone financial institutions—strategic visioning and operational guidelines revision for National Clean Energy Fund, and product development for takeout, guarantees, and loan life extension for Indian Renewable Energy Development Agency;

(iii) Aligning financial regulations with sustainability—steering priority sector lending requirements in favor of sustainable finance projects, providing renewable energy with own exposure limit, and mainstreaming sustainability considerations into financial system regulations through new Indian Financial Code;

(iv) Building financial sector capacities—financial sector capacitation in financial ratings, financial disclosure, and green credits decision making, including for agricultural commodities and forestry;

(v) Increasing access to sustainable finance—advancing energy savings and climate change adaptation through extended finance access for small and medium enterprises and incentives of finance for water, sanitation, and waste management; and

(vi) Mobilizing international financial flows—leveraging Green Climate Fund, Solar Alliance, foreign green credit, based on changes to external commercial borrowing rules, and attracting foreign institutional investors through Green Infrastructure Investment Coalition and other mechanisms.

Note: Also see Insert 2 on India.

Source: UNEP and FICCI, 2016. Delivering a Sustainable Financial System in India. UNEP Inquiry: Design of a Sustainable Financial System. Geneva.

Indonesia: Recommendations for Building a Green Finance System

Under the United Nations Environment Programme Inquiry into the Design of a Sustainable Financial System in partnership with the Association for Sustainable and Responsible Investment in Asia and the International Finance Corporation, recommendations were formulated to build a green finance system in Indonesia. Based on a number of smaller scale capacity building and guideline formulations, as well as more recent developments where green financing in the form of both investment and lending has been promoted through sustainability ratings (SRI-KEHATI Index and exchange-traded fund), Indonesia's financial services regulator, Otoritas Jasa Keunangan (OJK), signed an Memorandum of Understanding with the Indonesian Ministry of Environment, Kementerian Lingkungan Hidup (KLH), on "Improving the Roles of Financial Services Institutions in Environmental Protection and Management by Developing Sustainable Financial Services." Five major goals were defined in this agreement:

(i) Harmonization of financial services policy with environmental policy;

INSERT 3

(ii) Harmonization of environmental policy with financial services policy;
(iii) Use of environmental data and information for developing sustainable financial services;
(iv) Research to draft policy concept for sustainable finance; and
(v) Development of environmental competency in the financial services sector.

Furthermore, OJK launched its Roadmap for Sustainable Finance in Indonesia in December 2014, constituting a part of the Master Plan for Indonesia's Financial Sector—a strategic approach that is considered unique among developing countries. Four dimensions are defined as follows:

(i) Achieve industry, social, and economic superiority to address the threats of global warming and mitigate other environmental and social issues;
(ii) Aims to encourage the shifting of the target toward a competitive low-carbon economy;
(iii) Strategically promote environmentally friendly investment in various business/economic sectors; and
(iv) Support the principles of development of Indonesia as stated in the RPJMN [National Medium-Term Development Plan], namely the 4P (pro-growth, pro-jobs, pro-poor, and pro-environment).

Based on this, three key goals are identified:

(i) To improve the resilience and competitiveness of financial service institutions;
(ii) To unleash financing resources; and
(iii) To contribute to the national commitments regarding climate change mitigation and adaptation and support the transition toward a competitive low-carbon economy.

Four principles shall be applied to achieve these goals, namely:

(i) Risk Management Principle—integrating environmental and social protection aspects;
(ii) Sustainable Priority Economic Sector Development Principle—increasing financing activities in priority sectors with a balance of economic, environmental, and social aspects and with a focus on finance access of excluded communities;
(iii) Environmental and Social Governance and Reporting Principle—implementing robust and transparent practices and their progress reporting; and
(iv) Capacity Enhancement and Collaborative Partnership Principle—developing human, information technology, and operational capacities for implementing above principles and fostering collaboration between the different actors.

Following from this roadmap, concrete actions will have to be formulated. Besides, policy incentives and the regulatory framework can contribute strongly to encouraging expanded green financing. With a large share of the banking system being state-owned, the government has room to steer its financial institutions toward greener investments. Also, with Indonesia being the country with the largest Muslim population in the world, the potential role of Islamic finance in green lending still has to be scoped. Furthermore, it is recognized that the short-termism in bank lending, as well as the bottlenecks in the development and structuring of bankable projects have to be addressed.

Note: Also see Insert 2 on Indonesia.

Source: United Nations Environment Programme (UNEP), Association for Sustainable and Responsible Investment in Asia, International Finance Corporation. 2015. Towards a Sustainable Financial System in Indonesia. UNEP Inquiry: Design of a Sustainable Financial System. Geneva.

Viet Nam: Providing Strategic Policy Guidance toward Green Growth and Climate Action

Although not the main focus of this publication, the policy element in advancing green finance can be a key facilitator and provide necessary steering of other actors has to be highlighted. This is particularly so as green finance agendas compete against other policy objectives and established behaviors. It calls for guiding strategies and policies that can engage government, private sector, and civil society to support the shift to green growth development. The example of Viet Nam illustrates this aspect.

Anchored in the Socio-Economic Development Plan 2011–2015, the Government of Viet Nam formulated several strategies, plans, and programs to guide its policymaking onto a green growth pathway. Sustainable urbanization was put on the agenda with the National Green Growth Strategy (2012) and its implementation outlined in the National Green Growth Action Plan 2012–2020. Likewise, the National Action Plan on Climate 2012–2020 indicated the key objectives to increase the country's resilience against climate change impacts through corresponding mitigation and adaptation options. Under the National Program on Urban Development 2011–2020, Viet Nam has been pursuing a development program for its secondary cities through targeted infrastructure investments—again under the principles of green growth and climate change resilience.

The Asian Development Bank has supported the Government of Viet Nam and its provincial and city-level governments in realizing its strategies through a variety of projects, including the regional technical assistance on Green Cities. Integrated Urban Development Plans, so called GrEEEn City Action Plans (the three Es stand for economic competitiveness, environmental sustainability, and social equity), were co-designed in and with the cities of Ha Giang, Hue, and Vinh Yen. The ensuing results-based lending program on secondary cities took the identified and prioritized investments further and linked them to finance, including government resources, concessional lending, and grant money from the Urban Climate Change Resilience Trust Fund. Interconnected with these activities were also other projects, such as the Hue Urban Mobility Master Plan, financed by the Ministry of Land, Infrastructure, and Transport of the Republic of Korea. Lessons from the green cities work have informed the integrated urban planning and environmental management activities in other cities in Malaysia, Myanmar, Thailand, and Indonesia.

Sources:

ADB. 2016. GrEEEn Solutions for Livable Cities. Manila.

UNEP. 2015. The Financial System We Need: Aligning the Financial System with Sustainable Development. UNEP Inquiry: Design of a Sustainable Financial System. Geneva. pp. 17–18.

UNEP. 2016. Green Finance for Developing Countries: Needs, Concerns and Innovations. Nairobi. pp. 23–25.

3. Moving Forward: The Need for a Green Finance Catalyzing Facility

Risk and bankability emerge as the overarching factors that are constraints to the mainstreaming or expansion of private sector financing for green infrastructure development. The role for government has to move away from that of a pure "financier" of green assets to that of a "facilitator of finance" from private sector sources.

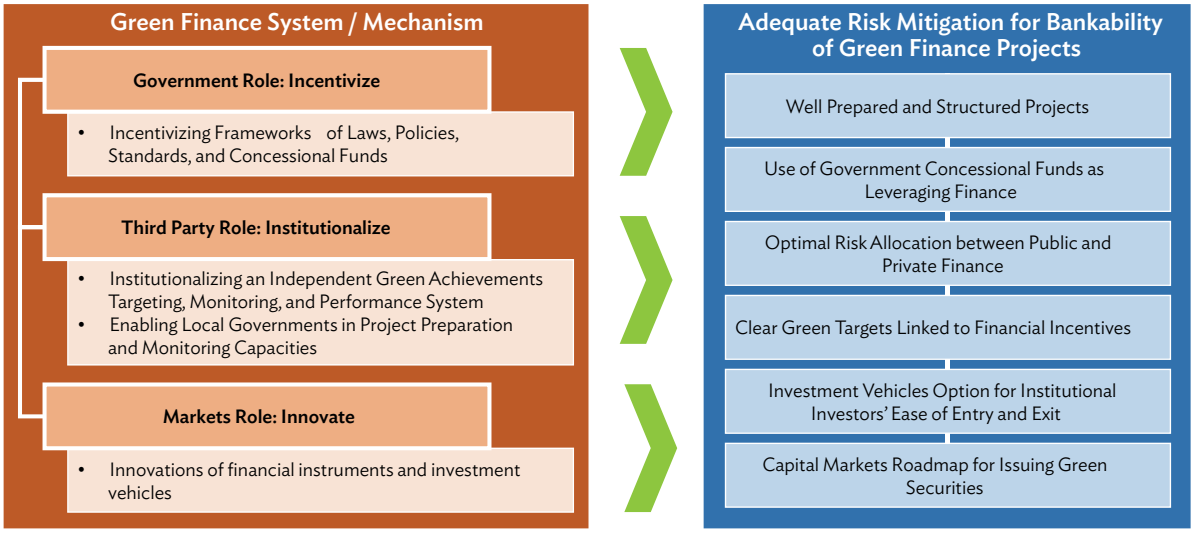
To do this, governments, supported by multilateral development institutions, would need to take responsibility for mitigating those risks best handled by government, especially in the initial phases of market development, and deploy their funds and policies as both risk mitigants and incentives that can help private sector bring their funds, technological innovations, and management efficiencies to bear in rapidly achieving green targets in projects.

For instance, to mitigate the risks of unquantified green benefits and additional green costs, government concessional funds could be used for provision of annual top-ups to revenues, or "green credits," rather than for capital expenditure financing; or to finance risks through viability gap funding approaches (Box 15).[96]

A measure of success then would be the leverage achieved by government funds in catalyzing private sector funds through blended risks and funds. Such an approach where government funds are combined with funds from different sources such as multilateral development agencies, commercial banks, institutional funds, capital markets, all with different financial return expectations set by their risk profiling, would create a blended finance approach for green infrastructure development, maximizing each source's ability to its best potential.

There is a clear need for all actors—government, private sector finance sources, markets, and institutions—to play a role in the acceleration of green finance for infrastructure in development (Figure 20).

Figure 20: Levers for Adequate Risk Mitigation of Green Finance Projects



Source: Authors.

[96] UNEP. 2016. Green Finance for Developing Countries. Needs, Concerns and Innovations. Geneva.

Box 10: India's Infrastructure Investment Trust Vehicle

The Infrastructure Investment Trust (InvIT) vehicle was conceptualized by the Government of India and Securities and Exchange Board of India (SEBI). An InvIT functions like a mutual fund, enabling direct investment of small amounts of money from possible retail and institutional investors into infrastructure to earn a portion of the income as return. India's InvIT vehicles are considered an effective securitization channel to accelerate institutional flows into infrastructure investment, allowing ease of entry and exit, into an underlying projects portfolio which must be at least 80% completed and revenue generating. These aim at financing, developing and managing infrastructure for growth and productivity, smart urbanization, renewable energy, social and environmental projects.

Sources: Authors.

Government of India. 2014. Infrastructure Investment Trusts Regulations. The Gazette of India Extraordinary Part—III—Section 4. Notification by the Securities and Exchange Board of India: 26 September 2014. New Delhi (Gazette of India). http://www.sebi.gov.in/cms/sebi_data/attachdocs/1411722495005.pdf

Government of India. 2016. Infrastructure Investment Trusts Regulations—Amendment. The Gazette of India Extraordinary Part—III—Section 4. Notification by the Securities and Exchange Board of India: 30 November 2016. New Delhi (Gazette of India). http://www.sebi.gov.in/cms/sebi_data/attachdocs/1480513049714.pdf

While governments act to play the incentivizing role, private finance markets would also need to innovate finance products and instruments which could respond to government created frameworks, such as the InviTS model in India (Box 10), or other pooled finance vehicles to reduce risk.

The interplay of the various financing instruments whether concessional debt, commercial debt, refinancing, sponsor and institutional equity, grants, would need to be blended and structured together so as to optimize the risk return profile for a project and bridge its bankability gap. For instance, utilizing concessional debt in risky construction periods and refinancing this with private institutional finance once operations commence, etc.

Finally, the capacities of local government institutions will need strong enhancement given the need for improving project preparation and especially for incorporation of both, sophisticated financial structuring able to cater to the various financing instruments, as well as setting of and monitoring realistic green targets in projects.

Appendix 4: Overview of Green Finance Projects provides a representative list of 34 green finance projects that illustrate the various ways blended finance structures can be linked to development of green projects. Overall, there is a promising picture of hundreds of green projects that are under implementation. Still, significant challenges and constraints for specific green finance remain. At the same time, green finance mechanisms have to cater to different risk appetites, which makes the role of pooling of different green infrastructure projects a viable means.[97]

While a comprehensive green finance system for a country might take a longer period of development, the establishment of a "pilot" or focused green finance catalyzing facility or mechanism which addressed much of the above needs, could quickly demonstrate the deepening of private sector finance for green infrastructure projects and also provide market-tested inputs for the design of a larger and evolving green finance system for

[97] New Climate Economy. 2016. The Sustainable Infrastructure Imperative: Financing for Better Growth and Development. The 2016 New Climate Economy Report. Washington D.C./London (World Resources Institute/Overseas Development Institute).

the country. This will be crucial for governments to be able to meet their greenhouse gas emission reduction targets, their pledges to the Sustainable Development Goals, and numerous other objectives defined in national policies or international frameworks.

Following from these aspects and based on the conclusions drawn in Parts A, B, and C, the clear need emerges to create a green finance facility that not only provide green funds for inclusive, low-carbon, and climate-resilient projects, but leverages concessional finance and catalyzes private and commercial finance to contribute to closing the green infrastructure investment gap. The Green Finance Catalyzing Facility proposes such a mechanism, outlined in Part D of this publication.

Photo Credits: ADB.

Photo Credit: ADB.

PART D

The Green Finance Catalyzing Facility

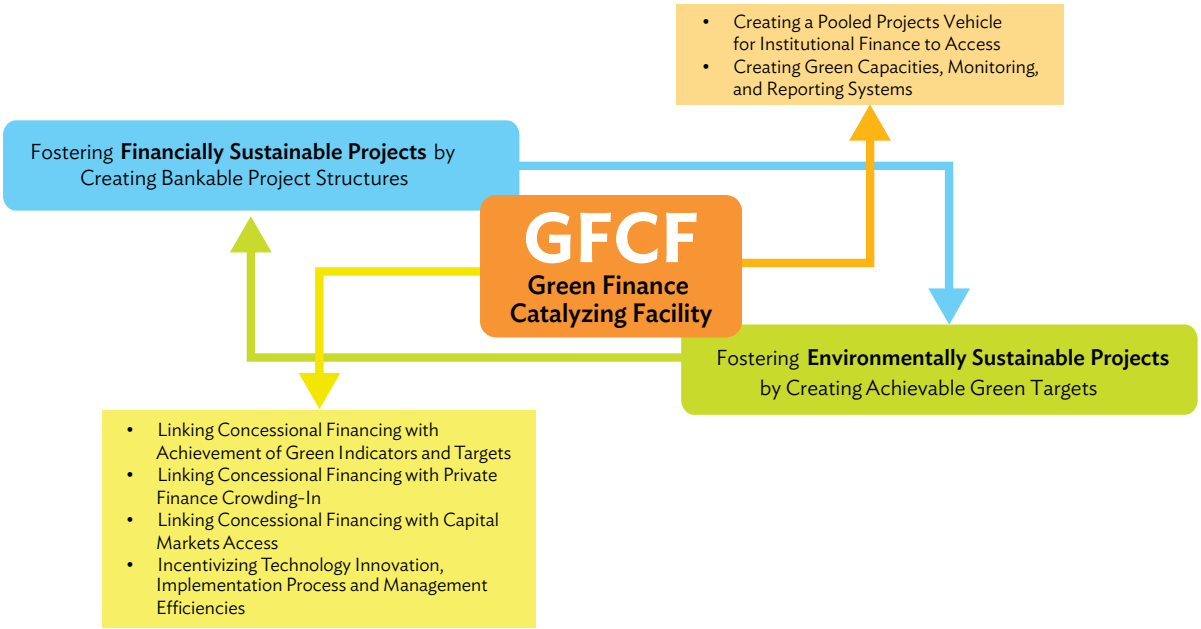
1. Objective

Bankability has been identified to be the key risk constraining the flow of funds from a wide range of private sector sources into infrastructure in general, and this risk is compounded when green requirements are added in.

A Green Finance Catalyzing Facility (GFCF) is therefore proposed as a facility that can transition green infrastructure projects across the bankability gap, with the express objective of catalyzing private sector finance into green projects. In so doing, it hopes to provide a model that could be used in the creation of a larger green finance system for a country.

The GFCF's transition finance role is based on the fundamental principle of risk allocation to the parties best suited to manage them and proposes using concessional finance to mitigate key project risks and costs, but with the provision of such finance conditional upon project road maps, at the start, and achievement of green policy objectives or indicators. It therefore aims to integrate financial sustainability and environmental sustainability (Figure 21).

Figure 21: Basic Rationale and Principles for the Green Finance Catalyzing Facility



Source: Authors.

Design Objectives—List of 10: With the assumption that the GFCF would primarily be utilizing government funds (or sovereign-guaranteed funds), which would be concessional in nature, and to meet the risk and bankability constraints identified earlier, 10 key objectives would need to be incorporated in the GFCF design:

(i) **Multiply through Leverage:** Create a measurable multiplier impact (percentages or dollar for dollar, etc.) of concessional finance to private sector finance.

(ii) **Reduce Uncertainty of Returns**: For instance, by guaranteeing revenue streams for a fixed period, the GFCF can provide clarity on cash flows and investment time scales, and provide a "green risk" coverage for investors.[98]

(iii) **Blend Finance and Refinancing Options**: The GFCF should facilitate in each project a blending of public and various private sector sources of finance, with various instruments, to optimize bankability, leverage, as well as options for swapping or refinancing one source of finance for another, based on risk patterns (for instance, allowing refinancing of concessional lending with commercial finance post construction completion).

(iv) **Innovative Use of Concessional Flows:** Concessional funds do not need to be applied for capital expenditure alone. For example, they could support revenues, and could be refinanced out early, depending on the best combination for mitigating risks.

(v) **Innovate for Unquantified Green Benefits**: By offering quasi-revenue support through government budgets or capital market approaches that could value these unmonetized benefits.

(vi) **Incentivize Green Targets**: Ensure clear and achievable green targets and incentives for ushering in technology innovation, implementation improvement, and management efficiencies to meet these.

(vii) **Ensure Performance:** Through robust green benefit monitoring systems.

(viii) **Facilitate Access to Capital Markets**: By establishing a roadmap where either an individual project, or pool of projects, could potentially raise equity through listing on the capital markets.

(ix) **Consider Pooling Structures for Risk Mitigation**: By bundling a diverse pool of green projects across a portfolio to diversify risks, and provide an entry point for institutional investors.

(x) **Directly Create a Projects' Pipeline:** By both creating demonstration or "pilot" green finance infrastructure projects, as well as capacities for scaling up active project development.

[98] A "green risk" from an investor's point of view describes the perceived risk of deploying a technology that may provide for greener results, such as in reduced pollution or increased resource efficiency; however, the novelty of such technology in combination with externalities—such as the legal and regulatory framework, policies linked to tariffs and subsidies, or green commodity market developments—do not allow for a high-certainty prediction of assured return on investments. Such additional "green risk" in environmental-friendly projects is reduced by various instruments in the GFCF, which are elaborated in the following sections of Part D.

2. Scope

Management versus Oversight: It is proposed that GFCF should be hosted within a sovereign government supported by funds and technical expertise from multilateral development banks and specialist green finance institutions, with a clear delineation between:

- Oversight and Policy Inputs: to be led by government agencies; and
- Facility Management: to be led by experienced financial institutions (or a Special Purpose Vehicle with financial and technical professionals).

This combination allows the GFCF to do more than simply be a channel for raising green funds, but to be an active developer of green projects which combine both policy objectives and funds from government to increase the quality and viability of green projects.

Fund versus Facility: Although the terminology is used interchangeably and there are no clear-cut boundaries, it is worth differentiating green funds from green finance facilities (Figure 22). It helps to understand why the approach of a facility can often support a paradigm shift with practical implications to address the green bankability conundrum (discussed in Part B of this publication)—an objective green funds have been struggling with (Box 11).

Partial (or "Add-On") versus Full-Scale Green Impact: As discussed in Part C of this publication, a number of existing green finance initiatives tend to provide additional green finance to projects, which were originally bankable, but not necessarily "green." Thus, there are numerous examples where green finance functions as an incentive to include green features in projects with traditional design to access additional green finance sources. The GFCF, however, aims to support projects that are green from the outset to address bankability issues through the deployment of green finance (Figure 23). The objective is to secure finance for actual green projects—not traditional projects with "green add-on" features.

Box 11: Differentiating the Approach of Green Funds Versus Green Finance Facilities

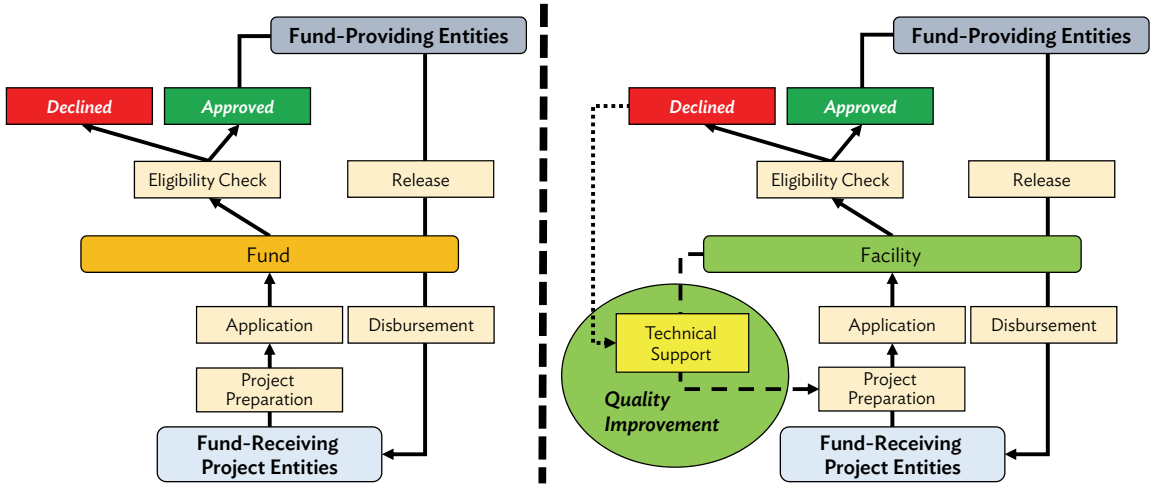
A green fund—although set-up with the same intention of providing finance to green projects—is usually more focused on *finance raising* through bonds or other market placements, and then making available this finance—*usually at market commercial terms*—to projects that are deemed eligible per specific criteria. The fund, thus, functions as a clearing house to assess applications and manage the flow of disbursements.

A green finance facility, however, functions to actively develop projects using a blended finance approach—*concessional plus commercial finance*—with a focus on actively creating project pipelines. It therefore provides more than the management of funds, aiming at "facilitating" access to green finance by providing technical support for project preparation (including technical design, project financial modelling and structuring, risk allocation, etc.). It is at this stage that a facility can help applicants improve the quality of their projects toward achieving objectives of green growth and finance (also see Part A of this publication).

Although named Green Municipal *Fund*, the example of the Federation of Canadian Municipalities illustrates what differences such hand-holding in the initial stages of a project can achieve in advancing green finance for sustainable projects (Box 8).

Source: Authors.

Figure 22: Simplified Conceptual Differentiation of Green Funds and Green Finance Facilities



Source: Authors.

Project Size and Sector: It is envisaged that GFCF-supported projects could encompass a wide range of scale, for example large scale urban infrastructure projects, retrofits of existing facilities or sites, and inclusive growth projects, such as by small and medium enterprises (Insert 1). The types of projects could cover the following indicative list of thematic areas (Figure 24):[99]

(i) **Renewable energy**: production, transmission, appliances and products based on wind, water, solar, and geothermal energy sources;

(ii) **Energy efficiency**: new and refurbished buildings, energy storage, district heating, smart grids, appliances and products;

(iii) **Pollution prevention and control**: waste water treatment, greenhouse gas control, soil remediation, recycling and waste to energy, value-added products from (hazardous) waste and remanufacturing, and associated environmental monitoring analysis;

(iv) **Sustainable management of living natural resources**: sustainable agriculture, fishery, aquaculture, forestry and climate-smart farm inputs such as biological crop protection or drip-irrigation;

(v) **Terrestrial and aquatic biodiversity conservation**: the protection of coastal, marine and watershed environments;[100]

(vi) **Clean transportation**: electric, hybrid, mass transit, rail, nonmotorized, multimodal transportation, infrastructure for clean energy vehicles and reduction of harmful emissions;

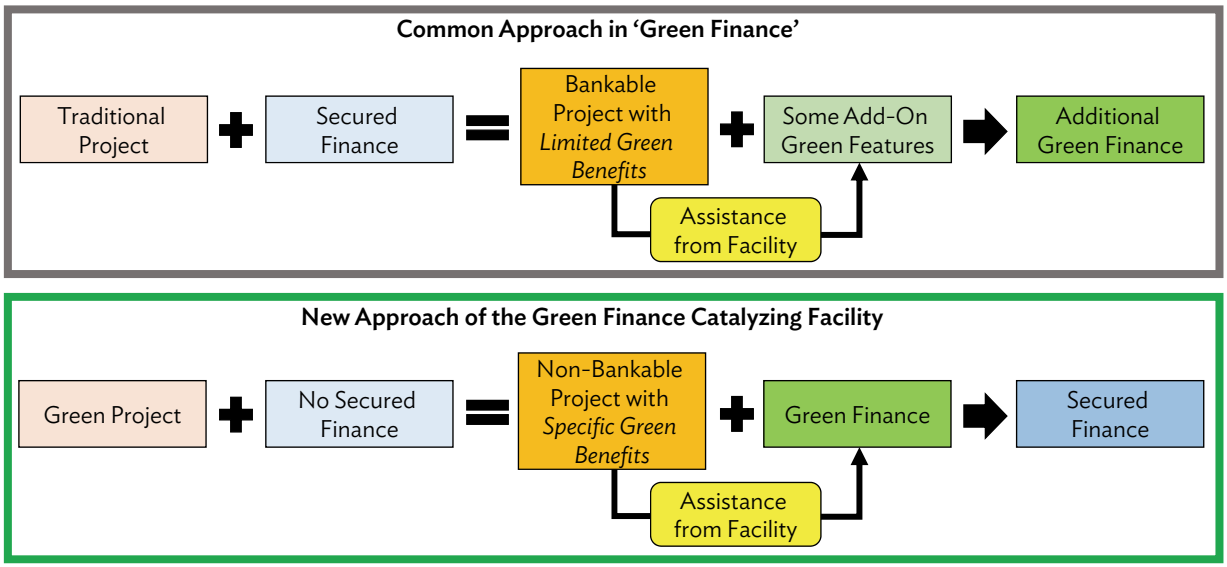
(vii) **Sustainable water management**: sustainable infrastructure for clean and/or drinking water, sustainable urban drainage systems and river management and other forms of flood mitigation; green water

[99] Also see: UNEP. Definitions and Concepts. Background Note. UNEP Inquiry: Design of a Sustainable Financial System. Inquiry Working Paper: 16/13, September 2016. Geneva

G. Inderst and Fiona Stewart. 2012. Defining and Measuring Green Investments: Implications for Institutional Investors' Asset Allocations. OECD Working Papers on Finance, Insurance and Private Pensions: No. 24. Paris.
ICMA. 2017. Green Bonds. http://www.icmagroup.org/Regulatory-Policy-and-Market-Practice/green-bonds/

[100] Regarding the GFCF feasibility of projects with small or no direct revenue generation, see for instance Box 21: Unquantified Green Benefits and Achieving Bankability: An Extreme Case—Watershed Development.

Figure 23: Approach of the Green Finance Catalyzing Facility



Source: Authors.

infrastructure with wastewater treatment and less-concrete infrastructure (e.g., through rainwater harvesting, source control of surface water), green roofs, and local processing of grey or black water;

(viii) **Sustainable urban development**: integrated place development, greening of public areas, compact design, transit-oriented development, urban regeneration and re-functionalization of infrastructure;

(ix) **Climate change and disaster resilience**: climate-proofing infrastructures, information support systems for climate observation, early warning, and modeling; and

(x) **Eco-efficient products, production technologies and processes**: development and introduction of environmentally friendlier, ecolabeled or certified products, resource efficient manufacturing, packaging and distribution.

Ultimately these suggestions of the facility's thematic scope of projects will be determined by the priorities of the host government. For example, the host government of the GFCF may want to prioritize projects presented by entrepreneurs as part of a national inclusive growth strategy, or could adapt the eligible project sectors in accordance with national priorities. The host government could also cap the number or limit the minimum or maximum size of projects, in a particular sector depending on demand.

A detailed discussion of the technical options proposed by the GFCF follows in the next sections. Readers looking for a summary of the proposed GFCF can skip to the section titled "Summary: Proposed Term Sheet of the Green Finance Catalyzing Facility".

Figure 24: Example Project Areas for Green Finance Catalyzing Facility Projects

Source: Authors.

Photo Credits: ADB.

3. The Twin Pillars of Financial and Environmental Sustainability

The GFCF is proposed to be based on the concept of combining financial sustainability (bankability of projects) together with environmental sustainability (green impacts of projects)—the twin pillars of green finance.

The proposed approach therefore is:
The GFCF identifies projects which (i) could transition to a "bankable" financial hurdle rate, e.g. 12% financial internal rate of return (IRR), if supported by some concessional finance; and (ii) could achieve faster green targets such as greenhouse gas emission reductions through better technology usage, for instance. The GFCF would then finance these projects with the amount of concessional finance needed for the project to achieve the set hurdle rates and green targets.

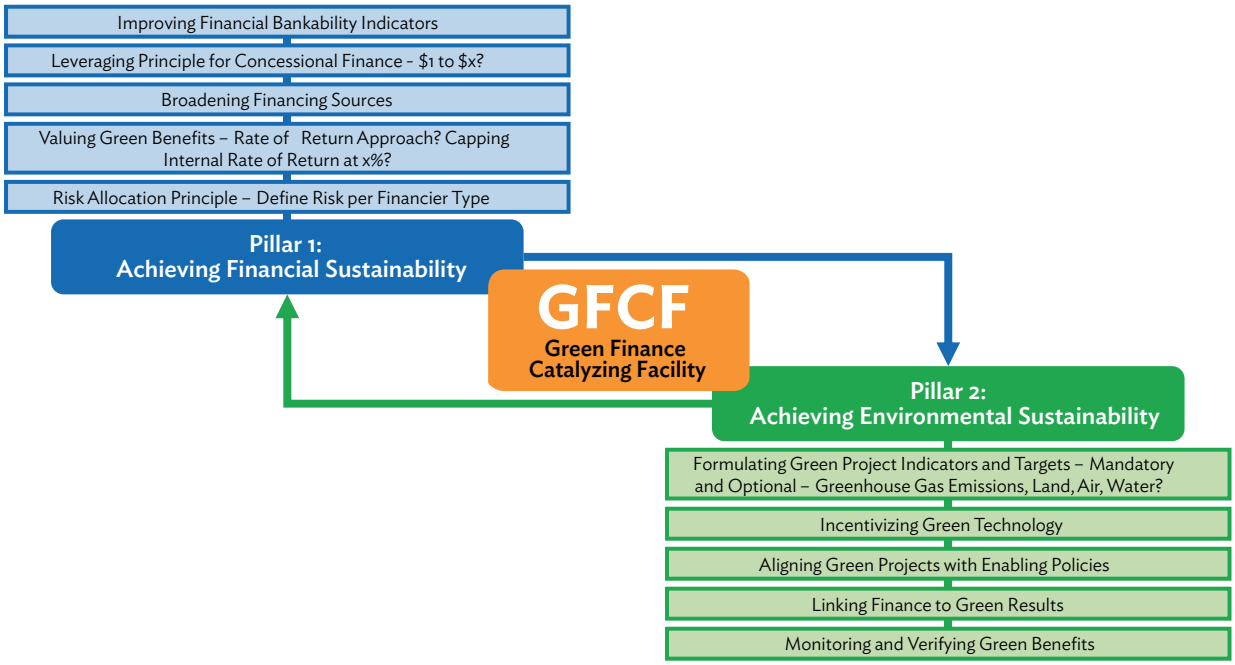
In addition, the GFCF needs to play a role in mitigating the risks and uncertainties associated with green projects, through a finance *plus* support approach, as part of its bankable-pipeline-generating objective. The GFCF approach must be to provide a product that combines funds with clear approaches or strategies that can address the most critical of the green project bankability risks. The key issues under each pillar have been identified and depicted in Figure 25. The key principles that should be incorporated in the GFCF's finance *plus* support approach are discussed in the next section.

This principles-based approach incorporates some of the approaches either developed or proposed for development in other recent examples of green finance or infrastructure finance facilities, such as the Viability Gap Funding scheme in India (Box 15), the Indonesia Infrastructure Finance Initiative (Box 12), Green Finance Task Force recommendations (Insert 3), amongst others.

In addition to the key principles, other aspects are likely to be important as well, and a host country could develop additional criteria, for instance those aligned with their Nationally Determined Contributions (NDCs) under the United Nations Framework Convention on Climate Change (UNFCCC).

These twin principles are elaborated further in the following two sections, 4. "Financial Sustainability Principles" and 5. "Environmental Sustainability Principles."

Figure 25: The Twin Pillars of Financial and Environmental Sustainability



Source: Authors.

4. Financial Sustainability Principles

Projects to be considered by the GFCF would need to demonstrate their financial sustainability. The test for financial sustainability is relatively straight forward: a project must demonstrate through a lifecycle-based financial model, which includes a financing plan and a weighted average cost of capital based on financing from various sources, its internal rate of return (IRR) and net present value (NPV). Bankability gaps can thus be identified and the GFCF will intervene to assist in transitioning such projects to achieve a minimum IRR-based hurdle rate, while also imposing certain conditionalities, such as crowding in a blend of private finance sources. The financial sustainability principles (Figure 25) to be used by GFCF in assisting projects are discussed as follows:

4.1 Improving Financial Bankability Indicators

The overwhelming reason many green projects fail to get financed via typical commercial sources of finance is because bankability parameters are not met, such as IRR.[101] The GFCF needs to identify and establish IRRs for green projects that will be acceptable to the private sector, if combined with other GFCF support to a project.

- **Establishing a Green Bankability Indicator**: While a typical due diligence by a financial institution would also include other financial indicators, for ease of use, a headline bankability indicator the GFCF could use for projects would be a project IRR calculated over its useful economic life. Project returns will differ,

[101] McKinsey & Company. 2016. Financing Change: How to Mobilize Private-Sector Financing for Sustainable Infrastructure. Detroit. p. 33.

New Climate Economy. 2016. The Sustainable Infrastructure Imperative: Financing for Better Growth and Development. The 2016 New Climate Economy Report. Washington D.C./London (World Resources Institute/Overseas Development Institute). p. 35.

Box 12: Indonesia Infrastructure Finance Setting Social and Environmental Principles for Projects

Established 2010, PT Indonesia Infrastructure Finance (IIF) is a private nonbank financial institution established under the Indonesian government's Ministry of Finance in cooperation with World Bank, the Asian Development Bank, and other multilateral agencies. It focuses on commercially viable infrastructure projects to advance private sector participation in the sector. Its financial instruments include senior loans and mezzanine finance, well as equity investments and guarantees. It also assists the government in infrastructure policymaking by providing public sector clients with transactional advisory services for public–private partnership projects.

It differs from many other infrastructure financiers, as it has established social and environmental principles its projects must adhere to:

- Principle 1: Assess and manage projects under social and environmental aspects
- Principle 2: Ensure equal, safe, and healthy working conditions and good worker-management relationship
- Principle 3: Prevent pollution, use resources sustainably, and assess, mitigate, and monitor climate change aspects
- Principle 4: Avoid or minimize risks to community health, safety, and security under human rights principles
- Principle 5: Avoid, minimize, mitigate, or compensate for social and economic impacts from land acquisition and involuntary resettlement
- Principle 6: Protect, conserve, and sustainably manage biodiversity and living natural resources and ecosystems
- Principle 7: Ensure due inclusion of and avoid or minimize adverse impacts on Indigenous People
- Principle 8: Identify and protect cultural property and heritage

Source: Indonesia Infrastructure Finance. 2016. Indonesia Infrastructure Finance. http://iif.co.id/en_US/

across sectors and regions, by phase of development, amongst others; however, according to discussions with market sources and from other infrastructure initiatives, a 12% to 14% IRR has been used as a hurdle rate by some development, as well as financial and government institutions. **As a start, attaining a 12% IRR is suggested as a bankability indicator for GFCF projects**.

- **Providing an Optimal Blend of Finance for Bankability**: In order to help green projects achieve key bankability indicators, GFCF could consider providing a blend of different financial support options focused on improving project IRR or reducing its weighted average cost of capital (WACC). Some of these options could include the following:

Basic Concessional Debt: Loans provided on substantially better terms than the commercial bank market, for example with lower interest rates, and/or, longer grace periods. Sovereign guaranteed finance from the multilateral development banks (MDBs) is often a major part of this. Concessional debt would be passed on from GFCF to finance the capital expenditure of projects at the same terms, for instance, as levied by MDBs. Grant financing from government or MDBs to GFCF could also be passed on to support project capital expenditure as the ultimate concessional financing.

First-Loss Capital: GFCF could act to provide "first-loss capital," i.e., a guarantee-based support rather than capital expenditure financing, for instance, ensuring to cover a first loss of say 20% of invested private sector capital. This could be through provision of GFCF funds as junior equity (junior-most in the capital structure),

or grants expressly for the purpose of covering a set amount of first-loss, or guarantees to cover set amount of first losses, and subordinated debt (junior-most debt position).[102]

Such an approach makes the project's risk/return profile much more attractive to investors and could catalyze more private capital finance. This first-loss capital model has been seen in impact industries and social investments, such as education, and home ownership for low-income populations, with the main providers being endowments, foundations, and government organizations looking to catalyze a positive social outcome.[103] First-loss capital can be useful as, for example, some private sector investors and impact investment funds are subject to specific risk-return limits, and thus are unable to invest in projects, that might fall outside these limits. Such first-loss capital would act as a credit enhancement to the project and make it investable by these financing sources.

Pari Passu Equity Co-Investment: With limited availability of private capital, a *pari passu* equity co-investment is usually used to allow passive funds to follow the lead equity investor's capital discipline requirement.[104] Mimicking examples such as utility joint ventures, this approach can commonly be found to be used by multilateral development banks in emerging markets. A facility, like the GFCF, could co-invest equity *pari passu* (i.e., hand-in-hand or on the same footing) alongside private capital to buy shares at the beginning of the development of qualified green projects. The purchased shares would be transferable, dependent on the limitations that apply to shareholder and lender. The facility can offer its shares for sale to interested third parties over the whole course of a project, possibly even at the inception phase, which would enable GFCF capital investments in other projects. Third party demand, particularly from private sector co-investors, for project shares would be sufficient at construction completion stage, allowing the GFCF to sell its project shares in order to recycle capital for new projects.

Intermediate/Mezzanine Funding: As exemplified by offshore wind parks, the GFCF can work with green technologies that lack a sufficient track record of large-scale application.[105] While such projects can be able to secure project finance debt at required levels, they may struggle to offer equity investors sufficient rate of returns. This often opens up the possibility to deploy intermediate/mezzanine debt instruments—quasi-equity capital, which is subordinated to the principal senior bond or bank debt, but still ranks higher than equity. For that, it is rewarded with higher returns than senior debt, but remains below equity returns due to its lower-risk profile. If a project performs positively, equity returns will be higher. If it however defaults, mezzanine debt will be paid only after senior debt. Thereby, the instrument functions as leverage to close the gap for private sector capital seeking acceptable returns.

Revenue Support: To improve project returns the GFCF could guarantee the first few years of operations and maintenance costs, or revenues, for example guaranteeing electricity payments or water revenues, or carbon revenues, depending on the project, to assure a specified rate of return over the short-term, for instance the 12% IRR above. This would assure other investors of the project return, at least over a defined period, making the project potentially more attractive to more risk-averse investors.

Loan Loss Reserves: In order to lower loan repayment risk, capital could be set aside to cover for potential losses from borrower defaults. For example, a standby loan facility can address the risk of cost overrun causing

[102] For clarification of terminology, kindly refer to: Investopedia. 2017. Dictionary. http://www.investopedia.com/dictionary/

[103] Global Impact Investing Network (GIIN). 2013. Catalytic First-Loss Capital. Issue Brief: October 2013. New York City.

[104] Green Investment Bank Commission. 2010. Unlocking Investment to Deliver Britain's Low Carbon Future. London. p. 26.

[105] Green Investment Bank Commission. 2010. Unlocking Investment to Deliver Britain's Low Carbon Future. London. p. 27.

Box 13: Green Bonds—State of the Market 2016

The Climate Bonds Initiative counts $118 billion in labeled green bonds at a 17% share of the overall climate-aligned bond market, which they tag at $694 billion outstanding bonds. Sector-wise, transport has the largest share at two-thirds, followed by energy at nearly one-fifth. Of the climate-aligned bonds, 78% are investment grade, 16% are below that and 16% are not rated. In contrast, labeled green bonds achieve investment grade in 82% of all cases, with only 13% below that and 14% not rated. It is characteristic for the green bonds market to show a variety of sectors, with nearly half of the market belonging to multisector bonds, while about 28% are pure green energy bonds and about 9% are pure green building and industry bonds. Geographically, North America has $138 billion outstanding climate-aligned bonds, Latin America $4.4 billion, Western Europe $195 billion, Eastern Europe $15.7 billion, and Asia and the Pacific $48 billion without the People's Republic of China (PRC) or $294 billion with the People's Republic of China. This translates into a market share for PRC's climate-aligned bonds of 36%, thereby taking a market leader role globally.

Source: Climate Bonds Initiative. 2016. Bonds and Climate Change. The State of the Market in 2016. London.

project drawdown. In addition, such an instrument can be accompanied by an equity draw-down facility to ensure that ranking and leverage ratios remain equal (or junior) to senior project debt.[106]

Green Bonds and Equity: The GFCF could also act to raise capital for projects through the issuance of a targeted green bond or listing green shares in the capital markets. The majority of issued green bonds have resembled green "use of proceeds" or asset-linked bonds, where funds have been raised for green projects, while having been backed by an issuer's entire balance sheet (Box 13). There have also been green project bonds, green "use of proceeds" revenue bonds, and green securitized bonds. Multilateral development banks have successfully issued green bonds of more than $20 billion between 2007 and 2014.[107] The example of ADB's green bonds illustrates how green bonds could be issued to either capitalize the GFCF, or to finance specific underlying projects (Box 14). Examples would be single project bonds that provide exposure to specific low-carbon projects, or bonds that directly fund asset portfolios in offshore wind, solar energy, energy efficiency, or even the GFCF itself.[108] Green equity issuance would allow the GFCF as a vehicle to provide investment opportunities to institutional investors in a diversified pool of projects structure and may thus be attractive, in a similar fashion to an Investment Trust Vehicle structure (Box 10).

Guarantees: GFCF could act to provide full risk coverage (covering all political and commercial risks) or partial risk coverage (either political or commercial risks) guarantees. These would-be undertakings by GFCF to fulfill a borrower's project obligations to lenders under an agreement, in the event of nonperformance or default by the borrower on such obligations under the agreement. Generally defined beforehand, underlying default causes can be either political or commercial risks (also see section on risk mitigation below). Partial credit guarantees and partial risk guarantees could both be utilized to cover a portion of a private loan's or bond's scheduled repayments against all risks.

[106] Green Investment Bank Commission. 2010. Unlocking Investment to Deliver Britain's Low Carbon Future. London. p. 28.

[107] AfDB, ADB, EBRD, EIB, IDB, WBG. 2014. Joint Statement by Multi-lateral Development Banks (MDBs) on Climate Finance. 11 September 2014. Multi-lateral Development Banks Agree to Reinforce Climate Finance. http://www.eib.org/attachments/press/joint-mdb-statement-on-climate-finance.pdf

[108] Green Investment Bank Commission. 2010. Unlocking Investment to Deliver Britain's Low Carbon Future. London. p. 19.

Box 14: Asian Development Bank Green Bonds

The Asian Development Bank (ADB) already issues green bonds to promote ADB's climate change strategy that identifies five priority areas:

(i) Expanding the use of clean energy;
(ii) Encouraging sustainable transport and urban development;
(iii) Managing land use and forests for carbon sequestration;
(iv) Promoting climate-resilient development; and
(v) Strengthening policies, governance, and capacities.

Mitigation projects include those that fall under the following sectors: renewable energy, energy efficiency, and sustainable transport.

Climate change adaptation projects include those that fall under the following sectors: energy, water and other urban infrastructure and services, and transport.

Eligible green bond projects are identified by ADB sector specialists on a continuous basis. This is done by using the joint multilateral development bank approach for tracking and reporting climate change mitigation and adaptation finance, and additional selection criteria for green projects, as defined by ADB's Green Bond Framework, that deliver environmentally sustainable growth.

Green bond net proceeds are allocated within ADB's treasury to a special subportfolio that is linked to ADB's lending operations to eligible projects. As long as the green bonds are outstanding, the balance of the subportfolio will be reduced at the end of each quarter in respect of eligible projects. Pending such disbursements, the subportfolio will be invested in liquid instruments, consistent with ADB's liquidity policy.

Sources: ADB. 2014. ADB Green Bond Framework. Manila

ADB. 2016. ADB Green Bonds. Manila.

Convertible Debt: GFCF could also look at providing funds as convertible debt that at a defined point in the future converts into equity. Debt is classically a cheaper financing instrument than equity, and a convertible debt structure is most often used by companies with a low credit rating but high growth potential, such as green field infrastructure or start-up projects. Conversion into equity once a project is operational would allow a better valuation rather than at the start when this would be more difficult to value without a proven record.

Any of these options above or a combination thereof could be deployed to support green projects.

An initial blended finance approach suggested for the GFCF:

- Concessional Debt *plus* Grants provision—with the intention of reducing the cost of capital for the project, but limited to a maximum cap—the traditional approach which is seen as necessary to reduce the upfront financing exposure for private sector sources.
- Revenue Support or Guarantees provision—to improve the overall revenue generation for the project but limited by a maximum IRR percentage; such a supporting component reduces the overall quantum of concessional finance support required upfront in a project's capital expenditure, can catalyze more private sector finance, and reduces the immediate upfront burden on government balance sheets.
- Green Bonds or Equity Issuance—for the GFCF to channel funds for pooled projects at its portfolio level, but with clear timelines based on operationalization of underlying projects.

As part of the support provided by the GFCF, project sponsors should be helped to structure the above financing support elements into a financial model, with a concluding IRR number at par with or higher than the suggested 12% IRR hurdle rate.

4.2 Leveraging Concessional Finance

Aside from concessional sovereign guaranteed funds that could be raised by GFCF from the MDBs, concessional resources could also be raised from bilateral and other development agencies, governments, philanthropic institutions, private foundations, and corporate social responsibility (CSR) funds. Concessional resources can include low-interest, or no-interest loans, extended term loans, grants and guarantees.

One of the key goals of the GFCF is to leverage these scarce concessional resources as best possible. The leveraging concept has been tested in other arenas such as the Viability Gap Funding Facility (Box 15), of the Government of India which proposes up to a maximum 40% concessional government financing support for a 60% private sector crowding in impact in projects.

Box 15: India's Viability Gap Funding Scheme for Public–Private Partnerships in Infrastructure

In order to support infrastructure projects that are financially not sufficiently viable, but highly relevant from an economic and developmental point of view, the government of India introduced a Viability Gap Funding scheme in 2004, administered by the Ministry of Finance. This scheme aims to attract private investors to public–private partnership projects under competitive bidding processes. The scheme basically provides a capital subsidy at the construction stage to address long gestation periods and/or limited revenue flows, e.g., user charges below commercial levels. This grant amount is limited to a maximum of 20% of a project's capital costs, by the national government's budgetary resources. The statutory entity owning the project asset can provide additional grants, but not more than another 20% of project cost.

Source: Government of India, Ministry of Finance. 2005. Scheme for Support to Public–Private Partnerships in Infrastructure. New Delhi.

While several market players have suggested various multiples of leverage that concessional funds should aim to achieve from private sector funds catalyzed into green projects, even up to 6 times private funds for each unit of public funds invested, a more conservative multiple might be necessary as a start for the GFCF.

Additionally, there is also room for more innovative use of concessional financing. Traditionally, MDB-sourced sovereign concessional financing is provided for a 20 to 25 year fixed term with straight line equal repayments and a 4 to 5 year grace period. However, this could be modified to be more flexible once the initial project risks are mitigated. For instance, once construction is complete, the concessional debt:

(i) Could have a mandatory trigger for early repayment if certain IRRs are achieved and allow for the project to be refinanced by private sector given risk mitigation;
(ii) Could be converted into semi-commercial financing terms; and
(iii) Could be converted into equity which could be linked to a GFCF flotation of securities in the capital markets.

These various options can allow concessional funds to be withdrawn and available for use elsewhere once a project's initial risks are reduced, for leveraging in further private sector finance, and to lead directly to green capital markets access. Some examples of the types of activities possible are shown in Box 16 and Box 17.

Box 16: Green Financing Platform for Accelerated Air Quality Improvement in the Greater Beijing–Tianjin–Hebei Region

The Asian Development Bank (ADB) has developed a project preparatory technical assistance for $500,000 to establish the institutional, legal, and financial arrangements for a dedicated green financing platform to overcome the barriers for green financing in the Greater Beijing–Tianjin–Hebei (BTH) Region. This platform aims to introduce innovative financial instruments as recommended by the Green Financing Guidelines of the China Banking Regulatory Commission and the National Development and Reform Commission. These instruments are meant to mobilize private and social capital for green investments. The platform will offer different financial products, including:

(i) Debt financing with limited recourse to fixed asset collateral;
(ii) Loss guarantee support to low-carbon development, energy saving, and environmental improvement projects for easier access to commercial bank financing; and
(iii) Mezzanine financing in the form of subordinate debt or preference share investments in promising small and medium enterprises, etc.

The technical assistance will also ensure knowledge transfer of green finance and green technologies into the target region to support the shift of industries toward low-carbon, low-emission and efficient practices, thus contributing to improved air quality.

The financing platform builds upon policy actions initiated in Hebei Province, People's Republic of China, under a policy-based loan for air quality improvement for the BTH Region.

In order to meet air quality targets defined in the 2013 Comprehensive Action Plan for Air Pollution Prevention and Control, the BTH Region requires direct investment of $37.8 billion. However, even the dedicated financial support from the national government and the support from ADB, German Development Bank KfW, and World Bank leaves a significant financing gap, which the green financing platform will help to address in order to support green growth and low-carbon transformation for the BTH region.

Source: ADB. 2016. China, People's Republic of: Green Financing Platform for Accelerated Air Quality Improvement in the Greater Beijing–Tianjin–Hebei Region. https://www.adb.org/projects/50096-001/main#project-pds

An initial leveraging approach suggested for the GFCF:

- Leverage Upfront: by linking GFCF concessional finance provision to a required private sector finance quantum of at least 1 to 1;
- Leverage Later: by allowing for refinancing by swapping out concessional finance for private sector post construction completion or post first 2–3 years completion of operations; and/or
- Leverage Project and Portfolio Level: in addition to project leveraging as above, GFCF should also leverage private finance from institutional investors at its own level as a pooled financing vehicle able to float green equity or debt securities.

4.3 Broadening Financing Sources: Accessing the Capital Markets

The GFCF needs to create a roadmap for green projects to access not just more finance from the private sector, but also to access a more diverse range of private sector sources, especially retail and institutional investors, such as insurance companies, dedicated green funds, and pension funds.

Box 17: Multilateral Development Banks and Leveraging Concessional Finance

Multilateral development banks, such as the Asian Development Bank, are scaling up financial leverage for low-carbon and climate-resilient investments by improving the planning, preparation, structuring, financing, aggregation, and de-risking of public and private investments. Also, multilateral development banks use risk mitigation instruments for financial investments, such as mezzanine financing, equity and quasi-equity structures, guarantees, risk-sharing facilities and insurance products, which can be attractive, relatively inexpensive ways for the public sector to mobilize private investment and help rebalance risk-reward profiles of climate related projects. This is an area that can be further scaled-up with sufficient access to concessional resources.

Building on experience, multilateral development banks will continue assisting government and private sector clients to access and make effective use of concessional resources, including from the Climate Investment Funds (CIFs), Global Environment Facility (GEF), Green Climate Fund (GCF), Adaptation Fund (AF), European Union (EU) blending facilities and bilateral sources. Concessional climate finance will continue to be important for covering the incremental costs of climate action, as well as for redirecting investment flows and accelerating the transition from fossil fuels to renewable energy and expanded energy efficiency. Multilateral development banks are working to ensure that policy options, institutional practices and reforms are deployed to minimize the required level of concessional finance and maximize its impact.

Additional concessional funds will be key to supporting multilateral development banks in meeting their targets regarding climate change and the Sustainable Development Goals, and mobilizing private sector participation at scale. Maintaining multilateral development banks' access to international sources of concessional finance, comparable at least to historical amounts, will be essential for most of the actions that will be required and particularly important in accelerating leverage of institutional investors. This kind of concessional funding has until now allowed multilateral development banks to finance climate investments that would not have been possible without this concessional financing. Multilateral development banks will work together to build on the positive experiences of the CIFs and the EU blended finance facilities. Multilateral development banks will work collectively and strategically with the GCF to increase access to climate finance for their clients.

Source: AfDB, ADB, EBRD, EIB, IDB, WBG. 2014. Joint Statement by Multilateral Development Banks (MDBs) on Climate Finance. 11 September 2014. Multilateral Development Banks Agree to Reinforce Climate Finance. http://www.eib.org/attachments/press/joint-mdb-statement-on-climate-finance.pdf

The pooled savings of individuals and/or companies managed by intermediaries such as specialized portfolio management firms, fund managers, banks or pension funds represent a vast quantum of private sector funds (Box 3), that must be accessed in order to meet the green infrastructure financing gaps.[109]

Institutional funds generally look to capital markets and private placements for investment opportunities but are severely constrained by challenges and constraints as discussed in Part B of this publication and risk-return equations, flowing from institutional mandates specifically focusing on their fiduciary responsibilities to maximize benefits to the group.[110] Consequently, while there is considerable interest in green investments, risk adjusted financial returns are the overriding investment criteria to be met. Consequently "greening" of the capital markets is needed, both domestic and international ones, so that both, appropriate green debt (e.g., corporate or government bonds) and green equity capital market instruments emerge in sizeable quantities, which can be taken up or invested in by these institutional and retail investors.

[109] McKinsey & Company. 2016. Financing Change: How to Mobilize Private-Sector Financing for Sustainable Infrastructure. Detroit. p. 14.

[110] UNEP. 2014. Demystifying Private Climate Finance. Geneva. p. 25.

A 2016 study by the Global Impact Investing Network found 157 major fund managers, foundations, and development finance institutions with more than $15 billion committed investments in 2015 and nearly $18 billion planned investments for 2016 in the area of social and environmental impact investments. Together, these investors managed about $77 billion in impact investment assets by the end of 2015. Half of these were going into emerging markets.[111] Looking ahead, analysts see for instance the potential for the social impact investment market at $3 trillion.[112] Interestingly, the unavailability of sufficient projects is often cited as a hindrance to such sustainability-based investments.

Islamic financing sources are another growing funding base that could be tapped by the GFCF, using for instance *sukuk* structures, the Islamic financial instrument similar to a conventional bond, through the capital markets.[113] While investors focused on environmentally sustainable investing are generally based in Europe, the United States, and Japan, *sukuk* investing has largely been from countries such as Malaysia (the largest *sukuk* issuance market) and other Gulf countries, although the interest in related instruments has also been growing beyond majority-Muslim countries. GFCF's green investment focus could allow for a capital market instrument like a *sukuk* to be created that could be attractive to both environmentally sustainable and Sharia-compliant investors, thus majorly increase the range of funding sources; integrating the two sources of funding to a common investment instrument would also be a major innovation.[114]

While the green bonds sector has been growing, this is largely on the back of corporate or government balance sheets, not ring-fenced for a particular project, or group of projects.[115] This is a more of a short-term solution and hence a key issue for green finance—an ideal goal is for projects to raise green financing on the strength of their own projects and projected balance sheets. For that to happen, green securities issued directly by projects will require a mix of the following:

(i) Better aligned risk profiles: Standardization of structures and risks to attract not just green finance-specialized investors but also typical capital market investors;
(ii) Secondary market and significant liquidity in the capital markets for easy access and exit for institutional investors, making trading on the secondary markets crucial. Without this liquidity, institutional investors would be less inclined to purchase green shares or bonds which are "sticky," i.e., difficult to unload in the future; investment horizons are shorter, risks within a portfolio need to be mitigated, and investors need to be able to see an exit strategy. A potential way of circumventing this issue could be to offer innovative structures which allow investors to "put" green bonds back to the issuer thereby creating a synthetic secondary market at the early stages;
(iii) Matched pension fund-type investors who are long-term "buy-to-hold" investors; and
(iv) Diversified pools of green projects that avoid single investment risk. Perhaps a combination of green projects with traditional infrastructure projects to get investors used to the new asset class would offer a staged approach.

While some more sophisticated capital market activity is beginning to happen in this arena, especially in developed markets, with instruments such as REITs (real estate investment trusts), green exchange traded funds (ETFs), and even the launch of a dedicated trading platform for green equity financial instruments in Luxembourg in September 2016, much more needs to be done structurally to developing countries' capital markets, through coordinated action by governments, potentially with multilateral development agency

111 Global Impact Investing Network. 2016. Annual Impact Investor Survey. 6th Edition. New York.

112 R. Cohen and M. Bannick. 2014. Is Social Impact Investing the Next Venture Capital?. Forbes: 20 September 2014. https://www.forbes.com/sites/realspin/2014/09/20/is-social-impact-investing-the-next-venture-capital/#4cf330ca46a4

113 ADB and IFSB. 2015. Islamic Finance for Asia: Development, Prospects, and Inclusive Growth. Manila and Kuala Lumpur (Asian Development Bank and Islamic Financial Services Board).

114 Also see the case of Indonesia in Insert 2: Country Cases for Infrastructure Investment Needs, Sources, and Instruments.

115 Climate Bonds Initiative. 2016. Green Bond Highlights 2016. London. p. 1.

support.[116] Much of the work will be in the area of advocacy and knowledge dissemination to explain the risk of the underlying projects and how they are different from tradition investments. Alternative assets are a sought-after asset class.

In addition to institutional investors, green funds also possess funding pools which in many cases are not flowing due to a lack of suitable projects or through cumbersome access procedures; the Green Climate Fund has $10.3 billion of funding available, and has so far committed about $2.2 billion.[117] These funds could be blended by the GFCF to offer a more concessional product for leveraging private sector funds in.

Securitization and Pooling Approach for Accessing Capital Markets: In addition, securitization and pooling approaches for accessing capital markets require attention—securitization and other structured finance vehicles allow the investor to benefit from over-collateralization, often defining, delinking and reducing risk. It allows for structured aspects such as government guarantees and support, linked and de-linked revenue streams, future revenues and insurance wraps to add credibility and ratings, and reduce risk perception, with the ultimate aim of reducing borrowing costs and making the vehicle more investible/bankable. A pooled vehicle approach, whereby an entity pools projects and therefore diversifies risks, and is able to undertake a better rated capital markets issuance—debt or equity—is often considered an optimal route for accessing institutional funds such as pension and insurance funds. The flexible approach also allows effective "time management" of when funding commitments and revenues can be realized and when they need to be utilized. The International Finance Facility for Immunisation illustrates this mechanism (Box 18).

Box 18: The International Finance Facility for Immunisation

With the current emphasis on sustainable finance, alternative sources and loan based funding, many organizations are exploring one of the deepest sources of funds, namely the capital markets. There is a good example of this mechanism in the public health space with the International Finance Facility for Immunisation (IFFIm). IFFIm was set up in 2006 to rapidly accelerate the availability and predictability of funds for immunization programs of the Global Alliance for Vaccines and Immunization (GAVI). Created in 2000, GAVI is an international organization—a global vaccine alliance—bringing together public and private sectors (PPP) with the shared goal of creating equal access to new and underused vaccines for children living in the world's poorest countries.

Simply put, IFFIm exists to rapidly accelerate the availability and predictability of funds for immunization. It uses international capital markets to raise funding for the purchase of vaccines, by securitizing (using as collateral) financial commitments from highly rated governments. IFFIm uses long-term legal commitments from donor governments to issue "vaccine bonds" in the capital markets (up to 20 years), raising funds (borrowings) immediately available for GAVI programs, thereby creating the predictability that is necessary for long-term budget and planning decisions for such programs. Thus far, they have refinanced $6.5 billion backed by legal commitments from the governments of the United Kingdom, France, Italy, Norway, Australia, Spain, The Netherlands, Sweden, and South Africa. The Third International Conference on Financing for Development in Addis Ababa in 2015 also backed this mechanism for wider applicability. Similarly, its flexibility in raising money from the *sukuk* markets (Islamic bonds) has also become a success factor.

Source: Background write-up provided by Amitabh Mehta, CEO/Managing Director, Innovative Financing, Indus Blue Consulting, Switzerland; former Deputy Director for Risk Management/Head of Asia-Pacific, Global Alliance for Vaccines and Immunization (GAVI), Geneva & VP Securitisation Deutsche Bank, London.

[116] S. Baker. 2016. Luxembourg Stock Exchange Launches First Green Securities Platform. Pensions & Investments Online: 27 September 2016. http://www.pionline.com/article/20160927/ONLINE/160929884/luxembourg-stock-exchange-launches-first-green-securities-platform

[117] Green Climate Fund. 2017. Portfolio. https://www.greenclimate.fund/projects/portfolio

Underpinning the success of any capital markets access will be the credit rating and structure of the issuing vehicle, which needs to be aligned with potential investor needs. As such providing credible, predictable revenue-like annual flows to the issuing vehicle from a government in addition to any revenue streams from underlying projects, adds a major amount of credit enhancement to the vehicle and might be critical in the Asian infrastructure capital markets arena.

In line with the above, the former Chief Executive Officer and Managing Director of Fitch Ratings India Private Limited, Atul Joshi, noted in the development of this report, that the major issue facing a green finance initiative, is its ability to finally be able to raise large volumes of financing from institutional investors. In this, it is important and possible to leverage annual government set-asides (e.g., "green taxes"), up to a 10 times quantum, to raise financing from bond issuances in the capital markets. Additionally, it will be essential to understand the underlying risks that prevent large volumes being raised—diversified risks, pooling, capital structure, payback periods, ratings, etc.—and address these in the structure created.

The GFCF therefore needs to explore ways, both at the project level as well as pooled vehicle level that would set road maps for accessing funds through the capital markets.

An initial capital markets approach suggested for the GFCF:

- Pooled Vehicle Issuance: GFCF itself provides a diversified risk profile through pooling several projects that it supports. With an IFFIm-like or Infrastructure Trust Fund (InviT)-like approach, the GFCF should consider floating its debt or equity in the capital markets linked to a subset of operating subprojects; it could consider an umbrella fund/subfund structure where risks can be constructed as per the need of the investor.
- Project Issuance: GFCF should consider converting some concessional debt into equity post a risk-benchmark such as 3 years of operation of a project and place that equity directly or indirectly with institutional investors; credit ratings should also be a mandatory requirement for projects supported by GFCF; they could potentially use hybrid instruments such as convertible debt and structured notes to attract investors at the first stage and as risks fall, offer the investors the ability to convert to equity.
- Blend Other Green Funds—such as Green Climate Fund and MDB funds,
- Some of the above actions could be phased in gradually once the GFCF vehicle itself matures.

4.4 Valuing Green Benefits

As noted earlier, ascribing a revenue or monetary value to green benefits generated by green projects, and which can flow to a project sponsor, is a major gap in green project bankability. Green benefits—not just emission reductions, but also other green benefits—are mostly not valued adequately, or at all. These green benefits can be difficult to quantify, but nevertheless, they do have a positive economic impact. For example, a transport project might directly help in reduction of air pollution and improved air quality, in turn improving health outcomes for the local population, and over a period of time, reducing the spending needs (of government and households) for treating respiratory diseases and other health implications of air pollution.[118] If these reduced costs could be converted into a revenue stream for a project that would improve bankability directly.

While difficult, there are some options and methodologies which could be explored for the GFCF approach, for quantifying these incremental economic benefits of green projects and programs. These include:

- **Social Impact Bonds**: A number of Social Impact Bonds, (or Development Impact Bonds in developing countries) have been launched to raise funds, (over 60 launched in 15 countries raising more than

[118] L.A. Reis et al. 2016. Theme Chapter Background Paper—The Economics of Greenhouse Gas Mitigation in Developing Asia. In: ADB. 2016. Asian Development Outlook 2016 Update: Meeting the Low-Carbon Growth Challenge. Manila.

$200 million), by various private sector financial institutions.[119] These bonds are for a fixed period; however, they do not offer a fixed rate of return to investors. Similar in nature to an equity investment, repayments to investors depend upon the achievement of specified environmental and/or social outcomes, and the funds to remunerate investors can be from commitments by donors, development agencies, government budgets, or a combination thereof. Social impact bonds have targeted diverse areas including early education for low-income families and reforming juvenile offenders. While tackling difficult social problems, these bonds often encounter problems in securing funding from the government, as the effectiveness linked to the achievement of outcomes can be difficult to monitor and prove.

- **The Clean Development Mechanism**: The Clean Development Mechanism (CDM) is considered a major success in terms of valuing sustainability outcomes (Box 19). Despite some criticism particularly regarding earlier CDM projects, the valuing of greenhouse gas emission reductions triggered significant investment, particularly private sector investment, into projects that reduced greenhouse gas emissions.[120] Since 2006, the CDM catalyzed the design and implementation of more than 7,700 projects and programs in 107 countries, reducing or avoiding greenhouse gas emissions by 1.5 gigatons of CO_2e, and leveraging an average of 1:10 public to private financing.[121] By creating a market for emission reductions, and valuing the emission reductions that were generated from renewable energy, or biogas, or energy efficiency projects, these projects received an additional revenue stream, which in turn made their projects bankable. In many cases the increase to a project's rate of return was incremental, for example, even at carbon prices much higher than those observed in current markets, in the order of 0.5-3.5% for renewable energy projects.[122] However, this was often enough to lift a project above a prespecified benchmark, such as a company's internal hurdle rate, and therefore catalyzed investment into, and implementation of, the project. Article 6 of the Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC) introduced the foundation for what is being called the Sustainable Development Mechanism (SDM), which is seen as the next evolution of the CDM. The rules being set in place are expected to essentially follow those that have been developed previously under the CDM, but with the difference that carbon markets and crediting under the SDM can take place in both developing and developed economies.[123]
- **Accessing Carbon Markets:** For emission reduction projects, access to carbon markets has provided a value for their green benefits and directly improved bankability. The issue for these types of projects is the collapse of carbon markets, where Certified Emission Reductions (CERs) are trading at approximately $0.40 per ton of carbon dioxide equivalent (tCO_2e) (as of October 2016), from a peak of more than €30 per tCO_2 in 2008.[124] The current low price in many cases does not justify the additional transaction costs required for registration and ongoing monitoring of projects. There is some optimism that the so-called Sustainable Development Mechanism (SDM), which is seen as the next evolution of the CDM based on Article 6 of the Paris Agreement may help restore carbon prices to levels that support investments into projects that mitigate greenhouse gases. The situation is even less favorable, however, when considering other green benefits, cobenefits or ecosystem services. At least for the quantification of carbon reductions, the infrastructure surrounding a market was developed and implemented. This

[119] Goldman Sachs. 2016. Social Impact Fund Fact S heet. http://www.goldmansachs.com/what-we-do/investing-and-lending/impact-investing/social-impact-bonds/

[120] Additionality was a concept included in the Marrakech Accords (COP7). It meant that only projects that were shown to be additional to any business-as-usual development could be credited under the CDM.

[121] UNFCCC. 2014. CDM Fact Sheet: Leveraging Private Finance, Delivering Verified Results. Lima. http://newsroom.unfccc.int/media/159267/cdm-leveraging-private-finance-and-delivering-results.pdf

[122] World Bank. 2007. State and Trends of Carbon Pricing. Washington, D.C.
UNEP CD4CDM. 2007. Guidebook to Financing CDM Projects, The Hague, http://www.cd4cdm.org/Publications/FinanceCDMprojectsGuidebook.pdf. p. 77.

[123] UNFCCC. 2016. The Paris Agreement. http://unfccc.int/paris_agreement/items/9485.php
UN. 2015. Paris Agreement. New York.

[124] Carrington, Damian. 2013. EU Carbon Prices Crash to a Record Low. The Guardian: 24 January 2013. https://www.theguardian.com/environment/2013/jan/24/eu-carbon-price-crash-record-low

Box 19: Overview of the Clean Development Mechanism and Carbon Markets

The Clean Development Mechanism (CDM) was established as one of the flexible market mechanisms under Article 12 of the Kyoto Protocol. It allows a country with emission reduction targets under the Kyoto Protocol to use emission reduction credits (known as certified emission reductions) from an emission reduction project in developing countries toward meeting their Kyoto targets. The mechanism in many ways was groundbreaking. The mechanism was designed as a win-win for both developed and developing countries. The CDM stimulates sustainable development and emission reductions in developing countries, while giving developed countries some flexibility in how they meet their emission reduction or limitation targets. It was the first global, environmental investment and credit scheme of its kind, catalyzing an international market for standardized emission reductions, certified emission reductions (CERs).

The CDM registered its first project in 2006, and since then more than 7,700 projects in a variety of sectors (e.g., renewable energy, energy efficiency, rural electrification, anaerobic digestion) have been registered. These projects are anticipated to achieve more than 2.9 billion tons of carbon dioxide in emission reductions. Certified emission reductions were also able to be used for compliance under emissions trading schemes, for example the EU Emissions Trading Scheme.

The 2016 World Bank report on the State and Trends of Carbon Pricing estimates the combined value of regional, national, and subnational carbon pricing instruments in 2016 at just under $50 billion globally, which includes both emissions trading and carbon taxes. Significant challenges have been faced in carbon markets from reduced demand for emission reductions due to the economic slow-down in major demand centers (mainly in Europe) and uncertainty related to international climate agreements. There was also an oversupply of international offsets, mainly Certified Emission Reductions (CERs) from Clean Development Mechanism projects, which had had a strong downward impact on price and resulted in significant problems for project developers who were expecting higher levels of carbon revenue to build and operate their greenhouse gas mitigation projects.

Sources:

UNFCCC. 2014. Clean Development Mechanism (CDM). http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php

World Bank. 2016. State and Trends of Carbon Pricing. Washington, D.C.

included methodologies for quantifying emission reductions (e.g., the Clean Development Mechanism, Verified Carbon Standard, the Gold Standard, the California Climate Action Registry),[125] procedures for the process and approval of projects, and clearly defined rules for project developers to work with and within. This work is continuing with frameworks being developed for recognizing efforts taken under Nationally Determined Contributions (NDCs). For other sustainable development or green benefits, which are not mitigating greenhouse gases, the standards are still evolving and the market is very nascent and highly fragmented.

- **Setting a Catalyzing Price for Green Benefits**: Each project will be different, with potentially different prices for carbon and/or other green benefits at which the project becomes bankable (i.e., reaches a predetermined benchmark). The GFCF could enter into long-term forward purchase agreements, providing additional comfort for investors and project proponents with regard to that future revenue stream. The GFCF could then act as an aggregator and on-sell benefits/credits, or distribute benefits to the facility participants on a

[125] Verified Carbon Standard. 2017. http://www.v-c-s.org/
Gold Standard. 2017. http://www.goldstandard.org/
California Climate Action Registry. 2017. http://www.climateregistry.org/

Box 20: ADB's Future Carbon Fund

The Asian Development Bank (ADB) launched the Carbon Market Program in November 2006. The Carbon Market Program is part of ADB's broader climate change program, with an objective to promote low-carbon projects in Asia and the Pacific such as renewable energy, energy efficiency, efficient transport, and other activities reducing greenhouse gas (GHG) emissions.

The Carbon Market Program currently has two components which support ADB's developing member countries (DMCs) through a comprehensive package of financial, technical, and marketing support for projects potentially eligible under the Clean Development Mechanism (CDM) of the Kyoto Protocol under the United Nations Framework Convention on Climate Change (UNFCCC). The technical support for identifying and developing CDM projects is extended by the Technical Support Facility while the Future Carbon Fund, managed by ADB as trustee, provides additional financial resources for project development and implementation through the pre-purchase of emission reductions expected to be generated from CDM projects hosted by ADB developing member countries.

The goals of the Future Carbon Fund are to:

(i) Support and encourage energy efficiency and renewable energy projects, and other projects with long-term greenhouse gas (GHG) abatement benefits beyond 2012 undertaken in developing member countries
(ii) Assist fund participants that have mandatory or voluntary GHG reduction targets and policies beyond 2012 by providing ongoing access to certified emission reductions (CERs) and verified emissions reductions (VERs)
(iii) Enhance the affordability and attractiveness of low-carbon technologies over conventional options through the reduction of the initial capital barriers of GHG mitigation projects

The Future Carbon Fund has a total capitalization of $115 million, and has contracted certified emission reductions on a forward basis, to be generated from 2013 to 2020 (the second Kyoto Protocol commitment period). Some of these forward contracts also had upfront payments made as part of the Future Carbon Funds' value proposition for project developers.

Source: ADB. 2016. Future Carbon Fund. https://www.adb.org/site/funds/funds/future-carbon-fund-fcf

pro rata basis, e.g., as happens with ADB's Future Carbon Fund (Box 20), or if the markets improve, give the developers an option to buy back their green benefits from the GFCF at a preagreed rate and then sell on the open market. For sustainable development benefits or ecosystem services pro rata distribution may be attractive to governments but also some proactive sources of private capital.

- **Securitization of Green Benefits**: Forward purchase agreements potentially also open up other structured finance opportunities; for example, securitization of the future revenue stream, whereby the project developer receives an upfront payment for the present value of their future revenue. Other examples of structured transactions using carbon credits, which could also be relevant for green benefits, utilized portfolios that were both geographically and technologically diverse such as the structured sale of over five million certified emission reductions by EcoSecurities and Credit Suisse in 2007. This was a significant transaction at the time due to the volume of emission reductions made available to potential buyers, the number of projects and different technology types, which gave new participants in the market the opportunity to get exposure to a range of projects and participate in the CDM market in a less risky way than purchasing credits from individual projects. Another example is the Standard Bank/Camco transaction in 2008, which involved a sale of certified emission reductions on a similar scale, generated by nine CDM

projects in the People's Republic of China. This transaction also enabled an innovative commodity finance structure, which provided a limited recourse upfront payment to Camco of €15 million.[126] Valuation of green benefits by the GFCF potentially opens up these types of opportunities, either for the GFCF, or even for other parties, such as investment banks.

- **Using Put Options**: As used in the World Bank's Pilot Auction Facility, the GFCF could provide a guaranteed floor price for green benefits (Box 23).[127] A guaranteed floor price gives project developers some certainty over potential future revenues, in a potentially very volatile marketplace—assuming the project is constructed and operates, and therefore generates green benefits in accordance with expectations. Supported by GFCF funding, the guaranteed floor price could be delivered through an auction of put options. A put option would give the project developer the right, but not the obligation, to sell green benefits at a specified price (known as the "strike" price) at a certain date. The put options could also be included in a GFCF-issued puttable bond. This optionality enables a put option owner to benefit when prices for green benefits (e.g., carbon credits) rise above the strike price. In such a case, the GFCF—at no cost to it—would achieve its goal of stimulating private sector investment in green projects by guaranteeing an additional revenue stream. In case prices fall, a put option owner has the right to sell the green benefits to the GFCF at the strike price. Nevertheless, in both cases, the price guarantee produces an incentive to fund green projects.[128]

Each of the approaches outlined here would benefit green projects by valuing the sometimes difficult to quantify benefits that these projects provide. As discussed, there are many options available to value the green benefits generated by projects, some more complex than others.

The simplest approach would aim at capturing at a government budget level an actual benchmarked improvement in annual budgets (income increase or expenditure reduction) from implemented green projects as green benefits, and pass these on in some form of annual top-up or "shadow revenue" support to the green projects. This might also work in extreme cases where little or no direct revenues can be raised due to the social nature of the project but where there is a definite impact on government budgets, for example reducing the need for disaster spending in areas where flood reduction infrastructure has been built (Box 21).

An initial green benefits valuation approach suggested for the GFCF:

- Minimum Revenue Guarantee—the GFCF could assure a project a guaranteed IRR of 12%, by committing to provide revenue top-ups; similar to a forward purchase agreement;
- Securitization—in addition, the GFCF could provide an upfront payment, or at least, escrowing of these projected revenue top-up amounts, at the start of a project, through a net present value calculation; and
- Equity Variation—the minimum revenue guarantee provided could be converted into equity by the GFCF and sold in the capital markets in a later phase.
- Sharing Upsides—If during project monitoring, it emerges that the project is earning significantly more than the aimed IRR of 12% (say 14% plus) then an upside/profit sharing structure should be developed which can plough some funds back to the GFCF. Alternatively, if equity shares were provided to GFCF in lieu of the top-up revenues provided then these would reflect the better valuation from the upside and be more attractive for capital markets issuance.

[126] JP Sweny, M. Nicolaides, and F. Alviar-Baquero. No year. The Applications of Structured Finance Techniques to the Cleantech Industry. Latham & Watkins LLP. https://www.lw.com/thoughtLeadership/structured-finance-techniques-in-cleantech-industry

[127] World Bank. 2016. Pilot Auction Facility. https://www.pilotauctionfacility.org/

[128] Pilot Auction Facility. 2016. Fact Sheet #1 Overview, Pilot Auction Facility. Washington, D.C. (World Bank). http://www.pilotauctionfacility.org/content/paf-fact-sheet-1-overview

Box 21: Unquantified Green Benefits and Achieving Bankability: An Extreme Case—Watershed Development

Some projects and programs are critical for green development but might, ostensibly, have no direct financial upsides and thus not be seen as bankable for private investment. One such example might be that of watershed development. However, a case can be made that the Green Finance Catalyzing Facility approach could also be used in such extreme cases where there is literally no direct revenue earning.

Watershed development programs aim to integrate activities for treating degraded lands, with the main objective of managing water and land resources that allows for the sustainable development of natural assets, overall economic development of communities in the area, and community empowerment. Projects under this theme have aimed at improving drought-prone areas; desert development. A holistic project might aim at facilitating the most efficient use of available water resources for both personal consumption as well as crop and livestock production by communities with the aim of (i) helping farmers increase cropping intensity by 30%–60%, (ii) improving crop yields by 40%–80%, (iii) increasing ground water tables by 1.5–4 meters, (iv) easing the supply of potable water, and (v) improving the supply of fodder for livestock. Activities under such projects might include rainwater harvesting, development of farm pond networks, and rehabilitating vernacular irrigation systems, amongst others.

"Project-ifying" the green benefits: None of the above activities would generally lead to any "revenue" streams to a project-implementing agency and hence such projects have tended to be funded and implemented by grant or budget-based government programs. However, the green benefits arising from such activities are undeniable with impacts such as (i) increased cropping yields, leading to generation of year-round employment and increased crop production (hence, increased tax revenues for government); (ii) improved green cover should allow for better soil and water conservation (hence, reduced budgetary funding spends for disaster mitigation in flood-prone areas); (iii) reduced pressure on biodiversity while improving food and nutritional security (reducing sudden budgetary pressures from having to mitigate price increases in times of food shortages); and (iv) reduced waterborne diseases from safe drinking water (reducing burden on public health budgets). The Green Finance Catalyzing Facility simple approach would thus suggest converting these very real green benefits in government budgets into "shadow revenues" for the project actually giving rise to the impacts, using for instance the 12% internal rate of return based mechanism to quantify what these "shadow revenues" might be that flow from government to the project entity on an annual basis. Such projected shadow revenues could even be ring-fenced or escrowed into specific project accounts and give a better assurance to the implementing entity. A more complex approach for determining the shadow revenues could be linked to actual measurable upsides from each activity or even market-based pricing from trading in green improvement or greenhouse gas reduction credits in the future. Such an approach would reduce the need for upfront government spending on the capital investment of a project, and catalyze private or commercial finance into such a space.

Source: Authors, based on: BAIF Development Research Foundation. 2016. Watershed Development: For Sustainable Livelihood and Environmental Conservation. BAIF Fact Sheet 5/2016. Pune.

4.5 Mitigating Risks

Most investments in particular countries face currency and political risks. But there are unfamiliarity and technology risks that specifically green growth and low-carbon projects experience. Therefore, concessional finance can help in reducing or mitigating these risks in order to leverage the needed private finance into green investments. With more and more projects proving the feasibility and effectiveness of green technologies, investor familiarity grows and policies establish a firmer context, which eventually lessens the need for concessional finance.[129]

[129] Overseas Development Institute. 2011. Leveraging Private Investment: The Role of Public Sector Climate Finance. ODI Background Note: April 2011. London.

Risks can be broadly grouped into three categories, political and regulatory, market and commercial, technology and technological risks. The Overseas Development Institute provides the following succinct overview:[130]

- **General political risk**—reflecting concern about political stability and the security of property rights in the country, along with the generally higher cost of working within unfamiliar legal systems;
- **Regulatory and policy risk**—reflecting concern about the stability and certainty of the regulatory and policy environment, including the longevity of incentives available for low-carbon investment and the reliability of power purchase agreements;
- **Currency risk**—reflecting concern about the loss of value of local currencies (and their lower utility to an overseas investor);
- **Execution risk**—reflecting concern that the local project developer/firm may lack the capacity and/or experience to execute the project efficiently; along with the general difficulty of operating in a distant and unfamiliar country with its government regulations on issues such as land acquisition, social and environment clearances;
- **Technology risk**—reflecting concern that a new and relatively untried technology or system may not work as expected;
- **Unfamiliarity risk**—reflecting the amount of time and effort it takes to understand a project of a kind that has not been undertaken by the investor before; and
- **Lack of pipeline**—reflecting concerns from financiers that there is a shortage of green bankable projects while project developers claim there is a shortage of finance. Meanwhile, an increasing proportion of stakeholders agree that we need to be developing green and inclusive projects that preserve future generations' access to the world's resources. Significant sums of money have been committed to finance, in particular, climate mitigation and adaptation projects. For example, the Green Climate Fund has $10.3 billion of funding available, but has only been able to commit $2.2 billion.[131]

To reduce the risks associated with these types of projects the GFCF could also employ a variety of risk mitigants. These are interventions specifically targeting a reduction, reassignment, or reapportioning of the various investment risks illustrated in Figure 26. Risk mitigants increase an investment's acceptability and attractiveness, because they address risks, which are new or too expensive to be covered by other financial actors. Guarantee structures specific to credit or political risk relevant to a project, greater support in earlier stages of project development, and also providing a diversified risk (pool of projects risk, not a single-project exposure) investment are all possible options for risk mitigation. However, the GFCF will not be able to mitigate all of these risks.

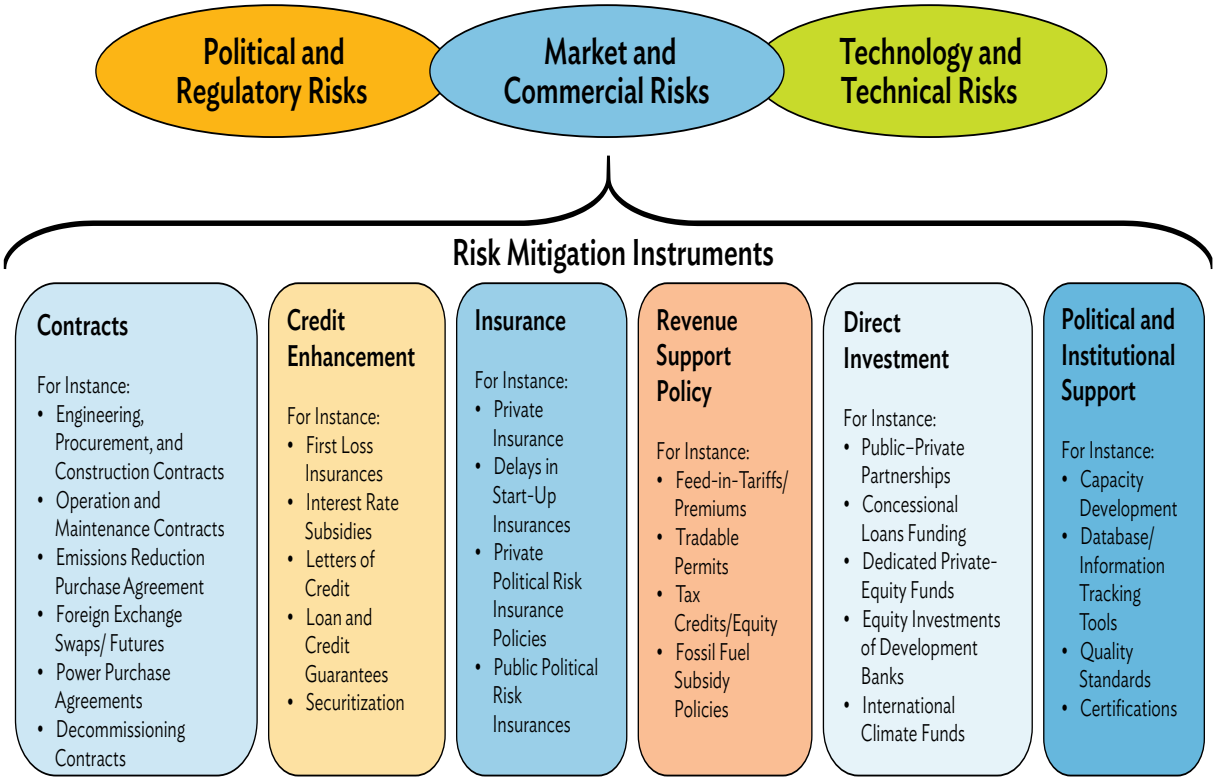
An initial risk mitigation approach suggested for the GFCF:

- Mitigate Construction Risk–by GFCF providing a larger share of finance at this stage and then revolving this out post completion of construction; and
- Mitigate Early Operations Risk–by GFCF assuring revenue guarantees as noted above, but only for the initial operations period, say 3–5 years post commencement of operations.

[130] Overseas Development Institute. 2011. Leveraging Private Investment: The Role of Public Sector Climate Finance. ODI Background Note: April 2011. London. p. 2.

[131] Green Climate Fund. 2017. Portfolio. https://www.greenclimate.fund/projects/portfolio

Figure 26: Risks and Mitigation Instruments to Green Finance Projects



Source: Authors, adopted from Climate Policy Initiative. 2013. Risk Gaps: A Map of Risk Mitigation Instruments for Clean Investments. San Francisco.

Also see: New Climate Economy. 2016. The Sustainable Infrastructure Imperative: Financing for Better Growth and Development. The 2016 New Climate Economy Report. Washington D.C./London (World Resources Institute/Overseas Development Institute). pp. 33–37.

5. Environmental Sustainability Principles

Identifying the key principles that the GFCF can focus on for assisting projects to incorporate and demonstrate their environmental sustainability, the second green finance pillar, as noted in Figure 25, is discussed below.

5.1 Formulating Green Project Indicators and Targets

Setting realistic yet incentivizing green targets for projects to achieve is a difficult task for green projects in developing countries with many uncertainties. This becomes more complex, given that a green project might be greenfield or brownfield, inclusive growth or a retrofit project. A fairly straightforward and measurable achievement might be centered around greenhouse gas emission levels. However, there are other benefits beyond this which need to be targeted for the purposes of the broader "green" approach versus climate change goals such as those captured within the SDGs. The GFCF needs to purposefully broaden its coverage to support projects that not only contribute to climate change mitigation but also include other benefits, such as ecosystem services or climate change adaptation through increased resilience. Indicators to measure achievement of results can be qualitative (e.g., contribution to sustainable development) and also quantitative (e.g., emission reductions, kilowatt hours, hectares).

The proposed approach therefore would be for any green project supported by GFCF to, ***both***,

1. Reduce environmental risk through the **reduction of greenhouse gas emissions**, **and**

2. Contribute to the environmental sustainability of land, air, and/or water by:
   (i) Reducing environmental risk through **minimization of another pollutant** (e.g., particulates related to air pollution), *or*
   (ii) Reducing ecological scarcities through **more efficient use of natural resources** (e.g., minimized loss of biodiversity), *or*
   (iii) **Improve quality of life** (e.g., urban redesign conducive to neighborhood interaction).

The suggested GFCF approach:

- A proposed project has to achieve objective 1 (reduced greenhouse gas emissions), and must contribute to at least two other environmental dimensions (land, air, or water) under objective 2 to be considered for support by the GFCF.
- A green project for the GFCF has to define its likely contribution to these objectives upfront by identifying its targeted goals, defining a baseline, and timebound indicators to measure the targets.
- It is suggested that the only compulsory indicator be greenhouse gas emission reductions or tCO_2e reduced under objective 1. Specific indicators for objective 2 will vary on a project-by-project basis and will be defined by the project proponent during the project development process.
- In addition, the application of the GFCF model in a particular country case can reflect specific indicators that are aligned with such country's Nationally Determined Contributions (NDCs) under the United Nations Framework Convention on Climate Change (UNFCCC) or its policy targets for the achievement of the Sustainable Development Goals.

Table 2 lists some examples of possible green benefit indicators and Box 22 provides the illustrative case of an industrial retrofit project.

Table 2: Examples of Green Indicators and Benefits

Sector	Aim	Indicator	Indicator Unit
Renewable Energy	Increase energy production from renewable sources	Greenhouse gas emissions reduction against industrial norms	tCO_2e reduced, MWh produced
Energy Efficiency	Make energy usage less intensive	Energy savings against industrial norms	tCO_2e reduced, MWh reduced
Transport	Reduce carbon footprint of all transport modes combined	Greenhouse gas emissions reduction against industrial norms	tCO_2e reduced, No. of passengers moved per hour
Water and Sanitation	Decrease pollution of natural water bodies	Amount of untreated water released into water bodies	BOD reduction in effluent (mg/L of BOD), tCO_2e reduced (if applicable, for some wastewater treatment projects)
Solid Waste	Minimize the amount of untreated waste dumped on landfill	Amount of untreated waste dumped on landfill	tCO_2e reduced, tons of waste reduced/diverted

continued on next page

Table 2 *continued*

Sector	Aim	Indicator	Indicator Unit
Climate Change and Disaster Resilience	Minimize the damages from recurring extreme weather events and natural disasters	Ability of project design to withstand plausible climate change scenarios	Protected population and physical infrastructure in area (%)
Land Use	Protect and/or enhance natural environment and biodiversity	Amount of ecosystem preserved or added	tCO_2e sequestered, Ha protected

Note: The indicators focus on the most tangible benefit that a green project in a specific sector could achieve. They do not cover all aspects of a green project; thus, they also do not value or reflect cobenefits or additional benefits in economic or social terms.

BOD = biochemical oxygen demand, ha = hectares, mg/L = milligram per liter, MWh = megawatt hours, tCO_2e = tons of carbon dioxide equivalent

Source: Authors, partly adopted from: ADB. 2014. Using Urban Sector Performance Indicators. A Quick Reference Guide. Draft Version: 8 January 2014. Manila.

Box 22: Example of Green Indicators for an Industrial Retrofit Project

A project proposed to the Green Finance Catalyzing Facility (GFCF) plans the retrofitting of a former industrial estate in the peri-urban area of a city. It envisions the property to be used as office space for the city's growing information technology sector. The estate's soil has to be remediated and will be used as publicly accessible green space thereafter. The edifice will be retrofitted for improved energy performance. A water recycling system will provide for gray water usage for the estate's open green space. The city government has indicated its support for the project as it puts abandoned space in an increasingly dense area to use and will also bring additional jobs to the neighborhood. In line with the project proposal, the following objectives are defined:

(i) Reduced environmental risk through the reduction of greenhouse gas emissions: Increased energy efficiency due to retrofitting—Indicator: 50% energy savings against industrial norm (current energy use intensity 210 kWh/m^2/year, target: 105 kWh/m^2/year), resulting in 1,750 tCO_2e reduced per year for a floor space of 20,000$m.^2$

And

(ii) Contribution to the environmental sustainability of water and land by
  (i) Reducing ecological scarcities through more efficient use of natural resources—Indicator: 26% reduction in water consumption, resulting in 3,240 m^3 of water savings per year.
  (ii) Improving quality of life—Indicator: 1 ha rehabilitated (added) green open space with 0.5 ha dedicated to tree planting, resulting in a 35% increase in publicly accessible green space in the neighborhood and 50 tCO_2e sequestered per year.

In addition to these environmental performance indicators, the project proposal can include other indicators in the overall project report relating to operation expenditure savings due to increased efficiency, increase in property/building value due to above-average performance values, economic benefits due to newly created jobs, etc.

Note: This is an illustrative example only, not based on a particular real-life case.

kWh = kilowatt hours, m^2 = square meters, tCO_2e = tons of carbon dioxide equivalent, m^3 = cubic meters, ha = hectares.

Source: Authors.

5.2 Incentivizing Green Technology

Promoting green growth increasingly requires the application of better and more advanced technologies in a variety of sectors. Therefore, as a principle, the GFCF needs to promote innovation in, and application of, green technology in green infrastructure projects. To be considered for GFCF support, projects should demonstrate that solutions they deploy are more environment-friendly than traditional options, which could be done in a number of ways:

- Projects to prepare green targets based on the best technology possible.
- Projects to show a comparison of their targeted green milestones versus current industrial averages and/or established sectoral/other norms in their corresponding country or region.
- Alternatively, projects could provide two to three reference examples where the proposed green technology has been applied successfully.
- In cases where a project is planned to deploy an early stage green technology, it could support its proposal with corresponding research findings from the piloted application of the technology. The GFCF can provide further references to good practice cases and may avail of external expertise in assessing a proposed green technology, and if necessary, suggesting a different technical solution for consideration by the project applicant.

5.3 Aligning Green Projects with Enabling Policies

Overall, it is proposed that the GFCF approach be guided by the host country's development and strategic development planning agenda (see Insert 3: Country Cases for Green Finance and Development); hence, GFCF eligible projects should be aligned with the broader policy objectives of the country and sector. This will indicate compatibility between a project and country goals to potential investors, which increases stability for the investment. Furthermore, the GFCF envisions government funding support—and thus any resources channeled from government budgets to the GFCF should follow an established enabling policy, plan, or program. Projects should be aligned with any plan or policy a government has developed as part of their National Determined Contributions (NDCs) under the United Nations Framework Convention on Climate Change (UNFCCC), or commitments made in support of the SDGs. Through this, the GFCF should be able to support—with real data and results—the government in showcasing the country's achievements in green growth targets.

5.4 Linking Finance to Green Results

To ensure that GFCF financing will result in actual benefits, GFCF support should include tools to link support to achieve green goals. A project's ability to attain its targeted green indicators (developed as per the green indicators principle noted above) will be driven by its ability to achieve optimal results under a combination of Technology innovation, Implementation improvements, and Management efficiency (the T.I.M paradigm). Rather than dictating any of these three aspects, the GFCF approach should be to link outputs to its financing support, or **results-based financing**.

Financing flows would then be based on actual achievement of results, based on monitoring points defined upfront, rather than on initial plans, or on evidence of input expenses incurred by a project. The lack of results should conversely lead to reduced or no flows of GFCF financing support. This approach would help strengthen accountability for results and align incentives of people responsible for delivering results with those who will benefit from the results.[132]

Types of results-based financing models include impact bonds and performance-based contracts; an example is shown in Box 23.

[132] ADB. 2013. Piloting Results-Based Lending for Programs. *Policy Paper*. Manila.

Box 23: Pilot Auction Facility for Methane and Climate Mitigation (PAF)

The Pilot Auction Facility for Methane and Climate Mitigation (PAF) is an example of Results Based Financing (RBF), which was launched by the World Bank in September 2014. The term RBF is broad and can cover a range of tools and instruments. It is a system of financing that can be provided to governments for results achieved at the national level as well as to other entities (e.g., companies, communities) for the delivery of specific services. Indicators to measure achievement of results can be qualitative (e.g., contribution to sustainable development) and also quantitative (e.g., emission reductions, kilowatt hours, hectares). Discussions on result-based climate finance are typically focused on the achievement of emission reductions. Payments for verified results fit well with the requirements for monitoring, reporting and verification (MRV) and the objective to incentivize private sector mitigation activities.

The PAF aims to stimulate investment in projects that reduce greenhouse gas emissions while maximizing the impact of public funds and leveraging private sector financing. The PAF is backed by several government donors (Germany, Sweden, Switzerland, and the United States) and has a capitalization of $100 million. In the first two auctions, it supported projects that cut methane emissions at landfill, animal waste, and wastewater sites facing low-carbon prices. The third auction will support projects reducing emissions from nitrous oxide, a very potent greenhouse gas, with a global warming potential 310 times that of carbon dioxide.

The PAF sets a floor price for future carbon credits in the form of a tradeable put option, which is competitively allocated via auction. The nature of the put option means that the facility's resources are disbursed only after the emission reductions have been independently verified, making the PAF a "pay for performance" facility. The put options are embedded into puttable bonds issued by the World Bank. The World Bank's obligations under the bonds will be backed by the PAF. Under the terms of the bond, the bondholders will have the right, but not the obligation, to sell the emission reductions achieved by the underlying projects to the PAF at a preagreed price, the put option "strike" price.

The optionality allows put option owners to benefit if carbon market prices rise above the strike price. In this case, the PAF will have achieved its objective (to stimulate private sector investment in mitigation) at no cost to itself. If prices fall, the put option owner has the right to sell the carbon credits to PAF at the strike price. Either way, the price guarantee has provided private investors a financial incentive to fund projects.

The second auction tested a "forward auction" format, where the value of the contract was fixed at $3.50 per carbon credit and auction participants bid its purchase price. The put option premium was $1.41/tons of carbon dioxide equivalent. In total, 5.7 million tons of carbon dioxide equivalent in put options were sold. In addition to CDM projects eligible in the first auction, emission reductions verified by the Gold Standard and the Verified Carbon Standard were also eligible in the second auction.

Sources:

Pilot Auction Facility. 2016. Fact Sheet #1 Overview, Pilot Auction Facility. Washington, D.C. (World Bank). http://www.pilotauctionfacility.org/content/paf-fact-sheet-1-overview

Pilot Auction Facility. 2016. Second Auction Details, Second Auction Results, Pilot Auction Facility. Washington, D.C. (World Bank). http://www.pilotauctionfacility.org/content/second-auction-results

The suggested results-based financing GFCF approach:

- A target timebound green indicators list to be established at the outset, with monitoring parameters;
- GFCF support provided as revenue top-ups during the first 5–7 years of project operations to be linked to achievement of the green indicators;
- If a project does not achieve targeted benefits, the revenue support payments could be reduced, delayed, or permanently deferred; and
- If projects are underperforming the GFCF can however provide technical assistance to understand the issue and, if possible, help the project get back on track.

5.5 Monitoring and Verifying Green Benefits

A dynamic and accurate performance monitoring and reporting system for the green benefits achieved through GFCF projects is critical, not only for ensuring real project level achievements but also for the country's overall green reporting requirements. This is required for alignment with:

- The Paris Agreement which includes a measurement, reporting and verification (MRV) provision, for countries to collate and provide verified data on emissions and track progress against their contributions; and
- The United Nations Framework Convention on Climate Change (UNFCCC) established global, harmonized MRV provisions for climate change mitigation.[133]

Confidence and transparency in international climate regimes depend on systems for consistently tracking emissions and related actions. Likewise, such systems produce valuable data that inform the various climate change mechanisms and instruments (i.e., the Flexible Mechanisms of the Kyoto Protocol), as well as their linked emission trading schemes and carbon markets. To this end, the UNFCCC MRV system can help in monitoring and documenting each country acts upon its commitments through actual emission reduction actions. This also relates to developed countries providing the capacity development and financial resource support to developing countries.[134] Clear, transparent, and auditable rules for MRV also give confidence to markets, whether that be carbon markets, or yet-to-be-created sustainable development benefit markets, or capital markets.

The suggested GFCF approach for monitoring benefits:

- A green benefits monitoring, verification, and reporting system and institutional structure is needed to be set up with the GFCF;
- All project proposals to the GFCF would need to include a monitoring and evaluation framework including project impact, outcome, and outputs as applicable to the green/environmental sustainability indicators discussed earlier; and
- A requirement for each project to have its green results verified and accredited by a recognized third party.

The GFCF would not impose a standards system onto its projects, but require project applicants to scope and choose from existing systems of standards or methodologies (some emerging examples are shown in Insert 4: Tools for Valuing and Monitoring Green Benefits), whether globally recognized or established by a national government. The standard or methodology chosen upfront to estimate the potential green benefits will then

[133] UNFCCC. 2016. The Paris Agreement. http://unfccc.int/paris_agreement/items/9485.php

[134] Partnership on Transparency in the Paris Agreement. 2017. Measuring, Reporting and Verification (MRV). https://www.transparency-partnership.net/measuring-reporting-and-verification-mrv-0

form the basis of the monitoring plan. Monitoring points will need to be defined upfront, and this information will be verified by a third-party to ensure green benefits are being achieved by the project.

In relation to this, the GFCF can incentivize the timeliness for countries to enhance their work in tandem with multilateral development banks and national statistical systems to revitalize data collection and collation systems. This would ensure the collection of appropriate data for rightful monitoring of impacts and benefits—a step forward to achieving overarching development objectives, such as those of the Sustainable Development Goals, through innovative financing.[135]

[135] S. Groff. 2017. Implementing the Global Goals for Sustainable Development. ADB Vlog: 5 May 2017. https://www.facebook.com/StephenPGroff/videos/1930750260529909/?pnref=story

INSERT 4

Tools for Valuing and Monitoring Green Benefits

To be eligible for Green Finance Catalyzing Facility investment, projects must demonstrate both financial and environmental sustainability. In demonstrating environmental sustainability, there are several existing screening tools that could be co-opted or adapted to suit the Green Finance Catalyzing Facility's purposes.

Gold Standard for the Global Goals

The Gold Standard is evolving its standard from a primarily climate-oriented standard to a framework to measure and certify impacts toward all the Sustainable Development Goals (SDGs).

The performance standards under development include the following:

- Climate mitigation: Based on SDG 13.2 as measured in emissions reductions/removals and short-lived climate pollutants (SLCP) reductions
- Energy: Based on SDG 7.1, 7.2 and 7.3
- Land use: Based on SDG 15
- Agriculture: Based on SDG 2.3 and 2.4
- Water: Based on SDG 6
- Poverty alleviation: Potentially based on cross-SDG target groups
- Gender equality: Based on SDG 5, particularly 5.5 and 5a
- Health: Based on SDG 3, particularly 3.9
- Employment: Based on SDG 8.5

The Gold Standard Foundation intend to generate the necessary guidance and infrastructure to fully launch the new standard for use by project developers by mid-2017.

The Climate, Community, and Biodiversity Standards

The Climate, Community, and Biodiversity (CCB) Standards identify land management projects that deliver net positive benefits for climate change mitigation, for local communities, and for biodiversity. These standards can be applied to any land management project, including projects that reduce greenhouse gas emissions from deforestation, forest degradation, or from avoided degradation of other ecosystems, and projects that remove carbon dioxide by sequestering carbon (e.g., reforestation, afforestation, revegetation, forest restoration, agroforestry, and sustainable agriculture) or other land management projects. The standards can also be combined with a carbon accounting standard such as, the Clean Development Mechanism (CDM) or the Verified Carbon Standard (VCS). In this case, the CCB Standards provide a basis for evaluating a project's social and environmental impacts while the carbon accounting standard enables verification and registration of quantified greenhouse gas emissions reductions or removals. In this way, the CCB Standards verify the social and environmental benefits generated by a project, enabling investors to select carbon credits with additional benefits, while screening out projects with unacceptable social and environmental impacts.

SuRe—the Standard for Sustainable and Resilient Infrastructure

SuRe features 14 themes with 63 performance- and management-oriented criteria covering the dimensions of environment, society, and governance, as well as two broader requirements. SuRe focuses on sustainability, resilience, and provides a voluntary standard to attract public and private financing to investments that bear social and environmental cobenefits in addition to sound economic returns. Projects above $10 million in capital expenditure can be assessed and certified if they satisfy a minimum set of compliance criteria (currently 21 mandatory requirements). Beyond this minimum threshold, projects can obtain silver and gold certification dependent on their performance assessment. SuRe was modeled after existing international standards,

guidelines, and conventions. It is currently piloted and the first final standard version is expected to be launched at the end of 2017.

Green Growth Certification Standard

The Global Green Growth Institute (GGGI) and the African Development Bank (AfDB) have held a series of consultations to set the foundations for the Green Growth Certification Standard (GGCS), which aims to facilitate the creation of an independent validation and certification program which will provide third-party assessments of compliance with green growth criteria. A standardized template for the presentation of green and inclusive growth criteria which, when independently validated, can be submitted to multiple agencies. Harmonization will arise through revisions of both the GGCS and green growth criteria within financial institutions. The standard is in a relatively early stage of maturity, but aims to be completed within 2017.

Joint Multilateral Development Banks Approach for Tracking and Reporting Climate Change Adaptation Finance

The multilateral development banks (MDBs) adaptation finance tracking methodology uses a context- and location-specific, conservative and granular approach that is intended to reflect the specific focus of adaptation activities, and reduce the scope for overreporting of adaptation finance against projects. The approach drills down into the "subproject" or "project element" level as appropriate, in line with the overall MDB climate finance tracking methodology. It also employs a clear process in order to ensure that project activities address specific climate vulnerabilities identified as being relevant to the project and its context/location.

The methodology is comprised of the following key steps:

- Setting out the climate vulnerability context of the project;
- Making an explicit statement of intent to address climate vulnerability as part of the project; and
- Articulating a clear and direct link between the climate vulnerability context and the specific project activities.

Joint Multilateral Development Banks Approach for Tracking and Reporting Climate Change Mitigation Finance

Mitigation finance tracking in Asian Development Bank (and other MDBs) is based on the Common Principles for Climate Mitigation Finance Tracking. The Common Principles were developed by the joint climate finance group of MDBs and the International Development Finance Club, based on their experience on the topic and with the intention to be shared with other institutions that are looking for common approaches for tracking and reporting. The principles consist of a set of common definitions and guidelines, including the list of activities, but do not cover aspects related to their implementation, including quality control procedures which remain the sole responsibility of each institution and/or group. The Common Principles, reflect the approach that both groups (MDBs and International Development Finance Club) have been following for tracking climate change mitigation activities for the past 5 years, and are based on the application of harmonized terms.

Sources:

Gold Standard. 2016. Higher Standards for Greater Impact in Climate and Development: Gold Standard 3.0. http://www.goldstandard.org/articles/gold-standard-30

Gold Standard. 2016. Gold Standard for the Global Goals: Leveraging Climate Action for Greater Impact in Sustainable Development. http://www.goldstandard.org/articles/gold-standard-global-goals

Global Infrastructure Basel. 2016. SuRe: The Standard for Sustainable and Resilient Infrastructure. Version 0.3. Basel.

The Climate, Community and Biodiversity Alliance. 2013. Climate, Community and Biodiversity Standards. Third Edition. Arlington.

European Investment Bank. 2015 Common Principles for Climate Change Adaptation Finance Tracking. http://www.eib.org/attachments/documents/mdb_idfc_adaptation_common_principles_en.pdf

Climate Policy Observer. 2015. Common Principles for Climate Mitigation Finance Tracking. http://climateobserver.org/wp-content/uploads/2015/04/common-principles-for-climate-mitigation-finance-tracking-WB-April-2015.pdf

6. The Value for (Green) Money

In most public–private partnership (PPP) projects, a value for money (VFM) analysis is deemed essential by government authorities to be able to compare the use of government funds in a traditional government procurement—build and manage—approach as opposed to a private sector partnership approach. Such an analysis might allow for better decision making by government, as it seeks to provide an objective approach to justify the use of government funds in the best way. While VFM analysis has its challenges—especially in a developing country context—it does provide a structured approach and discipline to the decision making process.

In the green context, VFM could also have a major use in the project selection process, especially to determine if a project approach was the best one for achieving the end objectives both in terms of the overt sector objectives as well as in terms of the green impacts a project should have.

For instance, whether an urban transport project should focus on roads and flyover expansion or instead utilize a metro rail project modality, would then include not just the direct costs and benefits of the project but also those from the green impacts of each approach. Perhaps the "cheaper" roads modality might in fact have much worse overall costs if these were to include green costs, e.g., increased air pollution costs from multiplying vehicles on the road, health costs from increased air pollution diseases, declining livability in an area from noise pollution and time-in-traffic factors, among others.

Developing a "Value for Green Money" methodology could be an important tool for governments to use in project selection decisions (Box 24). This will be a complicated tool to develop and while beyond the scope of this publication, could be an objective of the GFCF to further develop and utilize.

Box 24: Conceptual Approach to Developing the Value for Green Money Tool

Discussions with some of the peer reviewers focused on the VFM tool as an important aspect to highlight to make project sponsors "think differently" when developing projects. A green VFM tool would then be useful for every project selection decision, so that project selection may be based on ascribing a value to both, (i) the time value of implementation of a project; and (ii) the larger environmental degradation/"nongreen" costs created by a project over a lifecycle period, in addition to traditional project costs, and that this methodology is applied to compare; (iii) at least two to three different modalities that can be applied in undertaking any project objective (e.g., roads vs BRT vs LRT for an urban transport objective); and (iv) must include both a traditional aggregated approach (say one phase citywide implementation) as well as a disaggregated innovative approach (zonal or high impact circles in a city). The reason behind this is that many traditional (especially urbanization) projects have applied modalities that are either simple in the short-term (flyovers) or prestigious but very expensive especially with a high green cost (metro rail which have had massive time delays and green costs). These projects need to be assessed early on. An example is that of flyovers which are generally seen as only having a 3-year utility life, after which traffic situations have actually worsened than before because of inappropriate urban development along that flyover corridor.

Source: Authors.

7. Mechanics of the Green Finance Catalyzing Facility

Based on the principles emerging from the discussions on the twin pillars of financial and environmental sustainability, a proposed GFCF structure is suggested below. Numbers proposed are purely for illustration and will need to be adapted per sector and country context.

7.1 Overall GFCF Vehicle Design

- Ring-fenced vehicle structure—where GFCF has its own institutional structure with both project assistance and financing arms;
- Pooled projects vehicle—wherein GCFC manages investments in a pool of green projects across sectors and regions so as to diversify portfolio risk;
- Integrated blend of finance managed and leveraged—Funds in GFCF sourced from concessional sources mainly, and leveraged to attract commercial finance into projects;
- Provides concessional finance for a project's capital expenditure upfront, to achieve a 12% project IRR bankability hurdle rate;
- If required beyond the above, also provides revenue top-ups (paid over an initial operational period) to provide for the unquantified green benefits of a project, subject to appropriate limits;
- Links minimum revenue guarantee flows to green targets;
- Triggers refinancing from concessional debt to commercial finance, at the end of a reasonable project lifecycle period;
- Accesses institutional investors through investment into GFCF at vehicle level; and
- Links financing support to capital markets access for a project, through green debt or equity securities issued at GFCF vehicle or project level.

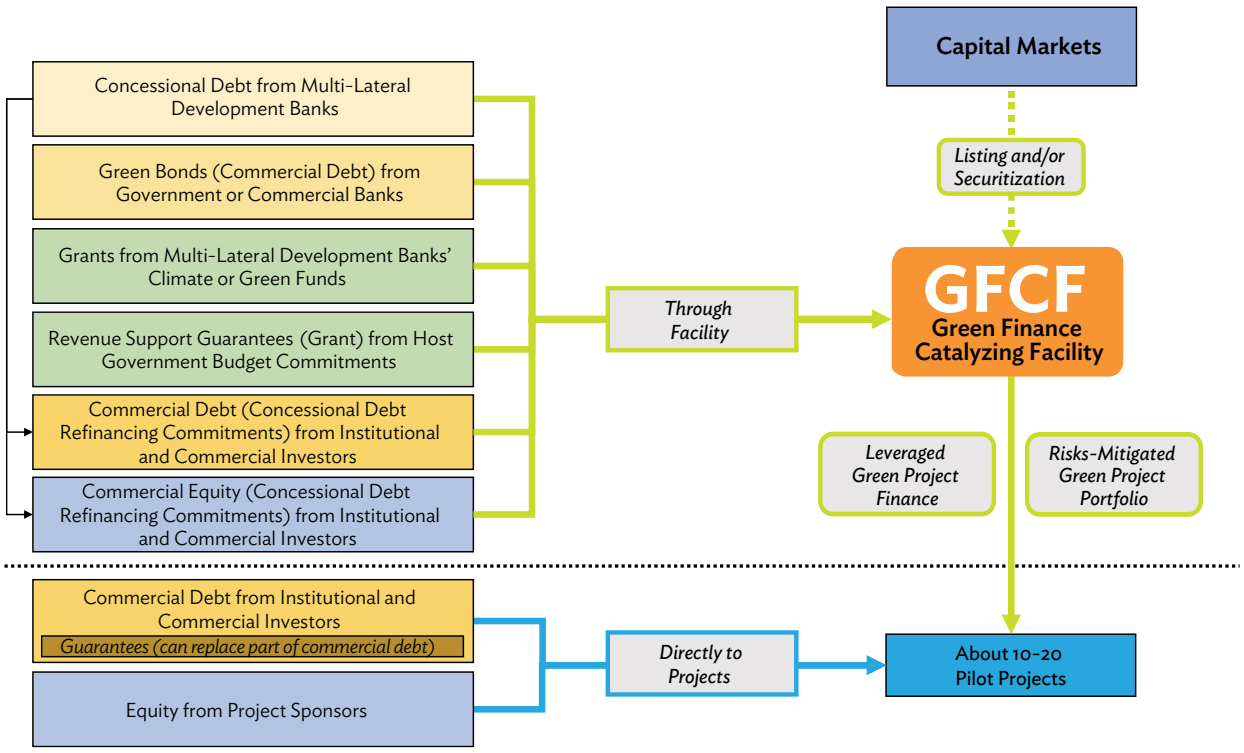
The suggested structure and sources are outlined in Figure 27, while project level mechanics are shown in Figure 28.

While a number of innovative options could be structured into the design of the GFCF, given the complexities of infrastructure projects in the Asia and Pacific region, evolving nature of financial markets, and capacity challenges at local governments, a simpler or standard GFCF usage approach has been proposed first; an option for a more complex GFCF approach to financing projects has been noted thereafter. Figure 29 illustrates the leveraging impact of blended finance with an example of specific numbers.

The elements noted in Figure 27 are elaborated further below:

- **Pooled Vehicle:** The GFCF is structured as a blend of funds that would be invested in a pool of projects across sectors, to create a diversified portfolio risk;
- **Funds Sources:** Initial funds for the pooled mechanism should be sought from both concessional and non-concessional sources;
- **Minimum Funds Pool**: The minimum suggested GFCF funds size necessary to commence operations will vary from country to country and should be sized per local needs. The size of the facility may be increased gradually based on demand from both projects and funding sources;
- **Concessional debt:** Sources include ADB and other multilateral development banks from their sovereign loan operations, bilateral and other donor agencies;
- **Grant funding:** From green and climate funds, monies should be sourced and ring-fenced to improve the concessionality of resources; a percentage of these would also be used for the project preparation support that GFCF would offer its list of pilot projects;
- **Government budgetary funds:** Are not envisaged as being required for capital expenditure support in projects, but rather for annual revenue top-up support to projects;

Figure 27: GFCF Mechanics at the Overall Pooled Vehicle Level



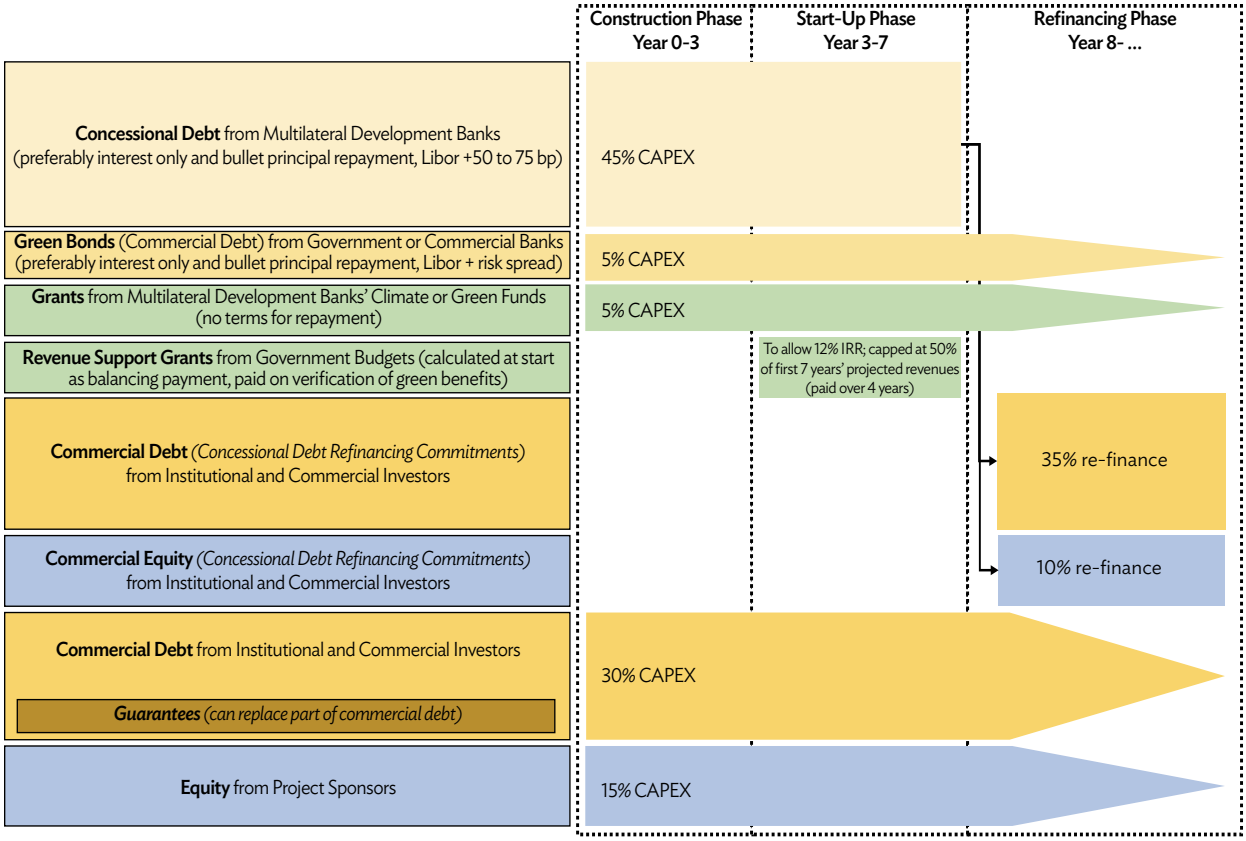
Note: Colored boxes on the left side: green = grant-related; blue = equity-related; yellow = debt-related; brown = guarantee-related.

Source: Authors.

- **Institutional and corporate funds**: Can be sourced into the GFCF either as funds or as commitments, with the clear usage of these funds for refinancing (Figure 29 and Table 3) and revolving out the concessional funds once project risks are reduced; the suggestion is for this to be at the 7 year point in a project's lifecycle or 4 years post commencement of operations. Pricing of these funds is expected to be commercial but reflective of the lower project risks, once the initial construction and operations risks are reduced while also ensuring that the project financing is assured. Institutional participants could include pension and insurance funds, or could also include active corporates, who want to actively participate in the SDG agenda and are willing to take voluntary action ahead of any mandatory requirements;[136]
- **Green Bonds:** Raised by commercial banks, governments or other institutions could also be infused into the GFCF on a back-to-back basis per commercial market terms;
- **GFCF Covenants:** For all fund providers to limit the exposure of each funding type per project to specific percentages: concessional debt finance as a percentage of total financing required per project not to exceed 45%, grants not to exceed 5%, capital market funds not to exceed 5%, cumulative GFCF exposure per project not to exceed 55% at any point; and
- **Pilot Projects:** It is envisaged that an initial group of pilot projects (10–20) across sectors should be supported and financed by the GFCF in its first phase of operations, which can be expanded in subsequent phases.

[136] Both listed on the Solactive SDG Index: Vigeo. 2016. Solactive Sustainable Development Goals Worlds EUR Index. https://www.solactive.com/wp-content/uploads/2016/10/SOGOALWE_SDGContribution_Sep-16.pdf

Figure 28: GFCF Mechanics at the Project Level



Note: CAPEX = capital expenditures, IRR = internal rate of return, LIBOR = London Interbank Offered Rate, bp = basis point (one hundredth of a percent)

Colored boxes: green = grant-related; blue = equity-related; yellow = debt-related; brown = guarantee-related.

Source: Authors.

7.2 Project Level Support—Basic/Standard Approach

The above pool of funds in the GFCF will be used to finance individual projects that meet GFCF eligibility requirements in accordance with the Financial and Environmental Sustainability pillars. The support per project is illustrated in Figure 28. A blend of instruments is suggested for use by the GFCF including debt, equity, and grant instruments. **The terms suggested below are only conceptual and illustrative, and will need to be adapted for local contexts.**

Overall Project Financing Approach:

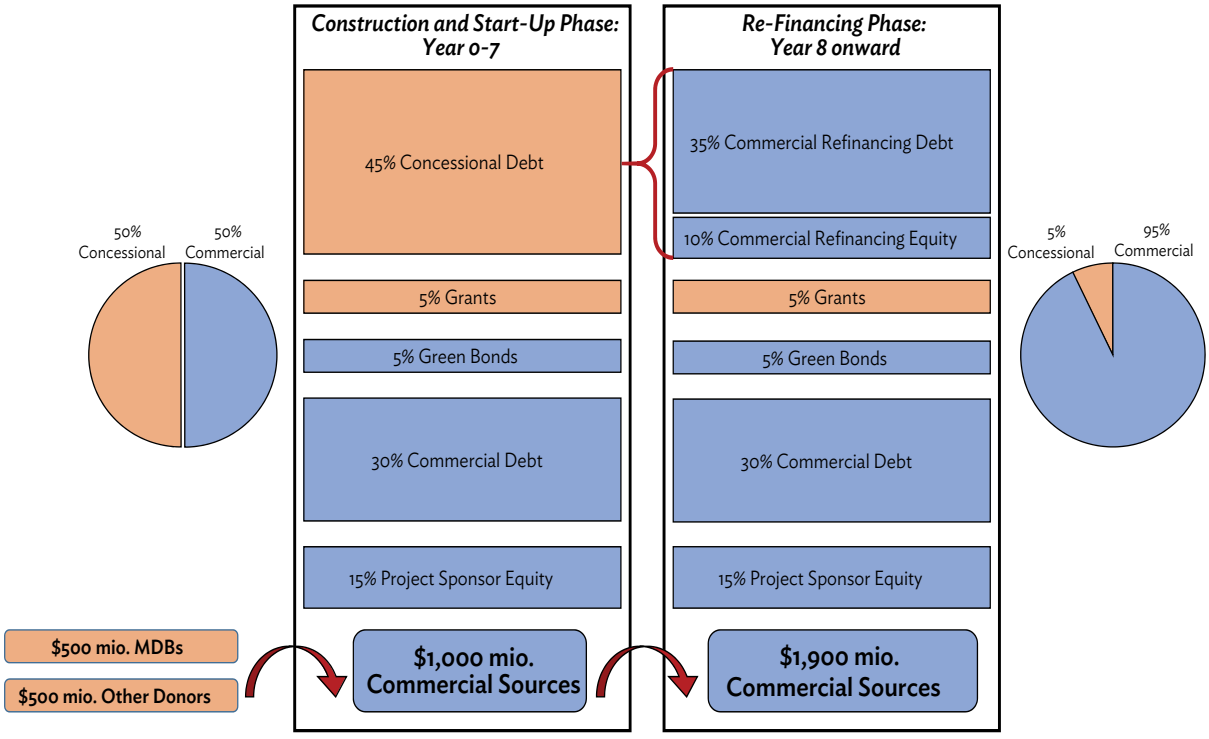
- 50% of financing to be concessional (45% concessional debt, 5% grant) through the GFCF;
- 50% from commercial sources: 15% equity, 30% commercial debt directly to the project; and 5% through the GFCF (i.e., sourced from commercial participants within the GFCF, or green bond issuances);
- Year 7 of the project lifecycle (about 4 years after completion of construction) is proposed as a refinancing point (these will be subject to change per sector); and
- Post refinancing, in year 7 of a project's lifecycle, the financing structure would change, with concessional finance accounting for only 5% (the initial grant) and 95% from commercial sources (65% commercial debt, 25% equity, and 5% green bond funds through GFCF).

Overall Leveraging: Assuming an initial pool size of $1 billion (being funds raised from development, corporate social responsibility, and climate fund entities) represents the concessional finance available to the GFCF, under the approach noted above, this amount could be leveraged initially to raise private sector and commercial funds of another $1 billion, if all GFCF funds were utilized across a pool of projects. Concessional funds do not include any funds to be raised through the GFCF from green bond issuances. At the project lifecycle refinancing point, assumed at around 7 years, concessional debt funds would be swapped out and should leverage in additional private and commercial financing sources. If all concessional debt funds were swapped out, that could lead to a final crowding in of $1.9 billion private sector funds, allowing a much high leveraging multiplier of the concessional funds applied through the GFCF (Figure 29).

Specific financing elements from the GFCF are discussed further below:

Concessional Debt: Sourced mainly from development agencies as sovereign guaranteed loans, the GFCF will provide up to 45% of capital expenditure as a concessional loan to a project, to be disbursed during the construction phase. The loan will have a 7-year term, preferably with interest only payments until the end of the term, at an interest rate of LIBOR (London Interbank Offered Rate) + 50 to 75 basis points (to reflect

Figure 29: Multiplying Leverage Through the Green Finance Catalyzing Facility (GFCF)



Note: MDBs = multilateral development banks.

Source: Authors.

general development financing terms). At the end of the 7-year term, the principal will be required to be repaid in full as a bullet payment, and go back into the GFCF to finance other projects.

- **Term Extension**: A 7-year concessional debt term has been envisaged, to cater to the generally higher risk period of a project, assumed at an average 3-4 year construction and 3-4 year initial operations period (to be varied per sector); it is assumed that the concessional debt would be refinance-able using institutional and commercial finance in year 7; however, in the event of this not happening, the concessional debt will continue in place for another 13 years (total 20-year term) but at higher interest rates with regular principal repayments to be more reflective of commercial lending; this is in line with the principle of GFCF being a "transition finance" provider for the risky initial 5–7 years of a project's lifecycle and then revolving out.

Grant: Up to 5% of capital expenditure will be offered as a grant, to be disbursed during the construction phase, sourced from green and/or climate funds and channeled through the GFCF. As a grant this money would not need to be repaid. Potential grant sources are illustrated in Box 25 and Box 26.

Box 25: The Climate Investment Funds

Since its start in 2008, the Climate Investment Funds has built up $8.3 billion in pledged resources, estimated to leverage $58 billion in cofinancing (ratio 1:7) into more than 300 projects. It has four dedicated programs: (i) **Clean Technology Fund**—$5.6 billion: for middle-income countries to demonstrate, deploy, and transfer low-carbon technologies in energy efficiency, renewable energy, and sustainable transport. New Modalities are tested, including the Dedicated Private Sector Programs to finance large-scale private sector projects; (ii) **Pilot Program for Climate Resilience**—$1.2 billion: for developing countries to integrate climate resilience into development planning, with additional support for public and private sector investments for implementation; (iii) **Scaling Up Renewable Energy in Low Income Countries Program**—$780 million: for low-income countries to deploy renewable energy solutions for increased energy access and economic growth; and (iv) **Forest Investment Program**—$775 million: for developing countries for reducing deforestation and forest degradation, as well as promoting sustainable forest management.

Source: The Climate Investment Funds. 2016. http://www-cif.climateinvestmentfunds.org/

Green Bonds: Up to 5% of capital expenditure could be provided by GFCF using funds raised through green bond offerings, at market rates, and on-lent to projects on a back-to-back basis, depending on the green bond issuer (government or commercial bank). This strategy aims at accessing funds from green bonds raised by institutions or corporates which are looking for project pipelines. Alternatively, the GFCF could itself look at a green bond issuance at an appropriate operating juncture and subject to market requirements.

Project Sponsor Equity: At least 15% of capital expenditure must be provided as sponsor equity by the project sponsor. This is intended to ensure "skin in the game" by the sponsors, which could either be private sponsors, government-owned Special Purpose Vehicles, state-owned enterprises, or public–private partnerships.

Commercial Debt from Institutional and Private Investors: 30% of capital expenditure is proposed to be financed directly by the project through commercial debt (and/or equity) raised from institutions and commercial banks. Sourcing of this finance will be the responsibility of the project developer, and is external to the support offered by the GFCF. However, commercial participants in the GFCF would not be excluded from providing this portion of the financing, and therefore it is feasible that the developer could secure arrangements directly with commercial participants in the GFCF.

Box 26: Asian Development Bank Climate Change Fund

The Climate Change Fund (CCF) was established in May 2008 to facilitate greater investment in developing member countries (DMCs) to effectively address the causes and consequences of climate change. The CCF is a key mechanism for pooling resources within the Asian Development Bank (ADB) to address climate change through technical assistance (TA) and grant components of investment projects.

The CCF focuses on three areas: (i) Low-Carbon Economies: clean energy, sustainable transport, and low-carbon urban development; (ii) Carbon-Rich Natural Ecosystems: reduced emission from deforestation and degradation, and improved land use management; and (iii) Climate Resilience: adaptation of infrastructure and communities.

The CCF supports the following types of activities: (i) Preparation of relevant strategies and action plans; (ii) Investment in climate change mitigation and adaptation measures; (iii) Development of knowledge products and services with regard to climate change; (iv) Facilitation of knowledge management activities; and (v) Funding the offset of ADB's corporate carbon footprint. Related resources can be used for technical assistance, investment components of projects, as well as direct charges, with all developing member countries being eligible to the CCF. The fund utilized $50 million in 60 projects in 2008–2012.

Source: ADB. 2016. Climate Change Fund (CCF). https://www.adb.org/site/funds/funds/climate-change-fund

Guarantees: Guarantees could be an optional add-on to the basic GFCF modality, and where needed partial credit guarantees or partial risk guarantees, could be extended to cover risks such as technology risk or political risk. Instead of or in combination with other GFCF support, the facility should appraise whether guarantees would be an effective and efficient means for private capital mobilization to green projects. Similar to the Clean Technology Fund, an initiation fee of 0.10% could be applied on the committed but undisbursed balance of the guaranteed financing, analogous to the loans' lending fee.[137] This would accrue to the GFCF for costs related to the preparation, appraisal, and negotiation of projects. All investment income earned on undisbursed balances would accrue to the GFCF. A guarantee fee of 75 basis points per year would also be applied on the disbursed and outstanding amounts of a guaranteed financing, in the same way service charges on loans will be applied. Fees would accrue to the GFCF for guarantee supervision and reporting.

Minimum Revenue Guarantee: With a view to mitigating the issue of unquantified green benefits, the GFCF proposes to provide green revenue support as a performance linked "top-up" (grant) to the project's own direct revenues, paid over the first 4-5 years of project operations:

- Balancing Payment: This revenue support will be calculated at the start of a project as the balancing payment required for a project to achieve an IRR of 12% calculated after taking into account any concessional finance provided for capital expenditure.
- Maximum Payment: The revenue support will be capped at 50% of the projected revenues for the first seven years of project operations . This is suggested on the assumption that most projects have a slow revenue build up in the first 5–7 years.
- The payment can be split into four equal tranches, to be paid over the first four years of operations, but conditional on verification of achievement of targeted green benefits by the project.

[137] World Bank. 2008. Proposed Financing Products, Terms and Conditions for Public Sector Operations of the Clean Technology Fund. Paper for the First Donors Meeting on Climate Investment Funds, Paris (4–5 March 2008): 28 February 2008. Washington, D.C.

- Sharing Upsides: If during project monitoring, it emerges that the project is earning significantly more than the aimed IRR of 12% (say 14% plus) then an upside/profit sharing structure should be developed which can plough some funds back to the GFCF. Alternatively, if equity shares were provided to GFCF in lieu of the top-up revenues provided then these would reflect the better valuation from the upside and be more attractive for capital markets issuance.

Government Contribution: It is envisaged that the above minimum revenue guarantee will be provided by the relevant government through its annual budget spend for the sector. This is in line with the leveraging principle for public funds and using these for credit enhancement rather than capital expenditure. These funds could be ring-fenced within the GFCF or through contractual arrangements, and would function effectively as grants.

- In later phases, this revenue support should be provided as "green equity" infusions from GFCF into the project, with a timeline for floating this in the capital markets.

Concessional Debt Refinancing from Institutional and Private Investors: The entire transition finance approach of GFCF is intended to assist a project over its first 5-7 years, and then allow commercial—now considerably de-risked—finance to step-in:

- At the end of year 7 of a project's lifecycle, the GFCF-provided 45% concessional debt would need to be refinanced by 35% commercial debt and 10% equity from sponsor and/or institutional/commercial investors. It is expected that by the time concessional loans reach maturity, a project would have been constructed and operating for approximately 3–4 years, which would therefore significantly reduce the risk profile for commercial investors of the project, thereby allowing for better commercial rates.
- The institutional and commercial financing refinancing can be infused either through the GFCF or directly at the project level. Participants in the GFCF could either make a commitment to refinance at the start of a project, or infuse the capital upfront into the GFCF.
- In the event of external refinancing not materializing, GFCF funds would be transitioned to commercial terms post the 7-year period; therefore, a project is assured of 20-year financing, at least, for the initial 45% of costs.

7.3 Complex/Second Phase Approach—Capital Markets Access

As the GFCF evolves, accessing the capital markets and more sophisticated leveraging mechanics should be incorporated in its use, with the GFCF requiring projects to embark on actions for accessing the capital markets, so as to expand the class of institutional and retail investors investing in green projects, as illustrated in Table 3.

The principle is for the GFCF to actively facilitate issuance of green securities in the markets which would create a greater appetite for fresh fundraising by projects in the future. The options for this include:

- As green bonds floated by the GFCF at the outset to raise finance for projects; as a pool of projects, this should diversify project risk;
- The provision of minimum revenue support, or revenue top-up by the government through the GFCF could be in the form of green equity, which should be floated in the capital markets at the appropriate juncture;
- At the refinancing trigger point of year 7, the additional equity infusion required to refinance 10% of the initial concessional debt could be raised through GFCF and/or directly by the project entity itself through a flotation in the capital markets;
- It could also be suggested that projects have a roadmap for fresh equity raising through accessing the capital markets post commencement of operations, which would also be attractive for Public–Private Partnership (PPP) project sponsors looking to dilute their stakes; and

Table 3: Accessing Capital Markets

Project Level Funding Flow	Original Funds Source	Standard GFCF Model		Complex GFCF Model	
		At Project Start	Refinancing in Year 7	At Project Start	Refinancing in Year 7
Concessional Debt—from GFCF	MDBs and Government Funds	45%	0%	45%	0%
Grant Funds—from GFCF	MDBs and Government Funds	5%	5%	5%	5%
Commercial Debt—from GFCF	GFCF or MDB Supported Green Bonds issuance	5%	5%	5%	5%
Commercial Debt—Directly by project entity	Commercial Institutions Directly	30%	65%	30%	65%
Equity—Directly by project entity	Project Sponsor Directly	15%	25%	15%	15%
Equity—Directly by project entity	Project Entity Capital Markets Issuance	0%	0%	0%	5%
Equity—from GFCF	GFCF Capital Markets Issuance (for the GFCF Pooled Vehicle or for specific projects)	0%	0%	0%	5%
	Totals	100%	100%	100%	100%
	Capital Markets Accessed Percentage	5%	5%	5%	15%

Note: GFCF = Green Finance Catalyzing Facility, MDBs = multilateral development banks.

Source: Authors

- Listing of the GFCF vehicle itself in the stock market to allow GFCF securities to be traded as "green shares," which could infuse fresh equity from private, commercial, and institutional sources into the vehicle. This equity could be utilized to swap out a portion (e.g., 5%) of the concessional finance provided at the start to a project, when refinancing occurs in year 7 of the project lifecycle. In this case, the GFCF securities would provide a tradeable and liquid, pooled-risk investment opportunity for capital market investors.

The suggested 7-year period and percentages for a swap or refinancing can of course be tailored depending on country and project specifics. The aim of these steps is to maximize the "crowding in" of finance from commercial and private investors once risks are mitigated.

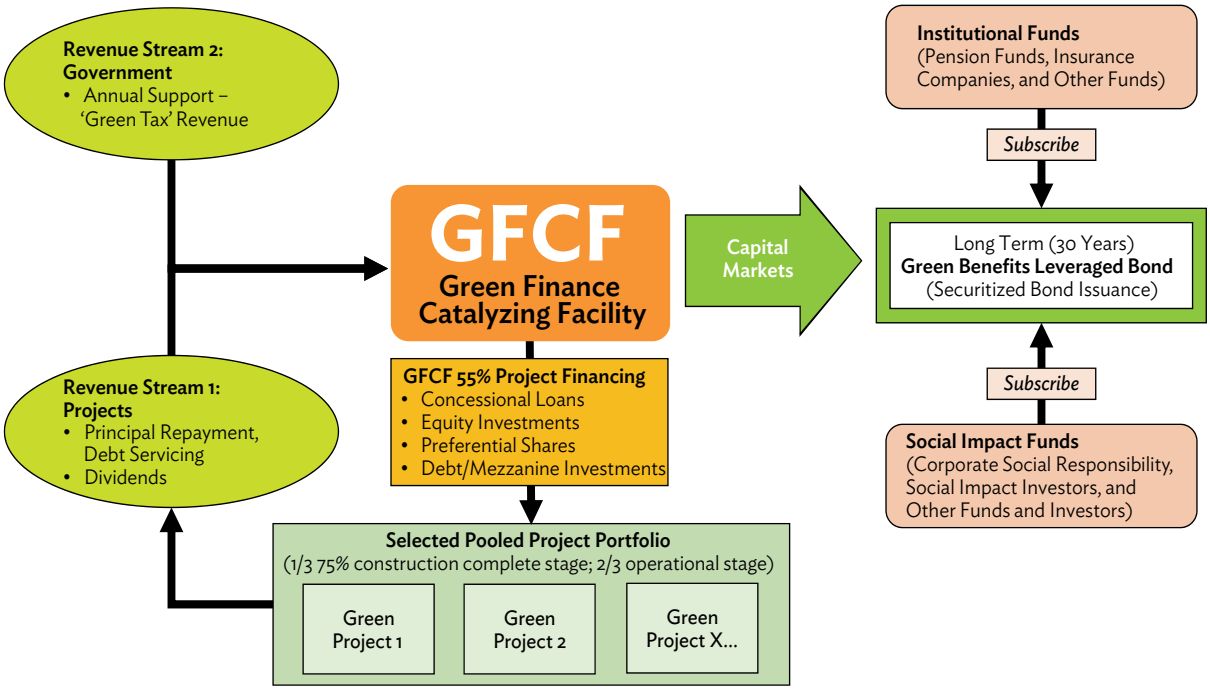
Developing a detailed time-bound roadmap for accessing these capital markets is critical, both at the project level as well as for the pooled vehicle at the GFCF level. It is suggested that the GFCF might look to creating specific ring-fenced special purpose vehicles (SPVs) under itself for accessing the capital markets. Such SPVs would combine specific assets or projects being financed by the GFCF according to specific criteria, for instance sector-based or, more probably, credit rating based. Developing the credit ratings of underlying GFCF financed projects will be vital so as to be able to group together those projects considered most attractive—at a specific point in time—to the financing appetites of domestic or international investors targeted for refinancing the portfolio of projects.

7.4 The "Green Benefits Leveraged Bond" Structure (Second Phase)

Under the complex approach above a leveraged bond structure is outlined (Figure 30) here based on suggestions from experts in the field,[138] to access the capital markets in more developed regions and markets. With the assumption that projects invested in by the GFCF would be at different stages, some in early operations phases and starting to generate revenues, while others would be in preconstruction completion phases, the following is suggested:

- A pool of projects is created under the GFCF, through a ring-fenced structure which combines at least 2 post-construction and operational projects (even if in the first year of operations), and one preconstruction completion project (at least 75% complete).
- For this pool of projects, an annual funds flow to the GFCF should be clearly visible, either in the form of dividends from equity (converted from initial debt infusion if possible), principal and interest repayment on debt, or revenue sharing, related to initial funds infusion into projects. Thus, a first revenue stream could theoretically be calculated which could be a combination of the various fund flows described.
- An additional revenue stream can be created by requiring participating governments (national, provincial, local) to ring-fence a small percentage (e.g., 1%) of their annual revenues as a "green tax" which could be

Figure 30: Green Benefits Leveraged Bond



Source: Authors, with inputs from Amitabh Mehta, CEO/managing director, Innovative Financing, Indus Blue Consulting, Switzerland; former deputy director for Risk Management/head of Asia-Pacific, Global Alliance for Vaccines and Immunization (GAVI), Geneva; and VP Securitisation Deutsche Bank, London; and Atul Joshi, founder and CEO of Oyster Capital Group; former CEO and managing director, Fitch Ratings, India.

[138] Amitabh Mehta, CEO/managing director, Innovative Financing, Indus Blue Consulting, Switzerland; former deputy director for Risk Management/head of Asia-Pacific, GAVI, Geneva; and VP Securitisation Deutsche Bank, London; and Atul Joshi, founder and CEO of Oyster Capital Group; former CEO and managing director, Fitch Ratings, India.

escrowed for flowing annually to the GFCF to shore up revenues of the pooled projects invested in. The reasoning behind this is that the green projects being developed in a particular geographic area would have an impact, even though in most cases unquantifiable directly, on reducing pollution and therefore budgetary costs to the government, such as government health and emergency disaster relief budgets. Hence, the "green tax" can be considered to be a small amount taken from the savings to the budgets of the government through green projects and which should therefore be a deemed "revenue" line for the green projects.

- The above two annual lines of "revenues" flowing to the GFCF will allow it to create a securitization vehicle or covered bond structure, which can issue a long-term bond in the capital markets—a "green benefits leveraged bond". The interest and principal for the bond will be secured by the revenue streams and allow the GFCF to lay-off some of its investments. This in turn will allow the GFCF to fund more projects and leverage higher.
- With two lines of revenues suggested as above the securitization structure and bond should be able to attain a good credit rating from ratings agencies, and allow the instrument to be placed with institutional and social impact investors.

The above structure would allow the GFCF to raise further financing from the capital markets for infusion in new green infrastructure projects, thus reducing the need for government to raise upfront sovereign finance for projects. This is therefore a crucial evolution that the GFCF might need to undertake once its initial development with support from sovereign financing, as in the standard approach above, is over.

A number of options have been suggested in the sections above for inclusion in the mechanics of the GFCF, not just between the standard and complex approaches, but even within the standard GFCF structure. Discussions have been held with various parties including peer reviewers, institutional investors, advisory firms, development agencies, as well as government officials to get comfort on these options. However, what clearly emerged was that different governments and countries will have different capacities and hence in some countries a very simple approach may be needed, perhaps just an initial 40% to 50% concessional debt or even grant financing for projects; in some countries a smaller facility size may be preferable as a start; in some countries a more sophisticated approach may be taken combining more of the options suggested, including the capital markets approach suggested.

Therefore, any effort to create a GFCF at a regional (within country or for groupings of smaller countries), country, or sector level will need to be accompanied by: (i) an assessment of the local context; (ii) an identification of which GFCF financing options are appropriate; and (iii) a capacity building program to improve the systems, institutions, skills, and understanding of officials and investors for the chosen mechanism, approaches, and financing options.

8. Institutional Structure of the Green Finance Catalyzing Facility

There are various options that can be considered in designing a GFCF institutional structure depending on the local context, and the facility could be operated under an international organization, a multilateral development bank, a commercial bank, or government.[139]

India's Viability Gap Funding scheme is housed in the government's own Finance Ministry (Box 28); Indonesia's Tropical Landscapes Financing Facility (launched in 2016), which aims to leverage public funding to channel private capital for achieving a number of SDGs such as climate change, biodiversity, and renewable energy, is managed by the private bank BNP Paribas as fund manager, while the World Bank hosts the Global Environment Facility as trustee. A number of trust funds are facilitated and/or run by multilateral development banks (Box 27).

Box 27: Asian Development Bank Funds and Financing Partnership Facilities

The Asian Development Bank (ADB) has a variety of 57 funds to support both lending and grant support in its projects. Among these funds, there are five dedicated partnership facilities that bundle funds in particular sectors, such as clean energy, health, regional cooperation and integration, urban, and water. These facilities—in addition to trust and special funds—also include risk-sharing mechanisms and knowledge-sharing partnerships.

One sector focused example is the Multi-Partner Trust Fund under the Water Financing Partnership Facility, established in 2006 to support activities that will increase the number of people in Asia and the Pacific with safe drinking water and improved sanitation, as well as higher efficiency and productivity of irrigation and drainage services, reduced flood risks, and improved water resource management.

A regional example within ADB is the Association of Southeast Asian Nations (ASEAN) Infrastructure Fund, which targets regional infrastructure investments in member countries of the ASEAN. Projects avail of regional savings and foreign exchange reserves, while ADB cofinances and record–lends all loans. Started in 2011 with eight countries and ADB, three more countries joined until 2014. Together, these shareholders have contributed equity of nearly $480 million. ADB, as the fund's administrator, also supports projects through technical assistance. Projects are identified as part of the country programming of ADB in each member country and approval by the ASEAN Infrastructure Fund's Board of Directors is needed.

Two other ADB funds, the Urban Climate Change Resilience Trust Fund and the Clean Energy Financing Partnership Facility are part of the comparative overview of green finance initiatives in Appendix 1: Overview of Green Finance Initiatives, with further information in Appendix 2: Comparative Analysis of Green Finance Initiatives and Appendix 3: Gap Analysis and Recommendations on Green Finance Initiatives.

Sources:

ADB. 2016. Funds. https://www.adb.org/site/funds/funds

ADB. 2016. Effectiveness of Asian Development Bank Partnerships. Thematic Evaluation Study by the Independent Evaluation Department. Manila.

[139] OECD. Green Investment Banks: Scaling Up Private Investment in Low-Carbon, Climate-Resilient Infrastructure. Paris.
Climate Investment Funds. 2016. http://www-cif.climateinvestmentfunds.org/
Climate Bonds Initiative. 2016. https://www.climatebonds.net/

The GFCF has been conceptualized as a facility that can create a model that might provide inputs into a country's aim of creating a larger green finance system, including better leveraging approaches for sovereign funds, policy models, and institutions such as green investment banks. As such, an institutional structure has been proposed for "housing" the GFCF, which envisages government ownership, oversight, and funds, but a separate professional management structure.

Some key design factors include:

- Committed national government ownership of the GFCF;
- GFCF operations to be placed under a ring-fenced, special purpose vehicle (SPV) or within an existing financial institution which would act as the fund manager or trustee of the GFCF;
- An independent third party contracted to provide certification on green achievements;
- Clarity of institutional structures and of roles of government and other parties, clear processes for facility operationalization;
- Clear roles and responsibilities for provision of project preparation assistance, and, financing support; and
- Good governance practices to be demonstrably followed by all public and private institutions involved (Box 28).

Box 28: Indian Funds under Public and Private Structures

The example of the Viability Gap Funding (VGF) scheme and the Skills Development Fund in India show that funds with a public purpose can be placed both under a public or a private structure.

The VGF scheme, set up in 2004 to support public–private partnerships (PPPs) in infrastructure provision in India, is under the government's Ministry of Finance. An "Empowered Committee" approves financial assistance to projects and consists of senior officials from the departments of Economic Affairs, Planning Commission, Expenditure, and the line ministry dealing with the project. For assistance beyond about $29.4 million, the Finance Minister has to approve the sanctioning by the Empowered Committee. This committee is also responsible for the allocation of support across different sectors. For projects below $14.7 million, the "Empowered Institution" with additional secretaries or high-ranking representatives of previously mentioned ministries sanctions projects.

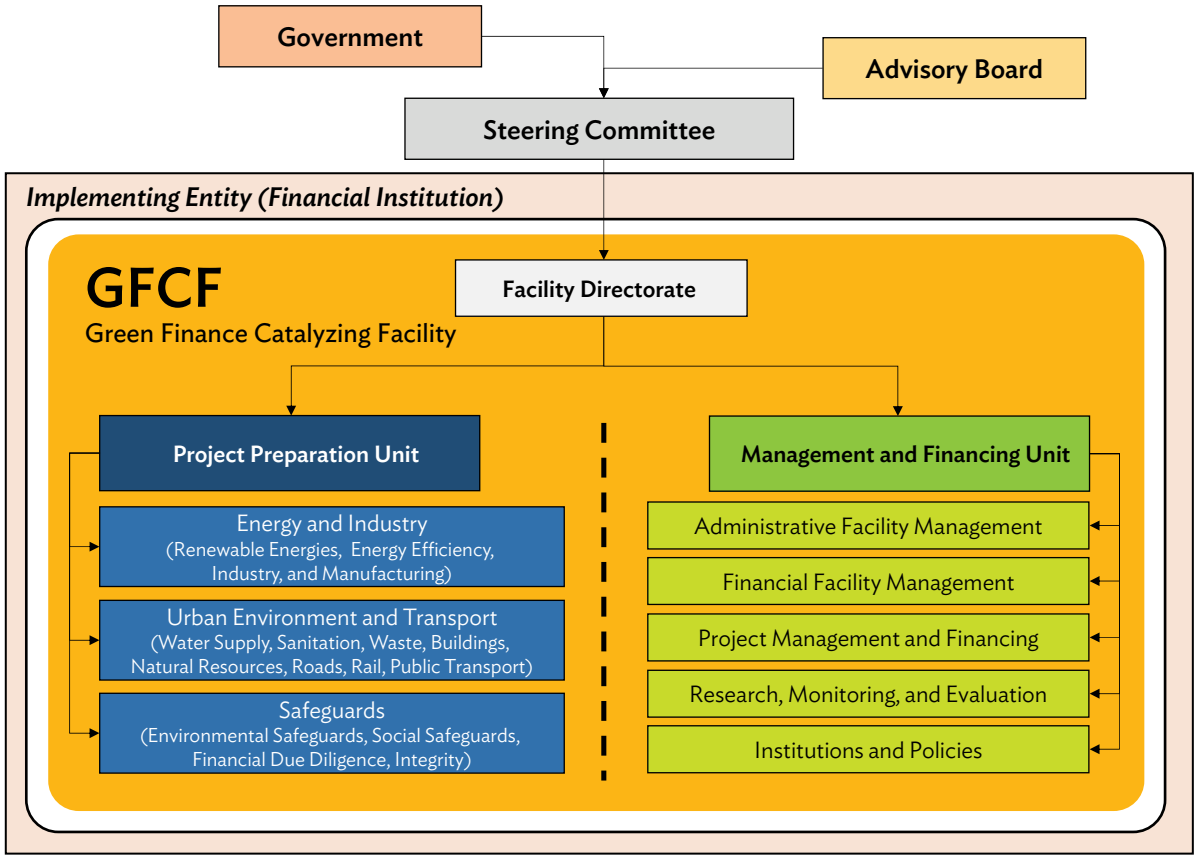
In contrast, the Skills Development Fund in India was set up in 2009 to raise funds for public and private sector for skills development. It receives contributions from various government sources and from other donors. The government functions as the custodian of the public trust fund, but the fund is operated and managed by a board of trustees and run by the National Skill Development Corporation—an industry-led not-for-profit company. At least $343 million have been put into skills development programs; for certification and reward schemes; collaborating with 160 training partners; 1,722 training centers; and training about 3.5 million people. One of India's largest corporate trustees, IL&FS Trust Company provides microprudential oversight on implementing partners and monitoring.

Sources: Government of India, Ministry of Finance. 2008. Scheme and Guidelines for Financial Support to Public–Private Partnerships in Infrastructure. New Delhi.

Government of India. Ministry of Skill Development and Entrepreneurship. 2016. National Skill Development Fund. http://www.skilldevelopment.gov.in/nationalskilldevelopmentfund.html

The proposed GFCF institutional design is shown in Figure 31 and further elaborated in Appendix 5: Operating Guidelines for the Green Finance Catalyzing Facility. This proposed structure will need to be adapted to individual country systems, policies, planning, and financing processes; the suggested arrangements are not intended to be prescriptive.

Figure 31: Proposed Organization Structure of the Green Finance Catalyzing Facility



Source: Authors.

Steering Committee: It is envisioned that a steering committee will oversee the GFCF on behalf of the national government. It would ideally be headed by a recognized leader in green finance and/or project finance in the respective country. The steering committee would have decision making power over the approval for project preparation support and funding of projects through the GFCF. In addition, financing from other sources, such as multilateral development banks, may itself need approval from the concerned institutions. The committee could include representatives from:

- Relevant government ministries;
- ADB and other multilateral development bank participants;
- Other GFCF donors; and
- Other GFCF investors.

Advisory Board: An advisory board is expected to provide linkages to the global green finance sector in order to offer external observations and recommendations, and could include representatives from:

- Global green finance initiatives (Appendix 1: Overview of Green Finance Initiatives);
- Related government agencies and institutions (e.g., PRC Green Finance Task Force);
- Institutional and commercial investors (e.g., Macquarie Group); and/or
- United Nations programs (e.g., UNEP Inquiry).

Private Sector Participation: A forum for private sector to provide feedback to GFCF on both policy level issues and project level issues is important for a successful impact of the GFCF, while also ensuring no conflict of interest. Hence, such a forum should be instituted at the advisory board or steering committee level, and a formal process established for regular interactions with representatives from the private sector, including institutional and commercial investors. Any equity investments made by private sector entities in the GFCF would in any case provide them normal equity representations on the GFCF for more detailed monitoring and oversight.

Implementing Entity: The implementing entity of the GFCF is envisioned to be either an existing financial institution or a special purpose vehicle established by the host national government. The implementing entity would create a ring-fenced operation for the GFCF including staff, and budgets to administer the day-to-day operations of the GFCF. Two operating units are envisaged within this, one for project preparation, and one for management and financing.

Facility Directorate: The facility directorate would have responsibility for the management and operation of the GFCF on a day-to-day basis. These responsibilities would include:

- Identifying, assessing, screening, and undertaking due diligence on potential projects;
- Negotiating contracts in compliance with criteria set by the Implementing Entity and Host Government;
- Managing the disbursement of payments to project entities;
- Reviewing the implementation and operation of the projects financed by the GFCF; and
- Reporting to and communicating with GFCF participants and the steering committee regarding the GFCF portfolio and operations, project status, timing of contributions, transactions, and the realization of green benefits.

Project Preparation Unit: The Project Preparation Unit has the critical task of assisting projects to conceptualize, structure and incorporate financial and green sustainability aspects per the principles stated earlier. It will assist as follows:

- Taking projects all the way through to screening, financing approvals, and financial closure from the GFCF;
- Assist in building capacities for the local government project sponsors in all aspects of project preparation, implementation, and management;
- Likely thematic areas could be clustered into groups (Figure 24), such as energy and industry, and urban environment and transport, to provide more specialized assistance, depending on each country's requirements and volume of projects; and
- Technical and funding assistance could be provided by multilateral development banks to support the establishment and initial phase of the project preparation unit. Some expertise will likely be sourced from other institutions and consulting companies. It is also possible that GFCF supporting funders could provide their own staff via a temporary secondment to the GFCF team.

Safeguards: A separate cross-cutting safeguards focal point or team will be needed for screening project proposals in the context of environmental and social safeguards, and integrity aspects, to ensure compliance with national requirements for safeguards.

Management and Financing Unit: The management and financing unit's responsibilities would include the following areas:

- Administrative Facility Management—running the day-to-day business of the GFCF with respect to the general internal management and human resources, as well as communications to enable a two-way flow of information to and from the GFCF, engage potential partners in active communication, and regularly reporting on GFCF activities, updates, and successes;

- Financial Facility Management—managing financial aspects of the GFCF funds within a ring-fenced entity with regard to portfolio finance and investors relations (not the financing of individual projects);
- Project Management and Financing—reviewing and supporting projects during the implementation and operation phases, ensuring regular project monitoring reports, including ensuring green targets are being achieved as expected and managing financing flows between the facility and projects;
- Research, Monitoring, and Evaluation—conducting background analysis to inform the GFCF work of other units and monitor progress on GFCF activities—in particular green finance flows—for the overall tracking of GFCF outcomes and impact, informing regular evaluation, producing good practice cases, and providing reports to the steering committee; and
- Institutions and Policies—coordinating with government, partners of the GFCF, the steering committee, and other actors in the green finance arena, as well as analyzing and contributing to the improvement of the legal and regulatory framework of the hosting country (Box 29).

Procedures: National government hosts will apply their individual appropriate procedures for the GFCF operations of appraisal, approval, supervision, monitoring and evaluation. Each host organization will need to provide to the steering committee a summary of its corresponding procedures for administering the GFCF, including project appraisal/approval, procurement, as well as anticorruption plans, financial reporting, flow of funds, arrangements for accounting, audit (including technical audits), quality assurance, and results-based monitoring and evaluation.[140]

Capacity Building and Team Development: In order to ensure the effectiveness of the GFCF it will be necessary to develop capacity so that staff and members of the steering committee understand the aims of the GFCF, green growth, and green finance. There are several green finance initiatives that specialize in providing the latest intelligence, training, and other knowledge sharing services that can bring GFCF teams up-to-date with recent developments, methodologies, and techniques for green project and finance assessment, and can further strengthen their connection to other green finance institutions and stakeholders. Formal partnerships of the GFCF with a wider network will also be useful for capacity building (Box 29).

Box 29: Pacific Private Sector Development Initiative

Cofinanced by the Asian Development Bank and the governments of Australia and New Zealand, the Pacific Private Sector Development Initiative (PSDI) was initiated in 2007 to address key constraints to doing business in the Pacific region, such as underdeveloped financial markets, inadequate competition, and outdated company laws. Aiming at strengthened institutions, as well as increased productivity and competitiveness, PSDI has helped both governments and the private sector in the region improve financial markets and services, update business laws, reform state-owned enterprises, promote public–private partnerships, improve competition policies and consumers rights, and promote women's economic empowerment. PSDI provides independent private sector assessments to feed into policy dialogue and policy making. As a flexible performance-driven instrument, it provides technical assistance and capacity development. It has employed a rapid expertise response to reform opportunities when they arise in a particular country in the Pacific.

Source: ADB and PSDI. 2017. Pacific Private Sector Development Initiative. http://www.adbpsdi.org/p/what-is-psdi.html

[140] Also see World Bank. 2008. Proposed Financing Products, Terms and Conditions for Public Sector Operations of the Clean Technology Fund. Paper for the First Donors Meeting on Climate Investment Funds, Paris (4–5 March 2008): 28 February 2008. Washington, D.C.

It is suggested that the development of a GFCF be accompanied by a capacity building program to assess weaknesses and strengthen systems, skills, institutions, and procedures at the relevant government levels. Such an effort should also likely interface with efforts made for regulatory systems and procedures, both at country/geographic and project levels, to be strengthened for monitoring projects and providing appropriate incentives and penalties.

Reporting, Results Management, and Audit: The GFCF will follow national norms for accounting, auditing, good governance systems, and practices. The GFCF will also be required to report annually on its overall contributions toward the host country government's commitments on green finance, NDCs, and impact on the green economy globally.

Third Party Verification of Green Benefits: In addition to reporting requirements imposed per best practices on the project entities, the GFCF would also require project sponsors to have their green benefits verified by an independent third-party entity annually. The green benefit indicators will vary from project to project, with the only common metric being emission reductions. However, the auditor would base their assessment on the specific project monitoring plan and verify the accuracy of the monitoring reports and give an independent assurance that, during a specific time period, the project activity achieved a certain amount of green benefits. This independent verification of results achieved will be a precondition for disbursement of green benefit revenue.

Operating Guidelines: Clear processes for all the above GFCF activities would need to be developed by the facility directorate including project application processes, approval procedures, monitoring requirements and systems, disbursement approaches, and safeguards and procurement guidelines. Instead of formulating policies from scratch it is recommended to use existing good practice examples, internationally-recognized frameworks, and readily available templates from examples of green funds or initiatives and their application procedures (Box 8, Box 16, Box 20, Box 25, Box 26, and Box 27) in addition to existing country systems whenever they have already been put in place.[141] A suggested design has been elaborated in Appendix 5: Operating Guidelines for the Green Finance Catalyzing Facility.

[141] ADB. 2015. Promoting the Use of Country System in ADB's Operations. A Systematic Approach. Manila.

OECD. 2010. Country Systems, and Why We Need to Use Them. In: OECD. Development Co-Operation Report 2010. Paris. pp. 43–54. http://www.oecd-ilibrary.org/docserver/download/4310031ec006.pdf?expires=1480774040&id=id&accname=guest&checksum=7A5F38D5FA8D7CBC731A7074EED1570F

9. Summary: Proposed Term Sheet of the Green Finance Catalyzing Facility

The provisions discussed in the previous section have been summarized in a term sheet for the GFCF in Table 4. These terms are only suggestions and would have to be adapted to fit the particular circumstances or priorities of each host country, its financial sector, and underlying project risks.

Table 4: Proposed Term Sheet of the Green Finance Catalyzing Facility

Name of Fund	Green Finance Catalyzing Facility (GFCF)
Operational Date	To be determined
Proposed Life of Fund	[20] years
Trustee	The [host organization] is the implementing entity and directorate of the Green Finance Catalyzing Facility. The [host country government] is the host nation of the Green Finance Catalyzing Facility.
Objectives	The objective of a GFCF is to leverage concessional finance and catalyze private and commercial finance into bankable, de-risked green projects that ensure long-term sustainability benefits. In addition: (i) The GFCF is designed to be a complete package hosted by individual countries, to develop green finance capacity and green projects within that country. (ii) It provides a vehicle for leveraging concessional funds, and explicitly aims to crowd-in private sector finance. (iii) It alters the typical approach of using concessional finance as the sole debt-provider to large infrastructure projects to being a financial bankability enhancer, to the extent required by a project (i.e., the level of concessional finance applied will vary depending on the individual needs of the project). (iv) It proposes a blended finance approach to manage risk such that concessional finance is used in the earlier, riskier stages of the project, and is then replaced by commercial (or semicommercial) finance at later stages. (v) It proposes a new role for government funds, not as a capital asset financier but as an operations revenue/returns guarantor, which reduces the upfront financing burden from governments. (vi) It explicitly links flow of funds to actual achievements of green benefits through defined targets and indicators—if these targets are not met funds will not flow making the GFCF a performance linked facility. (vii) It proposes the valuing of green benefits that can be difficult to quantify and are often not valued, or not valued sufficiently by introducing a minimum revenue guarantee payment, to ensure projects meet a specified rate of return over their lifecycle period.
Sectors Supported	The sectoral scope of the GFCF can include projects from the following indicative list of thematic areas: (i) Renewable energy: production, transmission, appliances, and products based on wind, water, solar, and geothermal energy sources; (ii) Energy efficiency: new and refurbished buildings, energy storage, district heating, smart grids, appliances, and products; (iii) Pollution prevention and control: waste water treatment, greenhouse gas control, soil remediation, recycling and waste to energy, value-added products from waste and remanufacturing, and associated environmental monitoring analysis;

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Table 4 *continued*

	(iv) Sustainable management of living natural resources: sustainable agriculture, fishery, aquaculture, forestry, and climate-smart farm inputs such as biological crop protection or drip-irrigation; (v) Terrestrial and aquatic biodiversity conservation: the protection of coastal, marine, and watershed environments; (vi) Clean transportation: electric, hybrid, mass transit, rail, nonmotorized, multimodal transportation, infrastructure for clean energy vehicles, and reduction of harmful emissions; (vii) Sustainable water management: sustainable infrastructure for clean and/or drinking water, sustainable urban drainage systems and river management, and other forms of flooding mitigation; green water infrastructure with wastewater treatment and less-concrete infrastructure (e.g., through rainwater harvesting, source control of surface water), green roofs, and local processing of grey or black water; (viii) Sustainable urban development: integrated place development, greening of public areas, compact design, transit-oriented development, urban regeneration, and re-functionalization of infrastructures; (ix) Climate change and disaster resilience: climate-proofing infrastructures, information support systems for climate observation, early warning, and modeling; and (x) Eco-efficient products, production technologies, and processes: development and introduction of environmentally friendlier, ecolabeled or certified products, resource efficient manufacturing, packaging, and distribution.
Eligibility Requirements	(i) Compliance with the GFCF environmental sustainability principles and time-bound targets for 3-4 green benefits/indicators; and (ii) Clear projected financial sustainability through an IRR based hurdle rate of 12% using a financial analysis which incorporates GFCF funding support required.
Accessing the Fund	Projects can submit a screening form to the GFCF (Appendix 4). The application will be screened by the GFCF Project Preparation Unit. If successful, the Project Preparation Unit will undertake due diligence The due diligence report will be submitted to the GFCF Steering Committee. If approved by the steering committee a project specific financing agreement will be negotiated.

Fund Governance

Decision making Structure	The GFCF is governed by the Implementing Entity, GFCF Steering Committee, an Advisory Board and a GFCF Directorate. Implementing Entity A Financial Institution/Special Purpose Vehicle will act as the Implementing Entity for the GFCF. It houses the GFCF and the staff required to administer day-to-day operations. GFCF Steering Committee The GFCF Steering Committee would oversee and advise on the operations and activities of the GFCF. It would be comprised of: (i) Relevant government ministries; (ii) ADB and other multilateral development bank participants; (iii) Other GFCF donors; and (iv) Other GFCF investors.

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Table 4 *continued*

Advisory Board
An Advisory Board can provide external observations and recommendations regarding the activities of the GFCF and could include representatives from:

(i) Global green finance initiatives;
(ii) Related government agencies and institutions (such as China Public–Private Partnerships Center);
(iii) Institutional and commercial investors;
(iv) United Nations programs (such as UNEP); and
(v) Other relevant stakeholders.

GFCF Directorate
The directorate supports the work of the GFCF and the GFCF Steering Committee. It is comprised of a Project Preparation Unit and a Management and Financing Unit and is comprised of professional and administrative staff, housed within the Implementing Entity.

Fund Mechanics

Financial Instruments/ Delivery Mechanisms

The GFCF uses a blend of financial instruments, including concessional loans, grants, guaranteed revenue support, refinancing commitments and guarantees to catalyze investment into green projects.

The terms of GFCF financing are:

Instrument	Source	Cap	Interest Rate	Maturity	Repayments	Currency
Concessional Loan[1,2]	ADB / other MDBs Ordinary Capital Resources	45% of CAPEX	LIBOR plus 50 basis points	7-years followed by commercial refinancing (or step up in terms)	Regular Interest and 7th year bullet principal repayment option	US dollar or local currency
Grant	Green Climate Fund, other climate funds	5% of CAPEX	NA	NA	NA	US dollar
Commercial refinancing of concessional loans in Year 7	Commercial investment participants in the GFCF		LIBOR plus a commercial spread (bp)	13–15 years on commercial terms (from GFCF in the event of a lack of commercial financiers)	Interest plus principal	US dollar or local currency
Revenue support	Government	Up to 50% of the first 7 years of project revenues to achieve a 12% IRR hurdle rate	NA	4 equal payments over first 4/5 years of operations. Payments to be made only if green targets achieved	NA	Local currency
Green Bonds	Commercial green bond issuers	5% of CAPEX	Market based pricing	Commercial basis		US dollar or local currency
Guarantees[3]	ADB/ other MDB participants					

[1] Commitment Fee: x% of undisbursed loan balance; accrues to the GFCF to recover its costs related to project preparation and appraisal
[2] Lending Fee: xx% of disbursed and outstanding loan balance (per annum)
[3] Guarantee Fee: at commercial terms
ADB = Asian Development Bank, CAPEX = capital expenditures, GFCF = Green Finance Catalyzing Facility, LIBOR = London Interbank Offered Rate, NA = not applicable.

Source: Authors.

10. Next Steps: From Concept to Practice

The GFCF has been conceptualized in response to the need for better leveraging of public funds to catalyze private sector investments in to green infrastructure projects. A structure to achieve this has been suggested in this publication, drawing from other financial leveraging and green growth initiatives, as well as policy pieces produced by national and international entities.

This concept will need to be adapted to suit local situations, sector requirements, and government strategic policies, as well as the stage of development of green finance in each country. The aim should be to build upon the principles and concept noted herein, and develop pilot GFCF-like vehicles in each country, starting initially with a series of workshops or dialogues with key relevant entities, including local governments and sector ministries and the private sector financing sources mentioned in the publication, to shape the final local GFCF structure and development.

The GFCF cannot be seen as a universal solution for green finance across Asia and the Pacific, but does aim to provide a framework for a catalyzing mechanism to be developed in each country, for proactively crowding in the currently untapped market sources of financing into green infrastructure for development. Such a mechanism could form part of what is eventually needed for green development—a systematic green finance system which will leverage private capital into green infrastructure systems and their development, thereby reducing government pressures to finance, improve performance and technology in using scarce natural resources, and overall moving the world to an inclusive and environmentally sustainable growth paradigm.

Photo Credits: ADB, *(except for Kazahkstan blue lake)* Anouj Mehta.

Photo Credit: Manish Tiwari.

Appendixes and Bibliography

Appendix 1: Overview of Green Finance Initiatives

Table A1 provides an exemplary overview of different initiatives that provide the resources and/or knowledge for green finance. The selected examples are not exhaustive; however, they represent the diversity of institutions, products, and approaches to enable accelerated green finance.

Table A1: Overview of Green Finance Initiatives

Green Investment Bank	
Type	Equity and debt bank
Region	United Kingdom (UK)
Funding Source	Government of the UK
Thematic Areas	• Energy efficiency • Waste and bioenergy • Offshore wind • Onshore renewables
Aim	Investments in green infrastructure projects that provide for both financial and green investment returns by leveraging of private sector capital

Functionality	• Market equivalent terms, no low-cost options
	• Investment must meet at least one of the green purposes:
	  ° Reduction of greenhouse gas emissions
	  ° Advancement of efficiency in the use of natural resources
	  ° Protection or enhancement of the natural environment
	  ° Protection or enhancement of biodiversity
	  ° Promotion of environmental sustainability
	• Reference are the Equator Principles and UN Principles for Responsible Investment

Partnering	UK Climate Investments LLP (UKCI) for investment in international renewable energy and energy efficiency projects in developing countries with £200m of funds, as a joint venture between the UK Green Investment Bank (GIB) and the UK Government's Department for Energy and Climate Change (DECC)
Website	http://www.greeninvestmentbank.com/about-us/
Knowledge Work	Low
Finance Work	Medium
Connecticut Green Bank	
Type	Equity and debts bank (State of Connecticut)
Region	United States
Funding Source	State of Connecticut
Thematic Areas	Green energy and related infrastructure measures
Aim	Supporting the Governor's and Legislature's energy strategy to achieve cleaner, cheaper and more reliable sources of energy while creating jobs and supporting local economic development, and leading the green bank movement by accelerating private investment in clean energy deployment for Connecticut

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Table A1 *continued*

Functionality	• Development of innovative programs to finance and support green energy investment in residential, municipal, small business and larger commercial projects • Support of financing or other expenditures that promote investment in green energy sources to foster the growth, development and commercialization of green energy sources and related enterprises • Stimulation of demand for green energy and the deployment of green energy sources within the state that serves end-use customers in the state • Partnering with private sector investors to create low-cost, long-term, sustainable financing to implement green energy measures in the residential, commercial, industrial, institutional, and infrastructure sectors. • Funding from a variety of sources, including a surcharge on residential and commercial electric bills, Regional Greenhouse Gas Initiative auction allowance proceeds, federal funds and grants, private capital in the form of contracts entered into with investors and other sources • Leveraging of over $491 million in private investment between 2012–2015
Partnering	Various private sector investors
Website	http://www.ctgreenbank.com/
Knowledge Work	High
Finance Work	High
Copenhagen Infrastructure Fund I/II	
Type	Equity and debt fund (Copenhagen Infrastructure Partners)
Region	Global, focus on countries with limited regulatory and political risk, primarily on Western and Northern Europe, as well as in North America
Funding Source	PensionDanmark, Lægernes Pension, PBU, JØP, DIP, Nordea, PFA, Nykredit, AP Pension, SEB Pension DK, SEB Pension SE, Lærernes Pension, Oslo Pensjonsforsikring, Villum Fonden, KLP, a UK pension fund, Widex, LB Forsikring, and European Investment Bank (with the backing of the European Union through European Fund for Strategic Investments)
Thematic Areas	Energy
Aim	Focusing on energy-related infrastructure assets within a wide range of technologies, with a long-term investment perspective, high degree of stability in cash flows and low correlation to ordinary business cycles
Functionality	• Investments into infrastructure assets at development, structuring, construction as well as operation stage, including financial bridging • Focus on long-term partnerships with co-investors • Copenhagen Infrastructure I K/S established in 2012 with PensionDanmark as limited partner for $1.1 billion, with equity and debt instruments • Copenhagen Infrastructure II K/S established in 2014 with 19 financial investors for $2.2 billion, primarily in renewable energy investments • CI Artemis K/S established in 2014 with PensionDanmark for $423 million, as special purpose fund for German offshore transmission asset, Dolwin 3
Partnering	PensionDanmark and 19 other institutional investors, as well as engineering and construction companies
Website	http://cipartners.dk/
Knowledge Work	Low
Finance Work	Medium

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Table A1 *continued*

Green Municipal Fund	
Type	Grants and debt fund (Federation of Canadian Municipalities)
Region	Canada
Funding Source	Government of Canada endowed Federation of Canadian Municipalities with $550 million
Thematic Areas	• Brownfields • Energy • Transportation • Waste • Water • Planning
Aim	Supporting partnerships and leveraging public and private sector funding for initiatives that demonstrate an innovative solution or approach to a municipal environmental issue (air, water, soil quality, climate protection), offer significant environmental benefits, a strong business case, social advantages, are complemented by local policies and measurement systems, and can generate new lessons and models for municipalities of all sizes and types in all regions of Canada
Functionality	• Funding is available to: all municipal governments and their partners (e.g., improvement districts, boards, regulatory authorities, First Nations, municipal or private sector or not-for-profit companies and organizations) • Funding is available for: plans (e.g., sustainable neighborhood action plans, community brownfield action plans and greenhouse gas reduction plans), feasibility studies and pilot projects (in the brownfields, energy, transportation, waste, and water sectors), capital projects (in the brownfields, energy, transportation, waste and water sectors) • Funding in the form of grants cover up to 50% of costs for plans, feasibility studies and pilot projects (maximum of $175,000 for plans and feasibility studies, $350,000 for pilot projects) • Funding in the form of low-interest loans (usually in combination with grants, except for brownfields) cover up to 80% of costs for capital projects (maximum $5 million, grant amount at 15% of loan, maximum of $750,000) • Applicants with high-ranking projects may be eligible for a loan of up to $10 million combined with a grant for 15% of loan amount (maximum of $1.5 million) • Process includes self-screening, preevaluation, application preparation, independent peer review, funding recommendation, approval and notification
Partnering	Several corporate partners and municipalities as members
Website	http://www.fcm.ca/home/programs/green-municipal-fund.htm
Knowledge Work	High
Finance Work	Medium
Green Finance Organization	
Type	Equity, debts, and grants fund (Government of Japan)
Region	Japan
Funding Source	Government of Japan
Thematic Areas	Clean energy, including wind, solar, small-scale hydro, biomass, and geothermal

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Table A1 *continued*

Aim	Responding to challenges associated with building out a clean energy projects, including high upfront capital costs for development and construction as well as long operation and income phases that increase project risk for project owners/developers, by decreasing debt to equity ratio
Functionality	• Fund provides equity and mezzanine investments to make clean energy projects bankable to attract further private sector capital. • Equity investments are limited to less than 50%, with a subfund being sometimes created for aggregating and housing combined equity investments for project vehicle funding. • Projects have to reduce greenhouse gas emissions and contribute to local economies. • Particular support is given to project development phase for projects that try new business models that can be replicated by other municipalities, including capacity development. • Project profits are often invested in the municipalities' low-carbon efforts for other funding, outreach, and education support initiatives • Successes are shared to encourage expanded green investment in private sectors across the country. • From 2013 to 2015, the fund made investment commitments of $78 million matched with $664 million from private sector sources.
Partnering	Local communities and private sector
Website	http://greenbanknetwork.org/green-finance-organisation-japan/ http://greenfinance.jp/
Knowledge Work	Medium
Finance Work	Medium
Clean Energy Finance Corporation	
Type	Equity and debt fund (corporate Commonwealth entity of Australian Government)
Region	Australia
Funding Source	Government of Australia (under the Clean Energy Finance Corporation Act 2012)
Thematic Areas	• Clean energy, including large and small-scale solar, wind and bioenergy • Energy efficiency of infrastructure • Clean energy financing products
Aim	Accelerating Australia's transformation toward a more competitive economy in a carbon constrained world, by acting as a catalyst to increase investment in emissions reduction
Functionality	• Investment in projects and businesses that develop or commercialize clean energy technologies, as well as their goods and service suppliers, with clear public policy benefits (e.g., reducing emissions, moving new clean energy technologies down the cost curve and bringing technological diversity into the energy mix, supporting productivity gains through energy efficiency, encouraging innovation, building capability, and leveraging private sector funds into the sector) • Focus on projects and technologies at later development stages, with positive expected rate of return and capacity to service and repay capital, as well as earlier-stage projects with significant support and appropriate risk profile • Investment through direct investment, partnerships, trusts, joint ventures, subsidiaries, using debt or equity products or a combination thereof • Clean Energy Innovation Fund also provides investment finance for projects and businesses that use technologies that have passed beyond the research and development stages but which are not yet established or of sufficient maturity, size or otherwise commercially ready to attract sufficient private sector capital

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Table A1 *continued*

	• Investments are to be diversified across Australia both by type and borrower, and preferably cofinanced, loan service from revenue and sufficient equity against underperformance ensured • Investments in clean energy-related financing products, i.e., climate bonds • Funding access of $7.7 billion between 2013–2017
Partnering	Several private sector cofinanciers
Website	https://www.cleanenergyfinancecorp.com.au/
Knowledge Work	Low
Finance Work	High
Green for Growth Fund	
Type	Debt, equity, and grants fund (Oppenheim Asset Management Services)
Region	Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Croatia, Egypt, Georgia, Jordan, Kosovo*, Lebanon, FYR Macedonia, Moldova, Montenegro, Morocco, Serbia, the Palestinian Territories, Tunisia, Turkey, and Ukraine
Funding Source	European Investment Bank, German Development Bank KfW, European Bank for Reconstruction and Development, International Finance Corporation, European Commission (first-loss funding), German Federal Ministry of Economic Cooperation and Development (BMZ), Austrian Development Bank OeBB, Netherlands Development Finance Company FMO, the Church of Sweden (Svenska kyrkan), Sal. Oppenheim, Finance in Motion, GLS Bank
Thematic Areas	• Energy efficiency • Renewable energy
Aim	Contributing, in the form of a public–private partnership with a layered risk/return structure, to enhancing energy efficiency and fostering renewable energies in the Southeast Europe Region including Turkey, in the European Neighborhood Region-East, and in the Middle East and North Africa (MENA) predominantly through the provision of dedicated financing to businesses and households via partnering with financial institutions and direct financing
Functionality	• Investments in energy efficiency and renewable energy sectors both indirectly and directly • Refinancing of financial institutions (local commercial banks, nonbank financial institutions such as microfinance institutions and leasing companies and other selected financial institutions) providing loans to households, businesses, municipalities and public sector for energy efficiency measures or renewable energy projects • Providing direct financing to nonfinancial institutions (companies, energy service companies, renewable energy companies or projects, small-scale renewable energy and energy efficiency service and supply companies) that meet Green for Growth Fund energy saving and/or emissions targets, and comply with technical criteria and Green for Growth Fund exclusion list • Project support through Technical Assistance Facility for capacity development and training, awareness raising and market-enabling activities, validation and monitoring of energy savings and carbon dioxide emission reductions • Utilization of tiered risk-sharing structure, designed to attract commercial capital from multilateral and private institutional investors • Outstanding portfolio of $340 million and investor commitments of $408 million
Partnering	Open to institutional investors only; Oppenheim Asset Management Services for investment management; MACS Management and Consulting Services for technical investment advisory; Finance in Motion for implementation advisory and Technical Assistance Facility Manager; Banque de Luxembourg as Depositary, Central Administration and Domiciliation Agent, with European Fund Administration acting as Central Administration

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Table A1 *continued*

Website	http://www.ggf.lu/
Knowledge Work	Medium
Finance Work	Medium
Global Energy Efficiency and Renewable Energy Fund	
Type	Equity fund (European Investment Bank and European Investment Fund)
Region	Global, initially Africa, Asia, the Caribbean, and Latin America
Funding Source	European Union, Germany, Norway, and private sector investors
Thematic Areas	• Renewable energy, including small hydro, solar, wind, biomass and geothermal • Energy Efficiency, including waste heat recovery, energy management in buildings, co-generation of heat and power, energy storage and smart grids
Aim	Focusing on renewable energy and energy efficiency projects which deploy proven technologies by catalyzing private sector investments into funds and underlying projects by leveraging public sector seed contributions
Functionality	• Investment of public and private sector risk capital in specialist renewable energy and energy efficiency private equity funds developing small and medium-sized projects in emerging markets with strong positive environmental and developmental impact, focusing on infrastructure projects that generate clean power through proven technologies with low risk • Total funds of $246 million estimated to leverage more than $10 billion • Invested funds usually engaged early for investment preconstruction, advised in strategy, team capability and structure, with strong technical and private equity transaction skills, regional focus and local presence, and overall size between $55 million and $222 million
Partnering	European Commission; European Investment Bank; European Investment Fund; Fund-of-funds structure
Website	http://geeref.com/
Knowledge Work	Low
Finance Work	Medium
Urban Climate Change Resilience Trust Fund	
Type	Grants fund (ADB)
Region	Asia (ADB developing member countries), initially Bangladesh, India, Indonesia, Pakistan, the Philippines, and Viet Nam
Funding Source	The Rockefeller Foundation, Switzerland, the United Kingdom, and the United States
Thematic Areas	Climate-resilient urban infrastructure
Aim	Meeting needs of Asia for basic and economic infrastructure while building resilience to climate change effects within medium-sized cities in Asia, particularly reducing vulnerability of the urban poor
Functionality	• Fund aims at systems-centered approach where climate change is central element in city planning • Fund supports infrastructure development for climate change adaptation, combined with implementation of policy and institutions interventions, capacity building, knowledge sharing, and networking • Grants of $150 million are to leverage more than $1 billion in investments from public, private and municipal sources

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Table A1 *continued*

Partnering	Asian Cities Climate Change Resilience Network (ACCCRN), ARUP; Fund established under Urban Financing Partnership Facility
Website	https://www.adb.org/site/funds/funds/urban-climate-change-resilience-trust-fund
Knowledge Work	Medium
Finance Work	Low
Clean Energy Financing Partnership Facility	
Type	Debt and grants facility (ADB)
Region	Asia (developing member countries of ADB)
Funding Source	Governments of Australia, Canada, Japan, Norway, Spain, Sweden, and the United Kingdom; Global Carbon Capture and Storage Institute
Thematic Areas	• Clean energy through renewable energy and energy efficiency, including: • biomass, biofuel, biogas • rural electrification and energy access • distributed energy production • waste-to-energy projects • demand-side management projects • energy-efficient district heating, transport, street lighting, buildings and end use facilities • clean energy power generation, transmission, and distribution • manufacturing facilities of clean energy system components, high efficiency appliances and industrial equipment • energy service company development • carbon capture and storage • integrated gasification combined cycle or IGCC, supercritical and ultra-supercritical steam technologies
Aim	Improving energy security in ADB's developing member countries and decreasing climate change rate through financing deployment of new, more efficient, and less polluting supply and end use technologies
Functionality	• Facility provides concessional lending and grants • Facility provides support for technologically innovative projects, particularly for demonstrating scaling-up potential • Resources are also intended to finance policy, regulatory, and institutional reforms for clean energy development through capacity development, studies and assessments, and awareness programs • Facility could leverage $2.16 billion of clean energy investment since its establishment from 2007 to 2015
Partnering	Facility houses four funds: Asian Clean Energy Fund (Japan), Canadian Climate Fund for the Private Sector in Asia, Carbon Capture and Storage Fund (Australia and United Kingdom), Clean Energy Fund (Australia, Norway, Spain, Sweden, and the United Kingdom)
Website	https://www.adb.org/site/funds/funds/clean-energy-financing-partnership-facility
Knowledge Work	High
Finance Work	High
Global Environment Facility	
Type	Grants Facility (World Bank trustee)

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Table A1 *continued*

Region	Developing countries and emerging economies
Funding Source	39 donor countries
Thematic Areas	• Biodiversity • International waters • Land degradation • Chemicals and waste • Climate change mitigation • Cross-cutting issues (e.g., sustainable forest management)
Aim	Catalyzing action on the environment through strategic investments and partnerships, also reducing poverty, strengthening governance, achieving greater gender equality
Functionality	• Country eligibility if GEF-served conventions ratified and conformed with, or if World Bank financing or UNDP technical assistance can be received • Supported projects have to address at least one focal area strategy in biodiversity, international waters, land degradation, chemicals and waste, and climate change mitigation, or cross-cutting issues like sustainable forest management • Financing only for agreed incremental costs on measures to achieve global environmental benefits • Financing of full-sized projects, medium-sized projects, enabling activities and programmatic approaches • Support provided to government agencies, civil society organizations, private sector companies, research institutions, among the broad diversity of potential partners, to implement projects and programs in recipient countries • Aiming to leverage $5.2 in additional financing for every $1 invested
Partnering	Financial mechanism for UN Convention on Biological Diversity, UN Framework Convention on Climate Change, Stockholm Convention on Persistent Organic Pollutants, UN Convention to Combat Desertification, Minamata Convention on Mercury Trust administration of Special Climate Change Fund, Least Developed Countries Fund, Nagoya Protocol Implementation Fund, Adaptation Fund; numerous other partners from 18 agencies, public and private sector, and civil society
Website	https://www.thegef.org/
Knowledge Work	Medium
Finance Work	High
Green Climate Fund	
Type	Grants, debt, equity, guarantee fund (World Bank interim trustee; UNFCCC)
Region	Global, focus on Least Developed Countries (LDCs), Small Island Developing States (SIDS), and African States
Funding Source	Established by 194 countries party to the UNFCCC
Thematic Areas	• Energy • Transport • Efficient buildings, cities, industries • Land use and forests • Climate resilient livelihoods • Health, food, water security • Resilient infrastructure • Resilient ecosystems

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Table A1 *continued*

Aim	Mobilizing funding at scale to invest in low-emission and climate-resilient development projects and programs in developing countries, with particular attention on most vulnerable populations in LDCs, SIDS, and African States
Functionality	• Country readiness funding of $16 million for preparatory activities to enhance country ownership and access, as well as accreditation through the fund, and project and program pipeline development by Accredited Entities • Supported projects must cater to mitigation and/or adaptation benefits by shifting to low-emission sustainable development pathways and/or increasing climate-resilient sustainable development • Fund aims for 50:50 balance between mitigation and adaptation investments • Variety of financial instruments available, including grants, concessional loans, subordinated debt, equity, and guarantees • Direct private sector engagement in transformational climate-sensitive investments through the Private Sector Facility (PSF) • Since 2010, resource mobilization of more than $10 billion pledged and more than $1 billion committed
Partnering	138 initial National Designated Authorities and 33 accredited entities, and numerous delivery partners
Website	http://www.greenclimate.fund/home
Knowledge Work	Low
Finance Work	High
World Bank Green Bond	
Type	Debt bonds (World Bank)
Region	Global
Funding Source	Fixed income investors
Thematic Areas	Mitigation projects: • Solar and wind installations; • Funding for new technologies that permit significant reductions in greenhouse gas (GHG) emissions; • Rehabilitation of power plants and transmission facilities to reduce greenhouse gas emissions; • Greater efficiency in transportation, including fuel switching and mass transport;
	• Waste management (methane emissions) and construction of energy-efficient buildings; • Carbon reduction through reforestation and avoided deforestation • Adaptation projects: • Protection against flooding (including reforestation and watershed management); • Food security improvement and implementing stress-resilient agricultural systems (which slow down deforestation); • Sustainable forest management and avoided deforestation
Aim	Raising funds from fixed income investors to support World Bank lending for climate change mitigation and adaptation projects
Functionality	• Green Bond offers high quality credit fixed income product with triple-A credit quality • Bond proceeds are credited to separate Green Cash Account and invested until used for financing of Green Bond projects

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Table A1 *continued*

	• Green Bond selection of projects that support transition to climate-resilient, low-carbon growth, with poverty reduction and local economy improvement benefits, through climate change mitigation or adaptation actions • Green Bond projects have to comply with World Bank safeguards, procurement policies, and other bank regulations • World Bank issued over $9 billion equivalent in Green Bonds through more than 125 transactions in 18 currencies from 2008 to 2016
Partnering	Co-design by Skandinaviska Enskilda Banken (SEB); Independent eligibility review by the Center for International Climate and Environmental Research at the University of Oslo (CICERO)
Website	http://treasury.worldbank.org/cmd/htm/WorldBankGreenBonds.html
Knowledge Work	Medium
Finance Work	High
IFC Catalyst Fund	
Type	Equity fund (IFC Asset Management Company)
Region	Latin America and the Caribbean, Africa, the Middle East, Eastern Europe, and Asia
Funding Source	IFC (World Bank Group)
Thematic Areas	• Renewable energy • Clean tech
Aim	Providing growth capital for companies and projects that enable low-carbon power generation, energy efficiency, and related businesses, by investing through funds and in co-investment
Functionality	Fund invests in renewable energy and clean tech of high potential companies and infrastructure projects
Partnering	Fund-of-funds structure
Website	https://www.ifcamc.org/funds/ifc-catalyst-fund/
Knowledge Work	Low
Finance Work	Medium
Climate Bonds Initiative	
Type	Policy Initiative (not-for-profit organization)
Region	Global
Funding Source	Switzerland, Bloomberg Philanthropies, The Rockefeller Foundation, National Australia Bank, Bank of America, HSBC, United Kingdom, Frederick Mulder Foundation, European Climate Foundation, The Sainsbury Family Charitable Trusts, Martin International, KR Foundation
Thematic Areas	Green and climate investments
Aim	Promoting investment in projects and assets necessary for a rapid transition to a low-carbon and climate resilient economy by developing large and liquid green and climate bonds market that will help drive down the cost of capital for climate projects in developed and emerging markets; to grow aggregation mechanisms for fragmented sectors; and to support governments seeking to tap debt capital markets

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Table A1 *continued*

Functionality	• Offering market tracking (climate bond development reports) and demonstration projects • Developing climate bonds standard and certification • Providing policy models and advice (e.g., for country governments to develop green bond markets)
Partnering	Various public and private sector entities
Website	https://www.climatebonds.net/about
Knowledge Work	High
Finance Work	Low
Global Green Growth Institute	
Type	Grants (GGGI)
Region	Global (Brazil, Ethiopia, Indonesia, Cambodia, the People's Republic of China, India, Jordan, Kazakhstan, Mongolia, Peru, the Philippines, Rwanda, Thailand, United Arab Emirates, Viet Nam, Mekong Delta, Colombia, Morocco, South Africa, South Pacific, and others)
Funding Source	Various countries, including Australia, Denmark, Germany, Indonesia, the Republic of Korea, Mexico, Norway, Switzerland, United Arab Emirates, and United Kingdom
Thematic Areas	• Energy • Water • Land use • Green city development
Aim	Accelerating the transition toward a new model of economic growth—green growth—founded on principles of social inclusivity and environmental sustainability through public and private sector cooperation in developing and emerging countries
Functionality	• Institutional capacity building, development of green growth policies, strengthening of peer learning and knowledge sharing, and engagement of private investors and public donors through two work streams: • Country Green Growth Planning and Implementation: GGGI experts embedded with partner governments to explore green growth opportunities in line with the country's development goals and drafting of corresponding plans (in about 26 countries) • Investment and Policy Knowledge Solutions: Producing cutting-edge, policy-relevant knowledge products and services to contribute to the broader global dialogue on green growth, and providing technical know-how for country programs, e.g., in designing (fiscally) sustainable incentive frameworks, creating fiscal tools aligned with green growth objectives, ensuring tax neutrality toward different financing forms and structures, initiating programs, networking with finance community, engaging at country level, matching supply and demand
Partnering	Various, mostly international and multilateral organizations, government agencies, and research institutes
Website	http://gggi.org/
Knowledge Work	Medium
Finance Work	Low

ADB = Asian Development Bank, GEF = Global Environment Facility, GGGI = Global Green Growth Institute, IFC = International Finance Corporation, UN= United Nations, UNDP = United Nations Development Programme, UNFCCC = United Nations Framework Convention on Climate Change.

Source: Authors, compiled from the websites indicated for each initiative above.

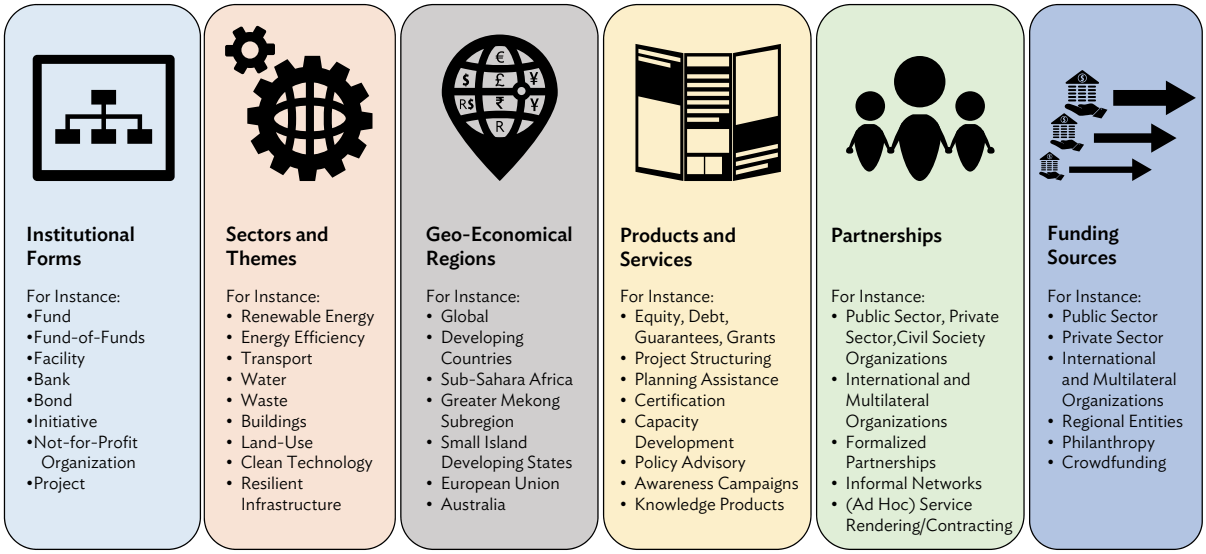
Appendix 2: Comparative Analysis of Green Finance Initiatives

When comparing existing initiatives, a diverse picture of comparatively new initiatives appears, which shows that green finance has not yet been catalyzed in particular ways that have proven to be the most effective solutions.[1] The diversity also underscores that the enhancement of green growth and related projects requires different forms of support.[2] For instance, just channeling grant money to a green project does not make it attractive to other investors, nor does it ensure a design and/or structure that enables revenue streams in the short- and long-term (Box 30).

Broadly, green finance initiatives can be analyzed along six categories as noted in Figure A1. Along these six categories, an analysis of green finance initiatives is provided in the following subchapters. Keeping in mind the conceptual diversity within the field of green finance, it is worthwhile to look at the different aims or missions of green finance initiatives (Appendix 1: Overview of Green Finance Initiatives); however, this is not very useful for comparison, as most initiatives apply their own definitions and there is no predefined understanding of how to keep, for instance, green growth initiatives and climate initiatives strictly separated—although Part A of this publication offers a conceptualizing perspective on green growth, green finance, and climate finance.[3]

Most importantly, the analyzed initiatives differ with regard to their functionality; i.e., how their products and services work with regard to eligibility criteria, regulatory limitations, or defined minimum or maximum rates of return, cofinancing, emission reductions, and other aspects.

Figure A1: Categorizing Green Finance Initiatives



Source: Authors.

1 OECD. 2016. Green Investment Banks: Scaling Up Private Investment in Low-Carbon, Climate-Resilient Infrastructure. Paris. pp. 25–27, 33–34.

2 C. Polycarp et al. 2013. Raising the Stakes: A Survey of Public and Public–Private Fund Models and Initiatives to Mobilize Private Investment. World Resources Institute Climate Finance Series: Working Paper, November 2013. Washington, D.C. (WRI).

3 Also see: A. Maheshwari et al. 2016. Measuring Progress on Green Finance–Findings from a Survey. Draft. UNEP Inquiry. http://unepinquiry.org/wp-content/uploads/2016/09/5_Outline_Framework_for_Measuring_Progress_on_Green_Finance.pdf

Box 30: The Green Municipal Fund of the Federation of Canadian Municipalities

Endowed with $414 million from the Government of Canada, the Green Municipal Fund of the Federation of Canadian Municipalities supports both public and private sector-led initiatives for innovative municipal infrastructure solutions with clear environmental benefits, public value, and model business cases and technologies.

The fund provides support for plans, feasibility studies, and pilot projects, as well as capital projects in the areas of planning, brownfield, energy, transport, waste, and water. The support is a package of grant money and low-interest loans, where grants are capped at a maximum of 50% of the costs for plans, feasibility studies and pilot projects (maximum of $132,000 for plans and feasibility studies, $263,000 for pilot projects), and low-interest loans are capped at a maximum of 80% of the costs for capital projects (maximum $3.8 million, grant amount at 15% of loan, maximum of $564,000). The loan amount can be increased for particularly innovative projects to $7.5 million together with a grant for 15% of the loan amount (maximum of $1.1 million).

While the financial support package is attractive for pursuing green projects, its embeddedness in a broader assistance structure makes the Green Municipal Fund an effective mechanism. Interested actors can access the peer network of the fund and be connected with other municipalities, inform their project designs with latest good practices, as well as use tools for capacity building and practical training in green infrastructure. Clear forms, templates, and sample letters provide guidance through the application process where applicants use a project scorecard to check if their proposal aligns with the fund's eligibility criteria. They receive feedback from an independent reviewer, upon which they can revise their applications before submission.

Since its inception in 2000, the Green Municipal Fund has approved 1,045 projects for plans, feasibility studies, and pilots with a grant amount of about $60.2 million and a total project value of about $181 million (ratio of 1:3). The total amount of the 298 approved capital projects reached about $64 million in grants and $461 million in loans for a total project value of about $2.6 billion (ratio 1:5). In 2016, the Government of Canada has provided an additional $94 million to the original endowment to strengthen the focus on low-carbon, resilient municipalities and improved asset management.

Note: Canadian dollars from original source have been converted to US dollars.

Sources:

Federation of Canadian Municipalities. 2016. Raising the Bar. Annual Report 2015-2016: Green Municipal Fund. Ottawa.

Federation of Canadian Municipalities. 2016. Green Municipal Fund—About GMF. http://www.fcm.ca/home/programs/green-municipal-fund/about-gmf.htm

Institutional Forms

Green finance initiatives are most commonly found in four institutional forms:

(i) They are managed as facilities or projects within larger organizations;
(ii) They are divested/spun-off as funds, bonds, or fund-of-funds (managed in special purpose vehicles);
(iii) They are divested as more institutionally structured entities, such as banks; or
(iv) They are separately-run initiatives or organizations.

It may be argued that the fourth form often comes with no financial resources for distribution, or small-scale grants at the most. Nevertheless, such initiatives also form a valuable part of the green finance arena, as they provide knowledge, technical assistance, or certification services for green projects and their partners.

The institutional form of green finance initiatives often defines its scope, capacities, activity area, and overarching goal. Some forms, such as banks, may provide for division into teams that specialize on different sectors and themes, geo-economical regions, or products and services, as well as other support activities (e.g., partner management). Other institutional forms, such as projects within larger organizations, are embedded in an established organizational structure with corresponding staffing, procedures, and capacities. Such initiatives may be more limited in their scope and rather understood as one mechanism or instrument among many deployed by an organization to implement its larger agenda.

Most importantly, the choice of a particular institutional form is automatically related to a legal and regulatory framework that defines what such a green finance initiative in its concrete institutional form is allowed to do or not; for instance, which products and services it can use, or which functions it can perform within the wider (financial) market.[4]

The selection of examples in Appendix 1: Overview of Green Finance Initiatives represents a certain arbitrary delineation of what kinds of initiatives to include or exclude. This is characteristic for the still evolving field of green finance. For instance, there are a multitude of instruments and mechanisms (e.g., the Clean Development Mechanism, the REDD+ scheme, or green bonds) that form part of green finance. Furthermore, the projects presented in Appendix 4: Overview of Green Finance Projects illustrate the different approaches and modalities to link green projects to green finance.

Sectors and Themes

Different sectoral and cross-sectoral thematic areas are supported by various green finance initiatives.[5] Disregarding the different subcategorizations (e.g., clean energy versus renewable energy versus energy efficiency), it is found that initiatives tend to be either focused on a particular sector or try to cover a whole range of sectors as long as an overarching theme is catered for.

The first case is most often found with regard to the energy sector. Arguably being the most established green finance and green growth sector, initiatives tend to focus on energy, as selection criteria are well-developed, standards and certifications are already defined in many subsectors, and energy's role in environmental and climate change terms is broadly acknowledged in the political sphere.[6]

The second case refers to initiatives that put a particular agenda on top of a sectoral focus. For instance, decreased pollution of land, air, and water would include various sectors, such as energy, transport, sanitation, as well as industries and buildings. Another example is an agenda of advancing "clean tech;" i.e., environment-friendly, resource-efficient technologies which can be applied in more than one sector such as wastewater management, manufacturing, or energy supply.

The mixture of political agenda-setting and agreement (i.e., codified in international conventions) and defined standards and selection criteria (i.e., codified in the International Standards Organization or the Climate Bond Initiative) result in some sectors, especially energy, being at the forefront of green finance. Other sectors, such as water supply, and, even more so, cross-cutting themes, such as resilient infrastructure, are currently

[4] OECD. 2016. Green Investment Banks: Scaling Up Private Investment in Low-Carbon, Climate-Resilient Infrastructure. Paris. pp. 60–65.

[5] OECD. 2016. Green Investment Banks: Scaling Up Private Investment in Low-Carbon, Climate-Resilient Infrastructure. Paris. p. 49.

[6] AfDB, ADB, EBRD, EIB, IDBG, WBG. 2015. Joint Report on Multi-lateral Development Banks' Climate Finance. Manila. p. 24.
Climate Policy Initiative. 2015. Global Landscape of Climate Finance 2015. San Francisco.
New Climate Economy. 2016. The Sustainable Infrastructure Imperative: Financing for Better Growth and Development. The 2016 New Climate Economy Report. Washington D.C./London (World Resources Institute/Overseas Development Institute). pp. 23–26, 66–84.

less covered by green finance initiatives, as the eligibility and monitoring mechanics are still debated and the monetization of benefits into revenue streams remains underdeveloped.[7]

Geo-Economical Regions

Each green finance initiative has well-defined reasons for focusing on particular countries of certain geographic regions, economic associations, or development stages.[8] Most often, initiatives either support projects in industrialized countries or in developing countries. This makes sense with regard to selection processes, where an equal playing field would otherwise be hard to establish. This is already a problem when initiatives have a global reach—beyond one particular region—as the various settings, legal frameworks, economic and environmental challenges and related development pathways can vary widely, making comparisons, and therefore eligibility and selection of projects difficult.[9]

The decision of initiatives to select particular regions also takes into account their institutional form. Funds, for instance, may be relatively flexible or very restricted in their spread of investments into geographically dispersed projects. Facilities may be set up for particular regions, following the identification of certain backlogs or challenges characteristic for such region.

In the narrowest form, green finance initiatives are set up in or for a particular country or province or state, which is most often linked to a corresponding national or subnational government providing key funding for the initiative, as a tool to further a defined policy toward, for instance, switching to renewable energy supply or increasing water security within its administrative boundaries. The advantage of such a narrow regional focus is that the status quo can be specifically defined and the legal and regulatory setting is very clear for the development or adjustment of green financing products and services. Besides, there are administrative advantages with regard to physical presence of the initiative in the region of activity, language (no need for translation), system-aligned application procedures and forms, etc.

It can be debated whether advantages outweigh disadvantages in the case of regionally limited initiatives, as they target a smaller geographic area with available financing resources versus spreading limited funds over many regions. A geographic focus also needs to be seen in relation to what additional financing is allowed to be leveraged for green projects; i.e., if an initiative and the corresponding legal setting invite foreign investors, or if they limit cofinanciers by sticking to one region that is not yet opened up or conducive to external finance through foreign investment.[10]

While the least developed countries may depend much more on accessing the support and funding of globally active green finance initiatives, countries with emerging economies, and particularly industrialized countries, often have a sufficient size and development of their financial markets to effectively form their own green finance system and market.[11]

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7 UNEP. 2014. *Demystifying Private Climate Finance*. Geneva.

8 C. Polycarp et al. 2013. Raising the Stakes: A Survey of Public and Public–Private Fund Models and Initiatives to Mobilize Private Investment. World Resources Institute Climate Finance Series: Working Paper, November 2013. Washington, D.C. (WRI). pp. 14–15.

9 Some initiatives address these by splitting their funds for different regions. Others may argue that they only judge projects by their fulfillment of eligibility criteria; however, in such cases there is eventually an indirect competitive comparison between project applications as funds are limited.

10 C. Polycarp et al. 2013. Raising the Stakes: A Survey of Public and Public–Private Fund Models and Initiatives to Mobilize Private Investment. World Resources Institute Climate Finance Series: Working Paper, November 2013. Washington, D.C. (WRI).

11 UNEP. 2016. Green Finance for Developing Countries. Needs, Concerns and Innovations. Geneva.

Products and Services

While the broader types of products and services by green finance initiatives can be defined, their actual design and practical execution will show a nearly endless variety. In general, one can differentiate between products related to finance and those concerning knowledge. Services, likewise, can also relate to assisting in the deployment of financial products or in the capacitation of actors in green projects through knowledge.

Financial products are broadly structured in equity (shares), debt (lending), and guarantees (de-risking), as well as grants ("free" money) (Figure 16).[12] Financial services relate, for example, to the structuring of a green project or the certification of financial products.

Knowledge products include reports, background papers, and other forms of research and policy advocacy. Knowledge services most prominently refer to capacity development, but also planning assistance, awareness campaigns, and various forms of knowledge sharing and networking.

Seen from a project process perspective, products and services very often focus on the preparatory and implementation stages, while they are less often offered in the prefeasibility phase or operation and maintenance phase.[13]

Many green finance initiatives offer products and services for both finance and knowledge. Very rarely does an initiative exclusively specialize in a single form of product and service. For instance, even standard-setting and certification initiatives will produce knowledge products, advocate their services in the policy arena, and advise project partners on other aspects. On the other hand, green finance funds prefer not to rely exclusively on loans as their only instrument. Furthermore, they will also do their market research and report on it.

What can be differentiated is the intensity with which initiatives specialize in either finance or knowledge work. Usually, a not-for-profit organization will have hardly any resources at hand to provide significant green finance, while it may provide highly-needed capacity development training for projects that other initiatives (intend to) finance. Looking at funds, one can often identify a small team of experts tasked with identifying, structuring, and closing green projects in particular sectors. Often, these teams will not have the capacity to widely advise project partners on nonfinance-related project aspects, and they will often refrain from establishing themselves as leaders in knowledge production and sharing.

Initiatives usually do not offer all kinds of financial and knowledge products and services in one place. One reason for this is the lack of multiple specializations and the lack of sufficiently large teams. Another reason is the accessibility of their products and services for potential projects and their partners. Already now, some funds and facilities have developed such a broad portfolio of products and services that these initiatives become hard to manage and monitor. Analyses and risk assessments have to be adjusted and performed for a variety of products. Large teams for different services have to be managed and guided by an overarching policy, in light of limited institutional resources. And clients have to be directed toward the right products and services.[14] Once a certain complexity in such products and services emerges, it can be more efficient

[12] C. Polycarp et al. 2013. Raising the Stakes: A Survey of Public and Public–Private Fund Models and Initiatives to Mobilize Private Investment. World Resources Institute Climate Finance Series: Working Paper, November 2013. Washington, D.C. (WRI). pp. 16–25.

OECD. 2016. Green Investment Banks: Scaling Up Private Investment in Low-Carbon, Climate-Resilient Infrastructure. Paris. pp. 60–65.

[13] I. Cochran et al. 2014. Public Financial Institutions and the Low-Carbon Transition: Five Case Studies on Low-Carbon Infrastructure and Project Investment. OECD Environment Working Paper: No. 72. Paris (OECD). p. 45.

[14] C. Polycarp et al. 2013. Raising the Stakes: A Survey of Public and Public–Private Fund Models and Initiatives to Mobilize Private Investment. World Resources Institute Climate Finance Series: Working Paper, November 2013. Washington, D.C. (WRI). p. 31.

and effective to divest an initiative and to organize products and services or finance and knowledge work in separate (although still related) entities.

Partnering

Directly related to products and services, existing green finance initiatives avail of external service providers to add to their own package of products and services. In line with this, initiatives build strategic partnerships with public and private sector entities, civil society organizations, international and multilateral organizations, as well as research institutes to strengthen their products and services without overburdening their own structure and resources.[15] This also increases such initiatives' adaptability to changing demand. Furthermore, it promotes or—if required by regulations (e.g., safeguards, procurement, anticorruption, good governance)—conforms to the separation of different tasks and inputs within the planning, design, structuring, construction, management, and monitoring of projects. With trust being of key importance in leveraging more investments in green finance, a particular role is played by third-party reviewers that monitor, certify, audit, etc. green finance initiatives and their products and services.

One can find formalized forms of partnerships, but also ad-hoc service/consulting-based cooperation, as well as informal partnerships in the form of networks, community of practices, and stakeholder groups. Many green finance initiatives are very transparent in showing other institutions what they are doing. In many cases, key partners of initiatives are at the same time also key funders of these initiatives (see next section). While the role of national governments and agencies—as well as their subnational counterparts—can still evolve much further, leading private sector financial institutions and international and multilateral organizations are already widely present as key partners in green finance. To a certain degree, this points toward limited resources and capacities on the side of project owners, particularly public institutions in the case of infrastructure projects and green finance.[16]

Many private sector entities and international and multilateral organizations are still positioning/repositioning themselves within the green finance arena. Therefore, one deals with a dynamic playing field where actors come to the fore or reprioritize their activities. This does not pose a problem to green finance initiatives, but it requires their flexibility in adjusting partnerships and having constant awareness of a changing stakeholder map. In addition to that, the high specialization in certain products and services necessitates that green finance initiatives perform a thorough analysis of their own strengths in light of possible dependencies on external partners' products and services.

Funding Sources

There is no apparent limitation to funding sources for green finance.[17] It can be expected that additional forms and types of investors and investment products will be won for green finance initiatives in the near future.

There are three basic types of funding sources with a direct link to institutional forms. Publicly-owned green finance initiatives most often receive their funding to a large extent from their founding entity, for instance a national government or a dedicated budget based on a particular act (law).[18] Privately owned green finance

[15] C. Polycarp et al. 2013. Raising the Stakes: A Survey of Public and Public–Private Fund Models and Initiatives to Mobilize Private Investment. World Resources Institute Climate Finance Series: Working Paper, November 2013. Washington, D.C. (WRI). pp. 25–28.

[16] New Climate Economy. 2016. The Sustainable Infrastructure Imperative: Financing for Better Growth and Development. The 2016 New Climate Economy Report. Washington D.C./London (World Resources Institute/Overseas Development Institute). p. 26.

[17] Climate Policy Initiative. 2015. Global Landscape of Climate Finance 2015. San Francisco.
ADB. 2015. Making Money Work: Financing a Sustainable Future in Asia and the Pacific. Manila. p. 33.

[18] OECD. 2016. Green Investment Banks: Scaling Up Private Investment in Low-Carbon, Climate-Resilient Infrastructure. Paris. pp. 99–100.

initiatives in many cases finance themselves through the market. And green finance initiatives by international and multilateral organizations often obtain key funding from governments, either directly or through existing schemes, replenishing budgets, or ownership shares that these countries have in an organization.

Most initiatives aim for a diversification of funding sources in order to scale-up their financing capacity, prove their market attractiveness, access different products and services, as well as related finance instruments, and minimize their dependence on particular funders.

Although needs for green finance investments are often estimated at a ratio of 1:4 to 1:6 between public and private finance, the current situation looks different.[19] Development finance through United Nations programs and multilateral development banks plays a significant role with regard to dedicated public and public–private climate funds and initiatives.[20] In turn, their money is also to a large extent public sector money, with less than 20 developed countries providing the majority of original public-sector funds, including the United States, Germany, Japan, and the United Kingdom.[21] It is national governments, their development banks, or their other fully owned entities (such as public pension funds etc.) that have so far been the key players in green finance initiatives. Such institutional investors combine two elements that are conducive for green project investors: They have a long-term investment perspective and they can access large funds to scale corresponding initiatives and crowd in other finance.[22]

On the other hand, a relevant role is also played by riskier equity funds that deploy venture capital (and other financing instruments) to support early stage development of innovative green technologies before they become market-ready. Nevertheless, even these funding sources (including small-scale instruments such as crowdfunding) are not yet sufficiently meeting the demand for "innovation financing." New financing forms should be scrutinized to accelerate progress in the initial phase of green technologies.[23] This becomes clear when the investment criteria of many green finance initiatives are studied, since they often exclusively fund green projects that deploy technologies that have sufficiently proven their market readiness, while other projects with newly emerging solutions remain unbankable.

Based on this overview of the six categories, the following appendix will draw conclusions that can inform more effective mechanism for green finance, as well as provide lessons for other forms of green initiatives.

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19 Green Growth Action Alliance. 2013. The Green Investment Report: The Ways and Means to Unlock Private Finance for Green Growth. Geneva (World Economic Forum). p. 21.

Green Finance Task Force. 2015. Establishing China's Green Financial System. Report of the Green Finance Task Force. Beijing (The People's Bank of China & UNEP Inquiry). p. 5.

20 ADB. 2015. Making Money Work: Financing a Sustainable Future in Asia and the Pacific. Manila. p. 37.
New Climate Economy. 2016. The Sustainable Infrastructure Imperative: Financing for Better Growth and Development. The 2016 New Climate Economy Report. Washington D.C./London (World Resources Institute/Overseas Development Institute). pp. 62–64.

21 C. Polycarp et al. 2013. Raising the Stakes: A Survey of Public and Public–Private Fund Models and Initiatives to Mobilize Private Investment. World Resources Institute Climate Finance Series: Working Paper, November 2013. Washington, D.C. (WRI). p. 16.

22 G. Inderst. 2016. Infrastructure Investment, Private Finance, and Institutional Investors: Asia from a Global Perspective. Asian Development Bank Institute Working Paper Series: No. 555. Tokyo (ADBI).

23 New Climate Economy. 2016. The Sustainable Infrastructure Imperative: Financing for Better Growth and Development. The 2016 New Climate Economy Report. Washington D.C./London (World Resources Institute/Overseas Development Institute).

Appendix 3: Gap Analysis and Recommendations on Green Finance Initiatives

It can be argued that every additional green finance initiative is another welcome contribution to the still small world of finance for green development. One could, however, also argue that there is a multiplying number of green finance initiatives that try to attract and leverage other finance, thus, competing against each other, while not successfully linking finance and projects together.[24] Referring to Part B of this publication and the green bankability conundrum, the finding holds: There are various financing sources, different initiatives, and an abundance of finance-seeking green projects, but they do not often seem to find each other and the bankability gap remains to a large extent.[25] However, along the six categories discussed in the previous section, specific gaps can be identified and recommendations can be suggested.

Gaps and Recommendations Regarding Institutional Forms

In general, there is no particular institutional form that is missing from the green finance landscape. However, focusing on the context of developing countries, adding further funds for green finance does not resolve the fundamental issue of linking projects to finance. The institutional structure of facilities may prove more promising in arriving at a tailor-made vehicle for specific regions or countries, while providing what ADB calls "finance ++"—in the case of a green finance initiative that means green finance, plus leveraging resources from other partners, plus providing knowledge (through sharing and capacity development) for clients to understand, access, and successfully deploy or use green finance.[26]

As discussed, no initiative can combine all products and services. Therefore, the choice of institutional form has to reflect how one type of form can allow for partnerships with other types of forms to provide a complimentary package of products and services. This means that gaps of an institutional nature are identified and addressed through external partnering instead of overburdening an initiative and its institutional forms with too many tasks and responsibilities.

Gaps and Recommendations Regarding Sectors and Themes

More standardization is needed to support green projects beyond the energy sector.[27] Most likely, cross-cutting themes of climate change resilience or environmental, economic, and social cobenefits will be quantified further, but will not be completely captured with simple indicators. Although not perfect, a more thorough framework of qualitative or quantitative proxy indicators will be needed to allow for the financial accounting of projects' green benefits in order for projects to effectively access other financing sources.[28]

It can be beneficial to have green finance initiatives first pilot their activities in more established sectors and to then take on other sectors where they can apply their initial experience of not-sector-specific finance and knowledge products and services. However, including a broad set of sectors in one initiative is likely to work better in geographically limited contexts, where an initiative can handle the sectoral complexity in a single legal

[24] C. Polycarp et al. 2013. Raising the Stakes: A Survey of Public and Public–Private Fund Models and Initiatives to Mobilize Private Investment. World Resources Institute Climate Finance Series: Working Paper, November 2013. Washington, D.C. (WRI). p. 4.

[25] ADB. 2015. Making Money Work: Financing a Sustainable Future in Asia and the Pacific. Manila.

[26] ADB. 2008. Strategy 2020: The Long-Term Strategic Framework of the Asian Development Bank, 2008–2020. Manila; ADB. 2013. Knowledge Management Directions and Action Plan (2013–2015): Supporting "Finance ++" at the Asian Development Bank. Manila.

[27] C. Polycarp et al. 2013. Raising the Stakes: A Survey of Public and Public–Private Fund Models and Initiatives to Mobilize Private Investment. World Resources Institute Climate Finance Series: Working Paper, November 2013. Washington, D.C. (WRI).

[28] New Climate Economy. 2016. The Sustainable Infrastructure Imperative: Financing for Better Growth and Development. The 2016 New Climate Economy Report. Washington D.C./London (World Resources Institute/Overseas Development Institute).
UNEP and Global Infrastructure Basel. 2016. Sustainable Infrastructure and Finance: How to Contribute to a Sustainable Future. UNEP Inquiry: Design of a Sustainable Financial System. Inquiry Working Paper: 16/09, June 2016. Geneva (UNEP).

and regulatory setting. Aiming for multisector support and broad geographical reach at the same time is likely to overburden and backlog an initiative.

Gaps and Recommendation Regarding Geo-Economical Regions

Green finance initiatives with an extensive global reach are currently linked to programs of the United Nations and the World Bank Group. Other initiatives focus on specific regions. Nonetheless, there are currently still many initiatives that have a portfolio dispersed over various countries and regions. This can be a feasible decision for sufficiently mobile, private sector initiatives, but those by international and multilateral organizations are better suited to targeting a specific geo-economical set of countries or regions. This is particularly pertinent due to the vastly different settings with which thinly-staffed teams of green finance initiatives have to deal. Aspects of comparison, knowledge exchange, and mutual learning across regions can also be ensured through other formats and mechanisms that a specific initiative does not necessarily need to incorporate.[29] That is the advantage of housing an initiative in a larger, already established organization, as the latter often has dedicated units to specialize in regions, sectors, and supporting services, such as in capacity development and knowledge sharing. For stand-alone initiatives of smaller scale or geographic reach, it makes sense to seek membership in a corresponding group of green finance initiatives.

Looking at aspects of financial leveraging, the developmental stage of a country's economy and financial market are relevant. Therefore, it can be useful to look at an initiative's potential group of client countries from an economic point of view and less from a geographic point of view. In the case of Asia, this would refer for instance to different groups of highly developed, emerging, and developing economies, as well as to the different regional associations that—to differing degrees— unite countries that share more than just geographical borders.

Gaps and Recommendations Regarding Products and Services

The green finance sphere has not yet attracted enough support, interest, or trust from either clients or potential investors.[30] On the clients' side, more knowledge-related work is needed to prove the advantages of pursing a greener development path.[31] On the project level, more capacity development and assistance is needed to structure green projects in a way that increases their bankability.[32] These are services that often require the partnering of different experts, and it can become a selling-point/competitive advantage of actors in the field, such as multilateral development banks, to have the overview and network to bring the different experts together and to link up clients with the service providers they need.[33]

On the investors' side, more supporting finance instruments are needed to lower risks that inhibit investments. There are many different finance products regarding equity, debt, grant, and risk mitigation, but the key is to mobilize these products as tools to bridge bankability gaps. This refers in particular to capital expenditures for construction and to assured revenues in the first years of a green infrastructure project. This is linked to the

[29] C. Polycarp et al. 2013. Raising the Stakes: A Survey of Public and Public–Private Fund Models and Initiatives to Mobilize Private Investment. World Resources Institute Climate Finance Series: Working Paper, November 2013. Washington, D.C. (WRI). pp. 25–28.

[30] New Climate Economy. 2016. The Sustainable Infrastructure Imperative: Financing for Better Growth and Development. The 2016 New Climate Economy Report. Washington D.C./London (World Resources Institute/Overseas Development Institute).

[31] ADB and ADBI. 2012. Policies and Practices for Low-Carbon Green Growth in Asia. Highlights. Study on Climate Change and Green Asia. Manila.

[32] OECD. 2016. Green Investment Banks: Scaling Up Private Investment in Low-Carbon, Climate-Resilient Infrastructure. Paris. McKinsey & Company. 2016. Financing Change: How to Mobilize Private-Sector Financing for Sustainable Infrastructure. Detroit.

[33] C. Polycarp et al. 2013. Raising the Stakes: A Survey of Public and Public–Private Fund Models and Initiatives to Mobilize Private Investment. World Resources Institute Climate Finance Series: Working Paper, November 2013. Washington, D.C. (WRI). p. 31.

institutional form of initiatives and of potential investors, as it concerns the legal and regulatory abilities of entities to develop, avail of, and use certain finance instruments.

Gaps and Recommendations Regarding Partnerships

Gaps in terms of partnerships are probably the least problematic among the six categories of analysis. Experts for specific aspects in green finance and green projects are available. It is—as mentioned above—rather the challenge of managing the actor network and linking up the right partners. Most crucially in the developing context, local expertise and capacities need to be effectively complemented by international ones. It is important to have a green finance initiative that is closely aligned with the regulatory setting and political system and policy agenda of a particular region or country. In relation to this, a multipartner initiative also calls for an alignment of different investment guidelines, such as in safeguards, procurement, anticorruption, and good governance regulations and procedures, as well as harmonized modes of reporting, monitoring, and evaluation.[34]

It is recommended to structure a green finance initiative with its partner network in mind and to line up cooperation agreements for essential products and services required for the effective financing of green projects at the initial stage. Also, cost considerations have to be factored in when external products and services add to the preparation expenditures of green projects. With the field still evolving and corporate social responsibility and related pro bono work playing a relevant role, it is worth providing a test bed for partner cooperation while benefiting from their expertise at reduced costs.

Gaps and Recommendations Regarding Funding Sources

Institutional investors, particularly pension funds and insurance companies, have to be crowded in more to green finance initiatives.[35] Investment entities have different strategies and objectives, as well as different risk-and-return profiles, which makes the funding sources for a particular initiative usually limited to certain investor groups. It is unlikely that all kinds of public and private investors would provide funding into a single initiative. As mentioned with regard to institutional forms, certain finance allows for certain products and services. And the combination of certain funding and a particular institutional form can make an initiative very dependent on external factors, for instance with regard to public sector-based initiatives with a replenishing fund that requires legislative approval and aligned governmental budgeting.

Due to the size of many green (infrastructure) projects, an overall funding basket of less than $100 million will significantly limit the scope and scale of a green finance initiative, also since project development and transaction costs for crowded-in private investors would be too high in relation to their potential capital contribution.[36] Furthermore, funding sources should be sized in a way that reflect the risk averseness of current (private sector) investors in the market. In light of the huge funding gaps for infrastructure and development agendas, green finance initiatives will increasingly aim for sizes of $1 billion and above. Such larger funding sources will allow for increased investments in different green projects, which can allow for a corresponding spread of investment risks across a diverse portfolio. On the other hand, oversizing an initiative runs the

[34] C. Polycarp et al. 2013. Raising the Stakes: A Survey of Public and Public–Private Fund Models and Initiatives to Mobilize Private Investment. World Resources Institute Climate Finance Series: Working Paper, November 2013. Washington, D.C. (WRI). pp. 4–5.

[35] ADB. 2015. Making Money Work: Financing a Sustainable Future in Asia and the Pacific. Manila. pp. 17–18.
McKinsey & Company. 2016. Financing Change: How to Mobilize Private-Sector Financing for Sustainable Infrastructure. Detroit. p. 14.

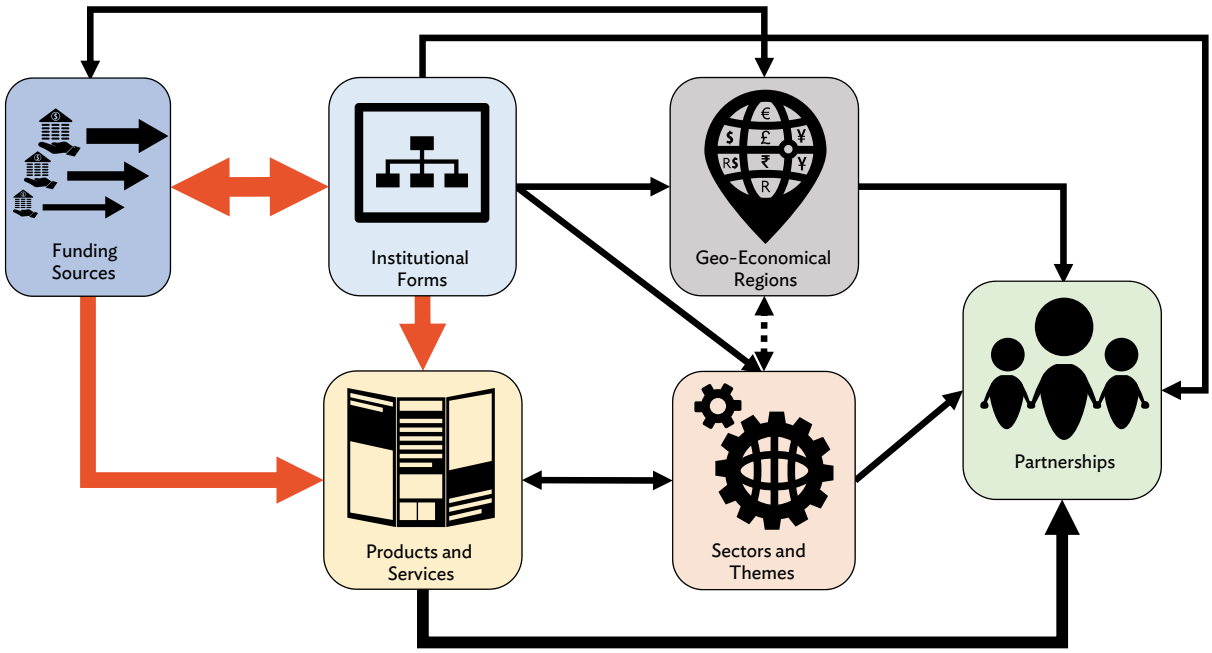
[36] C. Polycarp et al. 2013. Raising the Stakes: A Survey of Public and Public–Private Fund Models and Initiatives to Mobilize Private Investment. World Resources Institute Climate Finance Series: Working Paper, November 2013. Washington, D.C. (WRI). p. 3.
McKinsey & Company. 2016. Financing Change: How to Mobilize Private-Sector Financing for Sustainable Infrastructure. Detroit. pp. 32–33.

risk of money not being disbursed in a timely manner, due to, for instance, insufficient project pipelines and shortcomings in staffing and capacities (in the initiatives' teams and on the clients' side).[37]

Conclusions on the Institutional Design of Green Finance Initiatives

Concluding from the above analysis, Figure A2 illustrates the inter-linkage of the six categories that can inform the institutional design of green finance initiatives. The key consideration of interdependence is between the funding sources and institutional form of a green finance initiative. This also impacts on the products and services that are allowed or enabled by both funding and form.[38] The second most important consideration concerns how products and services offered by an initiative require additional inputs by partners. Other relations between the six categories are somewhat more flexible. The institutional form can impact on the geo-economical regions, as well as the sectors and themes of an initiative, and its partnerships. Likewise, geo-economic regions and sectors and themes can lead to certain partnerships (but not others). Dependent on the setting, funding sources and geo-economical regions are interrelated as well, as there are different ways of access or exclusion of either investments or regions. For instance, a country-specific initiative may not allow for all kinds of international investments; or certain investors in an initiative may only allow investments of that initiative in industrialized countries.

Figure A2: Set-Up Guidance for Green Finance Initiatives



Source: Authors.

[37] See for instance: C. Polycarp et al. 2013. Raising the Stakes: A Survey of Public and Public–Private Fund Models and Initiatives to Mobilize Private Investment. World Resources Institute Climate Finance Series: Working Paper, November 2013. Washington, D.C. (WRI). p. 29.

K. Kakakhel. 2016. Green Climate Fund Does Too Little, Hopefully Not Too late. The Third Pole: 11 April 2016. https://www.thethirdpole.net/2016/04/11/green-climate-fund-does-too-little-hopefully-not-too-late/

McKinsey & Company. 2016. Financing Change: How to Mobilize Private-Sector Financing for Sustainable Infrastructure. Detroit.

[38] C. Polycarp et al. 2013. Raising the Stakes: A Survey of Public and Public–Private Fund Models and Initiatives to Mobilize Private Investment. World Resources Institute Climate Finance Series: Working Paper, November 2013. Washington, D.C. (WRI).

Appendix 4: Overview of Green Finance Projects

Table A2 presents 34 green finance projects, which have been financed, facilitated, and implemented by a variety of actors in the field of public and private infrastructure development. The list is sorted after the key origin of green finance, starting with examples from the Global Environment Facility (GEF), followed by cases enabled through cofinancing from World Bank and the International Finance Corporation, Asian Development Bank, other regional multilateral and bilateral development agencies (such as the Inter-American Development Bank or the French Development Agency), as well as examples from industrialized countries with the Australian Clean Energy Finance Corporation, the UK Green Investment Bank, and the Green Municipal Fund of the Federation of Canadian Municipalities.

Note: All currencies have been converted to US dollars. Due to rounding and differing numbers in the sources provided, funding figures do not necessarily add up.

The websites of abovementioned institutions, as well as other infrastructure financiers can be consulted for further information for the presented, as well as different kinds of green projects.

Table A2: Overview of Green Finance Projects

Project	**Revitalizing Oasis Agro-ecosystems through a Sustainable, Integrated and Landscape Approach in the Draâ-Tafilalet Region (OASIL)**
Location	Morocco
Reference Year	2017
Thematic Area	Natural resource management
Partners	Food and Agriculture Organization of the United Nations (FAO), Ministry of Environment, Ministry of Agriculture and Maritime Fisheries (National Agency for the Development of the Oasis and Argan Zones (ADNZOA) and Agency for Agricultural Development (ADA)), and National Institute for Agricultural Research (INRA)
Objective	Revitalize oasis agroecosystems in the Drâa–Tafilalet Region to be productive, attractive, and healthy and to sustain and make more resilient the livelihoods of the local communities
Description	Policy dialogue support at national and regional level on sustainable management of oasis agroecosystems Improvement of planning and monitoring systems at regional and local levels Demonstration of restored, safeguarded, and sustainably managed oasis agroecosystems through an integrated landscape approach Project monitoring and knowledge management Activities increasing investments into pilot oasis agroecosystems by 20%, managing extended area of 60,000 ha of oasis agroecosystems sustainably in an integrated and participatory manner, mitigating CO2 emissions (1.5 million tons within 20 years), reducing land degradation in pilot landscapes by 60%, lowering level of water stress by 10% through more sustainable freshwater withdrawal
Funding	GEF Project Preparation Grant: $0.2 million GEF Project Grant: $8.6 million GEF Agency Fees: $0.8 million FAO grant: $0.5 million FAO in-kind: $0.2 million

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Table A2 *continued*

	Cofinancing: $40.4 million, of which: Government grant: $39 million Government in-kind: $0.6 million INRA grant: $0.8 million **Total: $50 million**
Website	https://www.thegef.org/project/revitalising-oasis-agro-ecosystems-through-sustainable-integrated-and-landscape-approach
Project	**Green Logistics Program**
Location	Europe (candidate countries: Albania, Armenia, Azerbaijan, Belarus, Bosnia, Egypt, Georgia, Jordan, FYR Macedonia, Moldova, Montenegro, Morocco, Serbia, Tunisia, Turkey, Ukraine)
Reference Year	2016
Thematic Areas	Industry, trade, transport
Partners	European Bank for Reconstruction and Development (EBRD), counterpart governments and logistics companies
Objective	Enhanced implementation of green logistics in the Black Sea and Mediterranean regions
Description	Component 1: Investment support and incentives through provision of structured finance Component 2: Capacity building activities for green logistics Component 3: Technical assistance supporting investments in green logistics through technically supported pipeline of investments Achieving 2.6 million direct and 6.9 million indirect metric tons of CO_2 mitigated Possible areas of intervention: green transport (modal shift, fuel switch, efficiency), warehousing (efficiency in buildings and equipment), packaging (standardization, efficiency, reuse, CO_2 labeling), responsibility (B2B partnerships and collaboration, training), technology (e-business, ITS technologies)
Funding	GEF Project Grant: $15 million GEF Agency Fees: $1.4 million Cofinancing: $155.3 million, of which: EBRD loan: $49.2 million EBRD in-kind: $2.5 million EBRD bilateral donor grants: $0.8 million EBRD private sector loans: $102.8 million **Total: $172 million**
Website	https://www.thegef.org/project/green-logistics-program-non-grant
Project	**Promoting Energy-Efficient Motors in Small and Medium Sized Enterprises (PEEMS)**
Location	Turkey
Reference Year	2015
Thematic Areas	Energy efficiency, industry
Partners	United Nations Development Programme (UNDP), Ministry of Science, Industry and Technology through the Directorate General for Productivity
Objective	Promoted significant additional investment in industrial energy efficiency (EE) in Turkey by transforming the market for energy efficient motors used in small and medium sized enterprises

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Table A2 *continued*

Description	Component 1: Strengthened legislative and regulatory and policy framework for EE motors in Turkey Component 2: Capacity building for relevant stakeholders to promote benefits of EE motors, including established Turkish electric motors manufacturers association, and technical training workshops on designing and implementing EE motor replacement programs Component 3: Upgraded Turkish Standards Institute test laboratory and strengthened monitoring, verification, and enforcement
	Component 4: One-stop shop for financial support mechanisms Component 5: Knowledge management and monitoring and evaluation, including national EE electric motor database, nationwide public awareness raising campaign for EE motors, and EE motors website
Funding	GEF Project Preparation Grant: $0.1 million GEF Project Grant: $3.8 million GEF Agency Fees: $0.4 million Cofinancing: $28.3 million, of which: UNDP in-kind: $0.2 million Government grant: $5.9 million NGOs grant/in-kind: $2.2 million Companies (motor manufacturers) investment: $20 million **Total: $33 million**
Website	https://www.thegef.org/project/promoting-energy-efficient-motors-small-and-medium-sized-enterprises-peems
Project	**Grid-Connected Rooftop Solar Program**
Location	India
Reference Year	2015
Thematic Areas	Renewable energy
Partners	World Bank, State Bank of India, Ministry of New and Renewable Energy
Objective	Increased installed capacity of grid-connected rooftop solar photovoltaic (GRPV) and strengthened capacity of relevant institutions for GRPV, and reductions in greenhouse gas emissions through displacement of thermal energy with solar energy
Description	Commercial lending for GRPV to increase capacity to 750 megawatts Mobilization of private and commercial sector investment and mainstreaming of GRPV lending Development of GRPV market and acceleration of GRPV deployment Avoidance of 14.8 million tons of greenhouse gas emissions Institutional support and technical assistance for GRPV program expansion
Funding	GEF Project Grant: $21.9 million GEF Project Management Cost: $1 million GEF Agency Fees: $2.1 million Cofinancing: $777 million, of which: State Bank of India Grant: $2 million World Bank Loan: $500 million Clean Technology Fund Loan: $125 million Private Developers and Aggregators Equity: $150 million **Total: $802 million**
Website	https://www.thegef.org/project/grid-connected-rooftop-solar-program

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Table A2 *continued*

Project	Establishment of the Upper Tana Nairobi Water Fund
Location	Kenya
Reference Year	2015
Thematic Areas	Natural resource management
Partners	International Fund for Agricultural Development, UNEP, The Nature Conservancy, Ministry of Environment and Natural Resources, National Museums of Kenya, Water Resources Management Authority, Kenya Forest Services, main downstream water private companies and utility providers (such as East Africa Breweries, Coca Cola, Unilever, Nairobi Water and Sewerage Company [NWSC], and Kenya Electricity Generating Company [KenGen])
Objective	Well-conserved Upper Tana River basin for improved water quality and quantity for downstream users (public and private), maintaining regular flows of water throughout the year; protecting remaining aquatic and terrestrial biodiversity and enhancing ecosystem services (soil/sediment retention, nutrient retention, amelioration of land degradation hot spots and water yield), improved food security, economic/green growth, and human well-being for upstream local communities
Description	Establishment of Water Fund as PPP as sustainable financing mechanism to support sustainable land management and integrated natural resource management approaches in Upper Tana catchment Support of 21,000 smallholder households (100,000 individuals) to adopt climate-smart sustainable land management practices Component 1: Institutionalized multistakeholder and multiscale Water Fund Platform as PPP as sustainable financing mechanism to support policy development, institutional reform, and upscaling of sustainable land management and integrated natural resource management approaches in Upper Tana catchment for climate-smart smallholder agriculture and food value chains in financially viable and sustainable watershed stewardships Component 2: Improved Upper Tana catchment ecosystems that support livelihoods, food security and economic development - increased land area, freshwater, and agroecosystems under sustainable land management and integrated natural resource management Component 3: Robust knowledge management and learning systems to direct water fund management and to share lessons nationally and regionally, including capacitation of institutions for monitoring and integration of climate resilience in policy making, knowledge management and sharing of lessons learned
Funding	GEF Project Preparation Grant: $0.1 million GEF Project Grant: $7.2 million GEF Agency Fees: $0.6 million Cofinancing: $61.1 million **Total: $69 million**
Website	https://www.thegef.org/project/food-iap-establishment-upper-tana-nairobi-water-fund-utnwf
Project	**Building Adaptive Capacity through the Scaling-Up of Renewable Energy Technologies in Rural Cambodia**
Location	Cambodia
Reference Year	2015
Thematic Areas	Renewable energy
Partners	International Fund for Agricultural Development, Ministry of Agriculture, Forestry and Fisheries
Objective	Achieved a large-scale adoption of Renewable Energy Technologies (RET) in the agricultural sector of Cambodia

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Table A2 *continued*

Description	Promoting uptake of climate resilient RET to support smallholder agriculture, production, and marketing (10,000 smallholder farm households with improved climate resilience, 4,000 best practice bio-digesters installed, 4,000 solar energy systems installed, 2,000 units high potential innovative RET systems piloted and assessed) Stimulating scale-up of climate resilient RET through agriculture sector policy making and resource allocation (enabling policy framework and institutional modalities facilitated, policy studies to engender an enabling environment, awareness raising and knowledge management for advancing policy dialogue and resource allocation)
Funding	GEF Project Preparation Grant: $0.2 million GEF Project Grant: $4.6 million GEF Agency Fees: $0.4 million Cofinancing: $23.5 million, of which: IFAD loan and grant: $18.5 million Government in-kind: $3.5 million Beneficiaries in-kind: $1 million **Total: $28 million**
Website	https://www.thegef.org/project/building-adaptive-capacity-through-scaling-renewable-energy-technologies-rural-cambodia-s
Project	**Multilateral Investment Fund Public–Private Partnership Program**
Location	Regional
Reference Year	2012
Thematic Areas	Renewable energy, energy efficiency, natural resource management
Partners	Inter-American Development Bank (IDB), private companies
Objective	Facilitated private investments in renewable energy, energy efficiency and in small, highly innovative companies that use natural resources sustainably, and thereby reducing greenhouse gas emissions, attract new market participants, create economic opportunities for local businesses, low income populations, including women and the indigenous, and protect the region biodiversity
Description	Low-carbon technology investment financing - $50 million invested in 6-10 carbon reduction projects or programs, private sector participation in such projects enhanced and funding catalyzed (at least 3 programs under UNFCCC registration, issuing Certified Emission Reductions, hurdle rate of 8% achieved for investors, at least 3,500,000 tons of CO_2 equivalent abated) Clean energy community investment financing—$100 million invested in 10–15 renewable energy projects with impact in local (indigenous) communities and promoted use of alternative energy and reduction of greenhouse gas emissions (investments negotiated and funded with target of 100 megawatt new renewable energy capacity operation, at least 150,000 tons of carbon emissions reduced or avoided, 400 jobs supported and 50–70 million of annual revenues generated by portfolio companies) Sustainable business models for investment in biodiversity—$30 million invested in 10–15 small and medium enterprises in sustainable markets in region (investments negotiated and funded, 40–60 million annual revenues generated by portfolio companies, 800–1000 jobs created, 9–12 companied formalized, hurdle rate of 6% per annum achieved for investors)
Funding	GEF Project Grant: $15 million GEF Agency Fees: $1.2 million Cofinancing: $266.3 million, of which: Multilateral investment fund IDB: $12.3 million Other lenders and private sector: $254 million **Total: $282 million**
Website	https://www.thegef.org/project/idb-ppp-mif-public-private-partnership-program

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Table A2 *continued*

Project	Electric Cooperative System Loss Reduction Project
Location	Philippines
Reference Year	2003
Thematic Areas	Energy efficiency
Partners	World Bank, National Electrification Administration, rural electric cooperatives
Objective	Achieved significant and sustained energy efficiency improvements in rural electric cooperatives (EC) in order to provide current and prospective viable EC customers with reliable and least-cost power supply over the long-term
Description	Develop and test financial and contractual mechanisms to support private sector investment, management and operation, and risk sharing to support system loss reduction measures in selected ECs: pilot the use of investment management contracts (IMCs) to attract private investors to manage and operate selected ECs under long-term, performance-based contracts, and to mobilize private finance without recourse to the government Support commercial lending to other qualified ECs for efficiency improvements: access to affordable term loans for ECs that are yet unable to attract private investors Component 1: Establishment of a GEF-funded partial loan guarantee facility for (i) pilot IMC contracts, and (ii) commercial loans Component 2: Technical assistance to develop both financing mechanisms Achievement of energy savings of at least 80 Gigawatt hours annually, CO_2 emissions avoided of at least 40,000 tons annually, reduction in system loss Partial credit guarantee program: at least $25 million of loan guarantee issued, $40 million of investments in ECs, 4 commercial banks and other financial institutions providing loans, not more than $3 million of cumulative guarantee claim payments, with at least 6 IMC transactions, 15 loan guarantees issued for ECs
Funding	GEF Project Preparation Grant: $0.4 million GEF Project Grant: $12 million (credit risk guarantees) GEF Agency Fees: $1.2 million Cofinancing: $50.6 million, of which: Local commercial bank loans: $37.5 million Private investors: $6.3 million Local communities (electric cooperative equity): $6.3 million Government grant: $0.5 million **Total: $64 million**
Website	https://www.thegef.org/project/electric-cooperative-system-loss-reduction-project
Project	Barrier Removal for Efficient Lighting Products and Systems
Location	People's Republic of China
Reference Year	2001
Thematic Areas	Energy efficiency
Partners	United Nations Development Programme (UNDP), Government, State Economic and Trade Commission/Department of Resources Conservation and Comprehensive Utilization (DRC)
Objective	Addressed identified market barriers to wide spread use of energy efficient lighting by broadening the China Green Lights startup efforts, and energy savings and protected environment by reducing lighting energy use in China in 2010 by 10%, and upgrading of Chinese lighting products; increased consumer awareness of, and comfort with, efficient lighting products and the establishment of a vibrant, self-sustaining market in efficient lighting products and services

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Table A2 *continued*

Description	Quality upgrade of Chinese lighting products to achieve energy savings of 103,277 million kilowatt hours and 135,700,000 tons CO_2 equivalent 2001–2010 Increase of consumer awareness of, and comfort with, efficient lighting products Increase affordability of quality, efficient lighting products for consumers Increase sales of efficient lighting products and services Establish a vibrant, self-sustaining market in efficient lighting products and services and associated supporting policies and services, in order to sustain and expand upon the gains achieved during the project period
	Usage of standards, certification, labeling, consumer education, financing programs, and technology support
Funding	GEF Project Grant: $8.1 million GEF Agency Fees: $0.5 million Cofinancing: $18.2 million, of which: Other international donors: $0.6 million Government grant: $10.6 million Private sector investment: $7 million **Total: $27 million**
Website	https://www.thegef.org/project/barrier-removal-efficient-lighting-products-and-systems
Project	**Biomass-Based Power Generation and Co-Generation in the Malaysian Palm Oil Industry, Tranche I**
Location	Malaysia
Reference Year	2001
Thematic Areas	Renewable energy, natural resource management
Partners	United Nations Development Programme (UNDP), Ministry of Energy, Communications, Multimedia
Objective	Reduction of the growth rate of greenhouse gas emissions from fossil fuel fired combustion processes and unutilized biomass waste through acceleration of growth of biomass-based power generation and combined heat and power (CHP)
Description	Enhancement of information services and awareness on biomass energy technology Policy studies and institutional capacity building in the area of biomass energy technology Financial assistance for biomass energy projects Demonstration schemes for biomass-based power generation and CHP Development of biomass energy technology
Funding	GEF Project Preparation Grant: $0.03 million GEF Project Grant: $4 million GEF Agency Fees: $0.3 million Cofinancing: $10.8 million, of which: Government grant: $3.9 million Private investment: $6.9 million **Total: $15 million**
Website	https://www.thegef.org/project/biomass-based-power-generation-and-co-generation-malaysian-palm-oil-industry-tranche-i

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Table A2 *continued*

Project	M2RE Energy Efficiency Construction Syndicated Loan
Location	Georgia
Reference Year	2015
Thematic Areas	Energy efficiency, housing
Partners	Green for Growth Fund Southeast Europe (GGF), International Finance Cooperation (World Bank Group), M2 Real Estate M2RE (JSC Bank of Georgia)
Objective	Construction of 1,900 new high quality, energy-efficient (EE) apartments in Tbilisi, resulting in annual primary energy savings of 8,800 Megawatt hours and CO_2 emission reductions of 1,600 tons
Description	Enabling M2RE to build close to 1,900 high-quality, mid-segment apartments with good EE standards through modern insulation across three different projects to address rising demand for EE living space in Tbilisi Achieving energy savings of 40% over similar-sized new buildings in Georgian market Demonstrating demand for high quality, green buildings
Funding	GGF syndicated loan: $11.5 million ICF syndicated loan: $11.5 million **Total: $23 million**
Website	http://www.ggf.lu/press/detail/ggf-provides-real-estate-developer-m2re-in-georgia-with-usd-115-million-loan-for-the-construction-o/
Project	**Partial Risk Sharing Facility for Energy Efficiency**
Location	India
Reference Year	2012
Thematic Areas	Energy efficiency
Partners	International Finance Corporation (IFC, World Bank Group), Small Industries Development Bank of India, Energy Efficiency Services Limited
Objective	Catalyzing market for implementing energy efficiency through risk sharing mechanisms (Partial Risk Sharing Facility— PRSF) for energy service companies (ESCOs) and achievement of India's energy saving target
Description	Mobilizing commercial financing using risk sharing mechanisms through GEF and CTF support to mitigate some of the risks for commercial financial institutions lending to ESCOs and other eligible categories of costumers (PRSF of $37 million) Catalyzing ESCO-implemented energy efficiency projects (likely 10 municipal street lighting projects and industrial and other building retrofits, and other energy efficiency projects) Providing complementary technical assistance and capacity building to stakeholders in India's energy efficiency market
Funding	IFC Clean Technology Fund guarantee: $25 million IFC Global Environment Facility loan: $18 million IFC Global Environment Facility technical assistance grant: $6 million Cofinancing: $135 million, of which Partial Risk Sharing Facility–covered debt: $51 million Uncovered debt: $44 million Private equity: $40 million **Total: $184 million**
Website	https://www-cif.climateinvestmentfunds.org/projects/partial-risk-sharing-facility-energy-efficiency

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Table A2 *continued*

Project	Ukraine - UA - Energy Efficiency Project
Location	Ukraine
Reference Year	2011
Thematic Areas	Energy efficiency, industry
Partners	World Bank, Ukreximbank
Objective	Contribution to improved energy efficiency by industrial and commercial companies, municipalities, municipal sector enterprises and Energy Service Companies by facilitating sustainable financial intermediation for the financing of energy efficiency investments
Description	Modernization of inefficient and obsolete equipment/facilities Installation of highly energy-efficient industrial equipment and processes for new production capacities whose current energy use considerably exceeds current best practices Utilization of waste gas and heat and excess pressure from industrial processes Improvement of systems which involves a suite of measures to increase energy efficiency Energy loss reduction in municipal sector companies Energy loss reduction in buildings Funding of individual projects up to $30 million, with debt service coverage ratio of at least 1:3 (3-year moving average) and minimum of 10% real financial rate of return (indicative 72 energy efficiency subprojects in industrial sector and 5 municipal energy efficiency subprojects, with 42 further projects) Achieving 1 million tons of CO_2 emissions annually avoided
Funding	World Bank financial intermediary loan: $200 million **Total: $200 million**
Website	http://projects.worldbank.org/P096586/ua-energy-efficiency?lang=en&tab=documents&subTab=projectDocuments
Project	**Sustainable Energy Acceleration Program**
Location	South Africa
Reference Year	2010
Thematic Areas	Renewable energy
Partners	International Finance Corporation (IFC, World Bank Group), African Development Bank (AfDB), private sector, other multilateral development banks
Objective	Support of first megawatt scale projects in three low-carbon technologies with potential to contribute in gigawatt scale to the country's energy mix
Description	Demonstration of different models for private sector participation in solar energy with plants constructed for captive consumption by industrial facilities, and plants constructed as Independent Power Producers selling to the Single Buyer under renewable energy feed-in tariffs (REFIT) Demonstration/Piloting of initial private sector megawatt scale projects in three technology areas that will improve sector capacities to provide these technologies (equipment supply, engineering, advisory etc.) and prove technical and economic realities of these technologies in the South African context Individual projects to be financed by IFC, AfDB, or both One of three joint IFC/AfDB Private Sector Proposals for South Africa under South Africa's Country Investment Plan (CIP) for Clean Technology Fund support, achieving direct emission reductions of 25,949,000 tons of CO_2 equivalent and 129,745,000 tons of CO_2 equivalent through indirect demonstration impact

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Table A2 *continued*

Funding	IFC/AfDB Clean Technology Fund senior loans: $42.5 million IFC (concessional) private sector loans: $41.5 million AfDB (concessional) private sector loans: $41.5 million IFC advisory services grant: $0.5 million AfDB advisory services grant: $0.5 million Cofinancing: $1,382.3 million **Total: $1,509 million**
Website	https://www-cif.climateinvestmentfunds.org/projects/sustainable-energy-acceleration-program-0
Project	**Sustainable Energy Finance Program**
Location	Thailand
Reference Year	2010
Thematic Areas	Energy efficiency, renewable energy
Partners	International Finance Corporation (IFC, World Bank Group), private leasing companies, commercial private banks, energy service companies
Objective	Support scale-up of Energy Efficiency (EE)/Renewable Energy (RE)/Energy Service Company (ESCO) projects in Thailand's large corporate, small and medium enterprise, commercial, residential and municipal sectors, build-up of capacity of local banking and leasing sectors to finance EE/RE/ESCO and securing of their financing, and direct and indirect emissions avoided of 0.44 million tons CO_2 equivalent per year
Description	Specialized Financial Institutions (SFIs) catalyze clean energy investments Private commercial banks and public utilities (Electricity Generating Authority of Thailand [EGAT] and Provincial Electricity Authority [PEA]) advance public investments in clean energy Support for comprehensive greenhouse gas emissions reduction program under the Bangkok Metropolitan Authority toward urban transformation, including Bus Rapid Transit program and city EE actions EE-related investments, including modernization and optimization of existing production systems and development of new market in small and medium enterprises/residential sector and expand existing EE related markets in commercial sectors
Funding	IFC Global Environment Facility loan: $28.5 million IFC advisory services grant: $1 million Implementation and supervision budget: $0.5 million IFC private sector loans: $70 million **Total: $100 million**
Website	https://www-cif.climateinvestmentfunds.org/projects/sustainable-energy-finance-program-tsef
Project	**Private Sector Renewable Energy and Energy Efficiency Project**
Location	Turkey
Reference Year	2009
Thematic Areas	Energy efficiency, renewable energy
Partners	World Bank, Turkiye Sinai Kalkinma Bankasi (TSKB), Turkiye Kalkinma Bankasi (TKB)
Objective	Increase privately owned and operated energy production from indigenous renewable sources within the market-based framework of the Turkish Electricity Market Law, enhance demand-side energy efficiency, and thereby help reduce greenhouse gas emissions

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Table A2 *continued*

Description	Finance the costs associated with scaled-up activities to enhance the positive impact of the original energy efficiency and renewable energy finance project using TKB and TSKB as financial intermediaries Eligibility of renewable resources (small hydroelectric installations), geothermal for heating and cooling purposes, and energy efficiency investments (iron and steel, cement, ceramics, chemicals, and textiles subsectors) with significant potential to be scaled-up for long-term greenhouse gas savings Financing of 41 renewable energy projects and 30 energy efficiency projects, installing 950 megawatts renewable capacity and achieving 4,065,000 Gigawatt hours energy efficiency savings, reducing 3.51 million tons of CO_2 equivalent emissions annually, and generating 28% of country's total energy through renewables
Funding	World Bank loan to TKB: $450 million World Bank loan to TSKB: $550 million Clean Technology Fund loan to TKB: $30 million Clean Technology Fund loan to TSKB: $70 million **Total: $1,100 million**
Website	http://projects.worldbank.org/P112578/private-sector-renewable-energy-energy-efficiency-project?lang=en
Project	**Urban Transport Transformation Project**
Location	Mexico
Reference Year	2009
Thematic Areas	Transport, energy efficiency
Partners	World Bank, BANOBRAS (National Bank for Works and Public Services), PROTRAM (Federal Support Program for Mass Transit)'s coordinating unit in FONADIN (national infrastructure fund), Grupo de Trabajo Consultivo
Objective	Upgrade and modernization of urban transportation in select Mexican cities, with prioritized improvements in mass transit by investing bus rapid transit (BRT) and nonmotorized transport (NMT), to alleviate air and noise pollution, traffic congestion, and greenhouse gas emissions of 1.96 million tons of CO_2 equivalent
Description	Improving quality of service provided by the urban transport systems in a cost efficient manner Deploying equipment, infrastructure, and operational strategies that reduce CO_2 emissions, particularly development of integrated transit systems (mass transit corridors and ancillary investments, low-carbon bus technologies and scrapping of displaced buses) Leveraging $2,344 million of investment Capacity building, technical assistance, training Mexico GEF STAQ (Global Environment Facility Sustainable Transport and Air Quality Project) project offers grants for preparing subprojects in four Mexican cities
Funding	World Bank Clean Technology Fund loan: $200 million World Bank concessional loan: $150 million Cofinancing: $2,344 million of which: FONADIN loans: $767.5 million Local government grants: $737.5 million Private sector investment: $839 million **Total: $2,694 million**
Website	https://www-cif.climateinvestmentfunds.org/projects/urban-transport-transformation-project
Project	**AP Paper Mills**
Location	India
Reference Year	2004

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Table A2 *continued*

Thematic Areas	Natural resource management, industry
Partners	International Finance Corporation (World Bank Group), AP Paper Mills (APPM), Coastal Papers (CP)
Objective	Shifting CP's production to printing and writing paper based on pulp transferred from APPM and restructuring APPM's short-term debt and recent privatization through purchase of remaining government shares
Description	Closing of 10,500 metric tons per year rice straw pulping section and replacement with new pulp mill Enhancement of pulp capacity, improvement of the product mix, and increase in production capacity and efficiency Increase in the existing farm forestry program, support of over 25,200 farmers and fostering sustainable forestry operations based on World Bank Group's Forest Strategy and Policy Improvement of environmental management systems and improved pollution control and decreased overall pollution, water consumption, and odoriferous emissions Provision of 3,200 jobs Stabilization of company's debt profile through IFC long-term debt, and attraction of other local banks for long-term lending
Funding	IFC A-Loan: $35 million IFC C-Loan equity investment: $5 million Cofinancing: $99.1 million **Total: $139.1 million**
Website	http://ifcextapps.ifc.org/ifcext/spiwebsite1.nsf/78e3b305216fcdba85257a8b0075079d/d84a1b4f53044402852576ba000e25bc?opendocument

Project	**ReNew Power Investment Project / ReNew Clean Energy Project**
Location	India
Reference Year	2014, 2016
Thematic Areas	Renewable energy
Partners	Asian Development Bank (ADB), Japan International Cooperation Agency (JICA), private equity arm of Goldman Sachs Group Inc, ReNew Power Ventures Private Limited
Objective	Accelerate India's economic growth by providing additional large-scale power generation capacity, contribute to the development of renewable energy generation, and help reduce greenhouse gas emissions, help in preserving India's energy mix by increasing the level of reliance on indigenous renewable resources as opposed to imported fossil fuels, support private sector development by catalyzing private investment in India's energy sector through demonstration of profitable investments in renewable power subsector
Description	Construction and operation of at least 1,000 megawatts of renewable power generation, across various states in India Partially fund the ReNew Power Ventures Private Limited equity injection in the pipeline portfolio of at least 560 megawatts of additional wind power capacity energy projects, additional loan in 7 SPVs established by ReNew for solar and wind projects
Funding	ADB equity: $50 million ADB-JICA Leading Asia's Private Sector Infrastructure Fund loan: $390 million Third-party equity: $30 million Third-party loans: $30 million **Total: $500 million**
Website	https://www.adb.org/projects/47926-014/main#project-pds

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Table A2 *continued*

Project	Second Green Power Development Project
Location	Bhutan
Reference Year	2014
Thematic Areas	Renewable energy
Partners	Asian Development Bank (ADB), Druk Green Power Corporation (DGPC), Tangsibji Hydro Energy Limited (THyE), State Bank of India, Export-Import Bank of India
Objective	Expanded cross-border power trading, increased clean hydropower generation, elimination of 460,000 tons of CO_2 emissions annually in India
Description	Construction of 118 megawatt hydropower plant Enhanced management and implementation capacity Improved hydropower development and trading framework for functional segregation of distribution and transmission, independent system operation, and separate power trading entity, draft tariff policy Usage of revenue generated from exporting power to India for financing of social services in Bhutan such as health, education and rural development
Funding	ADB Asian Development Fund grant: $25.3 million ADB ordinary capital resources loan: $70 million ADB Asian Development Fund concessional loan: $25.3 million ADB Technical Assistance Special Fund grant: $1 million Cofinancing: $77.8 million, of which State Bank of India syndicated loan: $41.7 million Export-Import Bank of India loan: $17.2 million Druk Green Power Corporation investment: $18.9 million **Total: $199 million**
Website	https://www.adb.org/projects/44444-013/main#project-pds
Project	**Loan Program for Clean Bus Leasing East Horizon Limited**
Location	People's Republic of China
Reference Year	2013
Thematic Areas	Transport, energy efficiency
Partners	Asian Development Bank (ADB), Industrial Bank Financial Leasing, Everbright Financial Leasing, Far East Horizon Limited
Objective	Increase in clean bus transport services and support of expansion of a low-cost, flexible mode of public transport, benefitting millions of low-income commuters, improving air quality, and reducing greenhouse gas emissions
Description	Increase in the deployment of clean buses in the urban, suburban, and intercity public transport markets (at least 5,000 clean buses by 2018, avoidance of greenhouse gas emissions of 1.31 million tons annually) Technical assistance to strengthen capacity of bus operators, development of information resources and training materials for maximizing service performance of bus fleets
Funding	ADB ordinary capital resources nonsovereign loan: $275 million Commercial cofinancing loans: $100–200 million **Total: $375–475 million**
Website	https://www.adb.org/projects/46928-014/main#project-pds

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Table A2 *continued*

Project	Off-Grid Prepaid Solar Leasing Project
Location	India
Reference Year	2013, 2015
Thematic Areas	Renewable energy
Partners	Asian Development Bank (ADB), Simpa Energy India Private Limited
Objective	Increased access to clean energy for 250,000 households by 2017, production of 103.3 gigawatt-hours annually, with locally purchased goods and services amounting to $23.6 million, while avoiding 162,951 tons of CO_2 emissions annually
Description	Improve access to electricity in rural India, leading to improved education outcomes as children can study after sunset, improved hygiene etc. Reduced greenhouse gas emissions by substituting kerosene with solar energy thereby also improving air quality and benefiting the respiratory health of household members Gender benefits due to female beneficiaries Demonstration effect for neighboring Bangladesh, Nepal and Pakistan Further capital infusion giving credence to the case for increasing financing for innovative off-grid renewable energy solutions in South Asia
Funding	ADB Clean Technology Fund loan (2015): $6 million (ADB equity (2013): $2 million) Commercial loans (2015): $4.5 million Commercial equity (2015): $5 million Internally generated cash (2015): $8.5 million **Total (2015): $24 million**
Website	https://www.adb.org/projects/49238-001/main#project-pds
Project	**Dynagreen Waste to Energy Project**
Location	People's Republic of China
Reference Year	2012
Thematic Areas	Renewable energy, waste
Partners	Asian Development Bank (ADB), Beijing State-Owned Assets Management Company (BSAM), Dynagreen Environmental Protection Group Company
Objective	Increased production of renewable energy from technically efficient and environmentally sustainable waste-to-energy (WTE) power plants in small and medium sized cities and improved urban solid-waste management
Description	Series of WTE subprojects with total capacity of 2.8 million tons of municipal solid waste annually, and to generate approximately 610 gigawatt-hours of electricity annually, and reduce CO_2 emissions by about 450,000 tons per year Each subproject incinerates waste, recovers waste heat for power generation, purifies waste gas, and disposes of ash
Funding	ADB ordinary capital loan: $100 million ADB local currency complementary loan: up to $100 million ADB Technical Assistance Special Fund grant: $0.5 million Cofinancing: $253.5 million, of which Commercial loan: up to $178 million BSAM guarantee: $75.5 million **Total: $454 million**
Website	https://www.adb.org/projects/46930-014/main#project-pds

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Table A2 *continued*

Project	Market Transformation through Introduction of Energy-Efficient Electric Vehicles Project
Location	Philippines
Reference Year	2012
Thematic Areas	Transport, energy efficiency, renewable energy, industry
Partners	Asian Development Bank (ADB), Department of Energy, Land Bank of the Philippines (LBP), local government units, Bureau of Treasury of the Department of Finance
Objective	Sustainable energy use by the transport sector and transformation of the tricycle industry through large-scale adoption of locally made energy-efficient e-trikes
Description	Delivery of 100,000 complete e-trike units to local government units accompanied by a standard 3-year warranty Establishment of lithium-ion battery supply chain with associated support services Piloting of solar charging stations in selected areas (pilot 5 stations) Set-up of material recovery from ICE tricycles and used batteries Successful communication, social mobilization, and technology transfer
Funding	ADB ordinary capital resources loan: $300 million ADB Clean Technology Fund loan: $100 million ADB Clean Technology Fund grant: $5 million Government grant and loans: $99 million **Total: $504 million**
Website	https://www-cif.climateinvestmentfunds.org/projects/market-transformation-through-introduction-energy-efficient-electric-vehicles-project
Project	**Foundation Wind Energy I and II Projects**
Location	Pakistan
Reference Year	2011
Thematic Areas	Renewable energy
Partners	Asian Development Bank (ADB), Islamic Development Bank, local banks, Fauji Foundation, Fauji Fertlizer Bin Qasim Limited, Islamic Infrastructure Fund, and Tapal Group
Objective	Help alleviate Pakistan's severe power shortage and foster confidence among potential investors and lenders and promote further private sector investment in renewable energy and power in Pakistan
Description	Foundation Wind Energy I (FWE I): construction, erection, and operation of 50 megawatts of wind generation capacity, selling electricity to the national grid under 20-year take-or-pay offtake contracts Foundation Wind Energy II (FWE II): construction, erection and operation of 50 megawatts of wind generation capacity, selling electricity to the national grid under 20-year take-or-pay offtake contracts Production of lower-cost, carbon-efficient power from wind energy with 143.2 Gigawatt hours annually (FWE I) and 143.7 Gigawatt hours annually (FWE II) Avoidance of 68,000 tons of CO_2 per year (FWE I) and 68,250 tons of CO_2 per year (FWE II)
Funding	ADB partial credit guarantee FWE I: $33.43 million Islamic Development Bank loan FWE I: $33.43 million Local bank loan FWE I: $33.43 million Sponsor equity FWE I: $33.43 million (Fauji Foundation (30%), Fauji Fertlizer Bin Qasim Limited (35%), and Islamic Infrastructure Fund (35%))

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Table A2 *continued*

	ADB partial credit guarantee FWE II: $33.18 million Islamic Development Bank loan FWE II: $33.18 million Local bank loan FWE II: $33.18 million Sponsor equity FWE II: $33.18 million (Fauji Foundation (20%), Fauji Fertlizer Bin Qasim Limited (35%), Islamic Infrastructure Fund (25%), and Tapal Group (20%)) **Total: $267 million**
Website	https://www.adb.org/projects/45905-014/main#project-pds

Project	**Senegal Integrated Urban Flood Management Project**
Location	Senegal
Reference Year	2016
Thematic Areas	Flood control
Partners	French Development Agency (AFD), Ministry of Environment and Sustainable Development
Objective	Climate change adaptation through reduced vulnerability to floods caused by expected increase in heavy rainfall events and elevation of sea-level
Description	Supporting Senegalese policy on flood risk management through disaster risk reduction Building knowledge of flood risk at national and local-scale through flood risk mapping and flood risk awareness Reducing vulnerability in existing and future urban centers through structural and nonstructural measures from flood risk reduction, tools for adequate investment in flood management infrastructure, and drainage and sanitation infrastructure in one of the most vulnerable areas of the capital city (Pikine Irrégulier Sud) Reinforcing prevention, especially for drainage infrastructure management through real-time hazard monitoring in Greater Dakar, and protocols for infrastructure management under extreme weather events Tackling challenge of trans-sectorial governance through support to integrated flood risk management policymaking and institutional strengthening and capacity building, and project management and assistance
Funding	AFD concessional loan (35% grant-element equivalent): $50 million Green Climate Fund grant: $15 million Government investment: $6 million **Total: $71 million**
Website	https://www.greenclimate.fund/-/senegal-integrated-urban-flood-management-project?inheritRedirect=true&redirect=%2Fprojects%2Fbrowse-projects
Project	**Ecocasa Program (Mexico Energy Efficiency Program Part II)**
Location	Mexico
Reference Year	2012
Thematic Areas	Energy efficiency, housing
Partners	Inter-American Development Bank (IDB), German Development Bank for Reconstruction (KfW), Latin America Investment Facility (LAIF, EU Commission), Federal Mortgage Society (SHF), local financing institutions, housing developers
Objective	Contribution to efforts of Mexico to reduce greenhouse emissions of residential sector through low-carbon housing finance, mortgage supply, and production

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Table A2 *continued*

Description	Improvement of quality of construction industry in Mexico by lifting energy efficiency standards of newly built houses into energy efficient housing units (ECOCASAs) Subsidizing construction of additional houses with highest energy efficiency standards Providing mortgage finance to encourage purchase of houses already built with a set of minimum efficiency criteria (resources from existing CCLIP MEX1006 fund SHF mortgage instruments) Inducing lower energy consumption and water usage, lower greenhouse gas emissions, complementing and giving an impulse to government policies and initiatives in this domain, and delivering higher level of comfort for beneficiaries (27,600 homes built, another 1,700 financed)
	Triggering additional construction of 13,800 houses Delivering energy savings of around 2.4 million megawatt hours and emissions reductions of 1.6 million metric tons of CO_2 equivalent over 40 years
Funding	IDB Clean Technology Fund public sector loan: $49.5 million IDB ordinary capital resources loan: $50 million IDB technical cooperation grant: $2 million IDB knowledge and supervision budget: $0.1 million Cofinancing: $199.7 million, of which KfW loan: $80 million LAIF grant: $9 million Private investments: $110.7 million **Total: $301.3 million**
Website	https://www-cif.climateinvestmentfunds.org/projects/ecocasa-program-mexico-energy-efficiency-program-part-ii

Project	**Western Australia Waste-to-Gas Plant**
Location	Australia
Reference Year	2014
Thematic Areas	Waste, energy efficiency, renewable energy
Partners	Clean Energy Finance Corporation (CEFC), New Energy Corporation
Objective	Recover energy from waste streams that would otherwise go to landfill, reducing environmental impact from waste and producing clean and renewable energy
Description	Application of market leader technology Conversion of waste to base load renewable energy by breaking down the organic portion of wastes to produce a synthetic gas that is burned to produce electricity Production of stable, inert ash that can be recycled in road pavement construction Plant capacity of 16.6 megawatts (over 75% of all municipal, commercial and industrial waste generated by Port Hedland and East Pilbara council areas) and potential electricity output of 122,068 megawatt hours annually and avoidance of 135,000 tons of carbon emissions annually Financial market viability, meeting European Union waste-to-energy standards, and eligibility for Australian Renewable Energy Certificates
Funding	CEFC senior debt: $37.1 million Private bank loan: $37.1 million Private equity: $74.3 million **Total: $149 million**
Website	http://www.cleanenergyfinancecorp.com.au/case-studies/waste-to-gas-project-reduces-landfill.aspx

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Table A2 *continued*

Project	Galloper Offshore Wind Farm
Location	UK
Reference Year	2015
Thematic Areas	Renewable energy
Partners	UK Green Investment Bank (GIB), European Investment Bank (EIB), project developer RWE Innogy, Siemens Financial Services and Macquarie Capital
Objective	Generation of wind energy to power 330,000 homes annually and reduce greenhouse gas emissions by more than 190 kilotons CO_2 equivalent annually
Description	Construction of 336 megawatts wind farm, to qualify for Renewables Obligation Certificates
Funding	GIB equity: $475.1 million Private equity: $1,425.3 million European Fund for Strategic Investments debt facility support (12 commercial banks and EIB): $1,735.7 million **Total: $3,636 million**
Website	http://www.greeninvestmentbank.com/news-and-insights/2015/uk-green-investment-bank-acquires-25-stake-in-galloper-offshore-wind-farm/
Project	**LED Financing Package for Santander Estates in the UK**
Location	UK
Reference Year	2015
Thematic Areas	Energy efficiency, buildings
Partners	UK Green Investment Bank (GIB), Santander Bank, Sustainable Development Capital Limited (SDCL), GE Lighting
Objective	Energy savings of more than 50% and cut greenhouse gas emissions by more than 7,000 tons annually
Description	Installation of 90,000 new lights across Santander's entire UK estate of 800 branches and 14 office buildings
Funding	GIB and SDCL equity through: UK Energy Efficiency Investments Fund: $10,6 million UK Energy Efficiency Investments 1A Fund: $11.5 million **Total: $22.1 million**
Website	http://www.greeninvestmentbank.com/news-and-insights/2015/uks-biggest-ever-led-financing-package-will-cut-santanders-energy-use-by-half/
Project	**Levenseat Renewable Energy Limited Energy-from-Waste Plant and Materials Recycling Facility**
Location	UK
Reference Year	2015
Thematic Areas	Energy efficiency, waste, natural resource management
Partners	UK Green Investment Bank (GIB), Foresight Group, Zouk Capital LLP, M+W Group
Objective	Recycling over 1 million tons of materials including plastics, metals, paper and aggregates over its lifetime and generation of heat required by the Materials Recycling Facility (MRF), and savings of around 1.3 million tons of CO_2 equivalent emissions, diversion of over 1.4 million tons of waste from landfill, and production of enough electricity to supply equivalent of almost 18,000 homes over its lifetime

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Table A2 *continued*

Description	MRV combining fluidized bed gasification technology and Refuse Derived Fuel Electricity to be supplied to the national grid with the heat output assisting the operation of the MRF Creation of more than 100 jobs during construction phase and support of 50 full-time jobs when completed
Funding	GIB through Foresight Group-managed UK Waste and Resource and Energy Investments Fund: $35.8 million Zouk Capital LLP equity - Levenseat Limited equity - Investec Bank senior debt - **Total: $141 million**
Website	http://www.greeninvestmentbank.com/news-and-insights/2015/scotland-set-for-new-first-of-kind-111m-recycling-and-waste-plant/
Project	**Widnes, Merseyside, Combined Heat and Power (CHP) Plant**
Location	UK
Reference Year	2014
Thematic Areas	Energy efficiency, waste, natural resource management
Partners	UK Green Investment Bank (GIB), Foresight Group, GCP Infrastructure Investors, Investec Bank, Eksport Kredit Fonden, Stobart, BWSC, Burmeister & Wain Scandinavian Contractor A/S
Objective	Become the largest waste wood renewable energy plant in the UK North West with lifetime savings of 1.3 million tons of greenhouse gas emissions and production of enough electricity to power the equivalent of 35,000 homes
Description	Powering of 20.2 megawatts and 7.8 megawatts CHP plant with 146,000 tons of Grade B-C recovered wood each year, sourced by Stobart Biomass Products Limited (Stobart) under a long-term fuel supply contract Providing power to the grid Usage of heat offtake by Stobart's adjacent wood drying facility Creation of more than 200 construction jobs and 20 full time jobs once operational
Funding	GIB through Foresight Group-managed UK Waste and Resource and Energy Investments Fund mezzanine loans: $21.4 million UK Green Investment Bank through Foresight Group-managed UK Waste and Resource and Energy Investments Fund equity: $16.7 million GCP Infrastructure Investors mezzanine finance: $53.3 million Investec Bank and Eksport Kredit Fonden senior loans: $53.8 million Stobart equity: $12.4 million BWSC equity: $3.3 million **Total: $161 million**
Website	http://www.greeninvestmentbank.com/news-and-insights/2014/110m-funding-secured-for-biggest-waste-wood-renewable-energy-facility-in-the-north-west/
Project	**Westminster Pier Park Brownfield to Greenfield Conversion**
Location	Canada
Reference Year	2012
Thematic Areas	Brownfield
Partners	Federation of Canadian Municipalities (FCM), City of New Westminster, British Columbia (BC) Ministry of Environment, BC Infrastructure Canada

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Table A2 *continued*

Objective	Transformation of 3.2 ha former industrial pier into urban riverfront park with connections to regional trail and greenway networks
Description	Combination of physical remediation (5,300 cubic meters) and risk management approaches (engineered sediment cap, soil vapor barriers, subsurface jet-grout containment wall) to address serious soil, groundwater, and sediment pollution (applying Notification of Independent Remediation (NIR) approach by BC Ministry of Environment) Redevelopment of site for waterfront park with pedestrian and bicycle pathways, children's play areas, public art, programmable open spaces, and natural riparian habitat areas (LEED Gold standards application for all structures built) Revitalization of neighborhood through new green space creation of a new economic base for the municipality Reduction of urban sprawl and enhanced environmental quality, health, and safety
Funding	FCM Green Municipal Fund concessional loan: $1.5 million BC Building Canada Infrastructure Program grant: $15.5 million Local government investment: $7.7 million **Total: $25 million**
Website	http://www.fcm.ca/home/programs/green-municipal-fund/funded-initiatives.htm?lang=en&project=6bc14c12-0359-e111-b187-005056bc2614&srch=
Project	**Grand River Transit North Depot Expansion**
Location	Canada
Reference Year	2011
Thematic Areas	Energy efficiency, buildings, transport
Partners	Federation of Canadian Municipalities (FCM), Regional Municipality of Waterloo
Objective	Provision of larger, energy-efficient facility for bus fleet maintenance
Description	Construction of bus maintenance facility with passive design features and energy-efficiency technologies (LEED Gold designation) Achieving cost savings of 74% compared to Model National Energy Code for Buildings reference building and reduction in greenhouse gas emissions Providing extended space of bus fleet maintenance, Improving transit service, helping to meet objective of a 17% transit modal share by 2031 (as identified in Regional Transportation Master Plan) Redevelopment and improvement of redundant City of Kitchener lands, as well as re-alignment of continuous sites together with consolidation of several properties into one site and redevelopment of brownfield properties into new industrial and commercial use
Funding	FCM Green Municipal Fund grant: $0.4 million FCM Green Municipal Fund concessional loan: $5.6 million Cofinancing: $29.7 million **Total: $36 million**
Website	http://www.fcm.ca/home/programs/green-municipal-fund/funded-initiatives.htm?lang=en&project=0b0d2cb8-cd45-e111-968a-005056bc2614&srch=

Note: Financial figures are converted into US Dollars and may not add up due to differing funding figures provided in different project documents. Kindly consult original sources for further information.

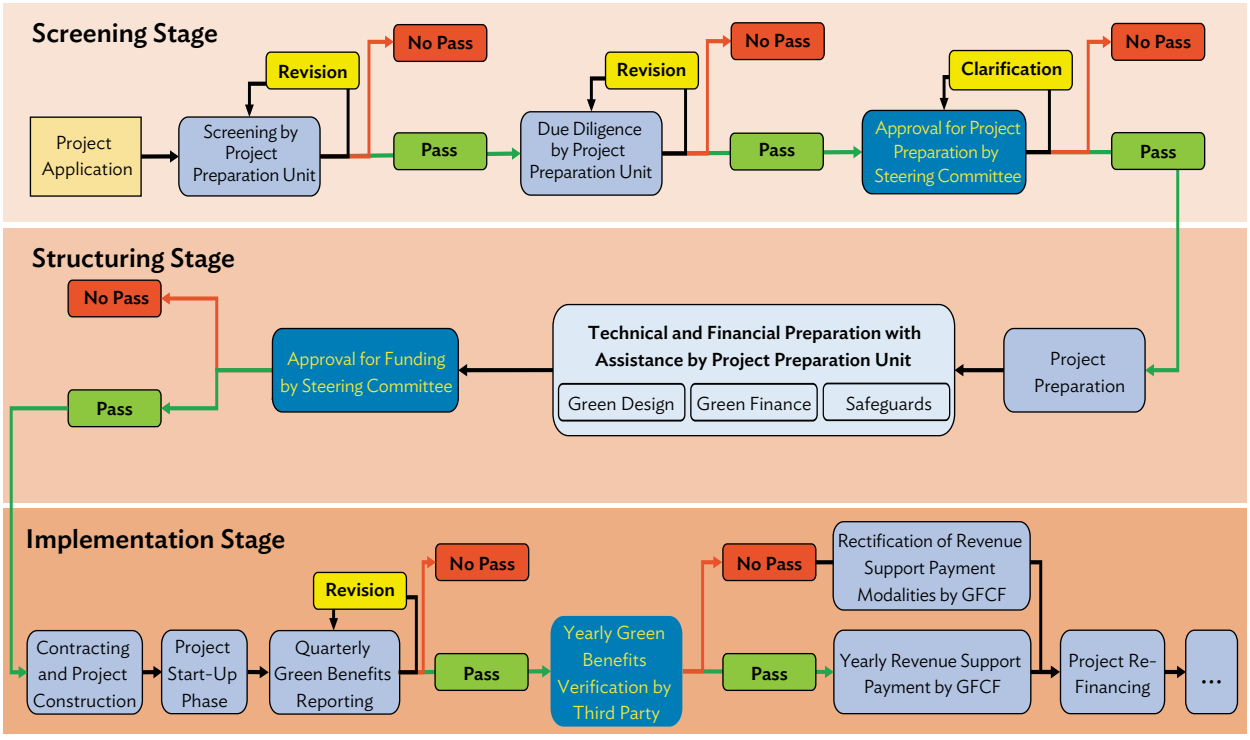
CO_2 = carbon dioxide, FAO, = Food and Agriculture Organization, GEF = Global Environment Facility, ha = hectare, IFAD, NGO = non-governmental organization, UNFCCC = United Nations Framework Convention on Climate Change.

Appendix 5: Operating Guidelines for the Green Finance Catalyzing Facility

The Green Finance Catalyzing Facility (GFCF) requires clear procedures that will need to be developed by the facility directorate to outline the GFCF application process, approval procedures, and related documentation for project applications, initial screening, revision, assessment, approval, monitoring, and disbursement steps. In line with this, safeguards and procurement guidelines will also have to be put in place. Instead of formulating all these policies from scratch it is recommended to use existing good practice examples, internationally recognized frameworks, and readily available templates. There are numerous examples of green funds or initiatives and their application procedures (Box 8, Box 16, Box 20, Box 25, Box 26, and Box 27). Furthermore, following recent strategy adjustments by multilateral development banks, it is recommended to apply country systems (regulations, institutional structures, procedures) whenever they have already been put in place and aligned with necessary codes of funding institutions to the GFCF.[39]

Some initial project processing guidance and suggestions are included in the sections below. A possible process is illustrated in Figure A3.

Figure A3: Illustrative Project Application Process for the Green Finance Catalyzing Facility



GFCF = Green Finance Catalyzing Facility.

Source: Authors.

[39] ADB. 2015. Promoting the Use of Country System in ADB's Operations. A Systematic Approach. Manila.

OECD. 2010. Country Systems, and Why We Need to Use Them. In: OECD. Development Co-Operation Report 2010. Paris. Chapter 3, pp. 43–54. http://www.oecd-ilibrary.org/docserver/download/4310031ec006.pdf?expires=1480774040&id=id&accname=guest&checksum=7A5F38D5FA8D7CBC731A7074EED1570F

Project Eligibility

Projects to be considered for support through the GFCF will have to fulfill eligibility criteria. The following broad criteria based upon the twin pillars of financial and environmental sustainability are suggested:

(i) Achievement of financial sustainability, demonstrated by achieving a 12% rate of return with the minimum revenue guarantee support capped at 15% of the net present value of the first seven years of revenue.

(ii) Compliance with environmental sustainability principles, specifically:

  (a) Defining green benefit targets (which will be monitored)—one to be greenhouse gas emission reductions, and at least two other targets to be defined which contribute to the environmental sustainability of land, air, and/or water by:

    - Reducing environmental risk through minimization of another pollutant (e.g., particulates related to air pollution), or
    - Reducing ecological scarcities through more efficient use of natural resources (e.g., minimized loss of biodiversity), or
    - Improving quality of life (e.g., urban redesign conducive to neighborhood interaction).

  (b) Utilizing green design and green technology;

  (c) Being aligned with national/subnational policies;

These criteria would be developed and refined by the GFCF and its host government, for example to specify eligible project types or sectors, or to define minimum or maximum project sizes. The eligibility criteria can be adapted to suit particular national policies or priorities.

To build, or encourage, a diverse pipeline of projects it may be best to keep eligibility criteria as broad as possible. Or the GFCF could, during an initial phase, focus on 10–15 projects to be piloted through the facility. These pilot projects could be spread across different sectors to ensure portfolio diversity and to maximize capacity building during the start-up phase. These projects would also receive support in both technical preparation and financial structuring to enable a successful process from project development and approval to implementation and operation.

As elaborated in the due diligence section below, projects selected for financing by the GFCF must conform to safeguard requirements particularly with regard to international investor and MDB principles and policies for social and environmental aspects in projects. This is critical for ensuring the future ability of projects to access the international capital markets for refinancing.

Project Screening

At project concept or technical assistance stage, project descriptions could be submitted by the relevant proponent to the GFCF for screening. Project applicants would submit a project screening form providing complete technical information comprising key features of the design and its financial and environmental sustainability attributes. The GFCF Project Preparation Unit will assess the project based on the information submitted in the screening form. If a project satisfies, or is likely to satisfy, the GFCF selection criteria, and any other relevant criteria (such as quotas on certain technologies, restrictions in terms of size of project etc.) then the project will move to the due diligence stage.

If a project is unsuitable, it will be rejected at the screening stage and feedback will be given to the project applicant for further guidance on green design and investment preparation. The GFCF Project Preparation Unit may offer applicants, or applicants may seek independently the advisory support of the GFCF for project criteria where they have identified insufficient eligibility, but see scope for adjustments. This approach reflects the difference between finance-channeling funds and supportive facilities as discussed in Box 11.

Due Diligence

The undertaking of a comprehensive due diligence assessment of projects is critical for managing risk. The due diligence will include an assessment of the financial, legal, technical, sustainability (economic, environmental, social) and commercial aspects of the project. In particular, it will consider specific risks associated with each aspect and how such risks might best be mitigated. A case manager will be assigned from within the GFCF Project Preparation Unit and will be responsible for managing the due diligence process. The final output of this stage will be a due diligence report, with a recommendation for consideration by the GFCF Steering Committee on whether to approve the project for GFCF project preparation support.

The due diligence report would provide an assessment of the following elements:

(i) Project Assessment: This would review the projects technical viability, including operational elements such as (but not limited to) feasibility of technical design, appropriateness of technology, continuity of financing, implementation mechanism proposed, and risks to the successful generation of green benefits.

(ii) Project Entity Assessment: This would review the governance, management and operational aspects of the project entity, and any other relevant entities, as relevant to the capacity, experience and expertise of the project entity to implement and manage the project and comply with its obligations to the GFCF.

(iii) Financial Analysis: This would ensure that the financial analysis undertaken is robust and provides an adequate assessment of the project's, and the project entity's, ongoing financial viability and sustainability over the period of the GFCF support and that there are sufficient management controls in place to support adequate ongoing monitoring and supervision. The case manager would also use the financial analysis to define the level of support required from the GFCF, such as the minimum green benefit revenue support.

(iv) Legal Due Diligence: This would review legal matters that affect, or may affect, the ability of the project entity to enter into, or perform its obligations, under a GFCF agreement, such as:

  (a) Corporate Matters—the corporate structure, a project entity's power and authority to enter into an agreement and undertake the project etc.

  (b) Permits, Licenses and Consents—necessary to execute an agreement, undertake the project and operate the project.

  (c) Contracts—the material contracts of the project entity, including loan and security agreements, operating contracts etc.

  (d) Property Rights—the land, easements and real property rights necessary to undertake the project.

  (e) Claims and Litigation—any pending or threatened material claims and litigation involving the project entity.

(v) Risk Analysis: This is the most important element of due diligence analysis. Careful evaluation of risk allows the best outcome in terms of risk assignment and the development of mitigation tools and strategies for those risks. If the risks identified are too great the GFCF Project Preparation Unit will not recommend the project for approval by the steering committee. The level of risk, and the availability of approaches to mitigate identified risks will influence the GFCF's decision on whether to proceed with a particular project.

The due diligence report will be circulated to the GFCF Steering Committee. The committee will decide whether to approve the project becoming a candidate for support through the GFCF.

Steering Committee Approval

Following the steering committee's approval for preparation support to a project applicant, the GFCF Project Preparation Unit would provide technical assistance for green design, green finance, and safeguards to a project applicant. Based on related project preparation activities, the GFCF Steering Committee will make an investment decision. The Project Preparation Unit will be responsible for preparing sufficient information regarding the proposed project to permit the steering committee to adequately assess the merits of that

transaction. For each project, the GFCF Project Preparation Unit should submit a due diligence report, including risk assessment documentation and any necessary supporting expert advice, and all other materials that the GFCF Project Preparation Unit considers appropriate.

Contracting

Once a project is approved for funding, the next step would be the negotiation and signing of a formal agreement with the GFCF. Each potential transaction will have different features and the documentation requirements may differ from project to project. The contract(s) will also contain provisions to ensure the GFCF can access information regarding the ongoing operation and management of the project, for example to evaluate green benefit generation. The contract will also contain the GFCF's rights against the project entity in the event of project entity default.

Disbursement

The contracts will also include payment schedules which will be tailored to each specific project. Prior to disbursement, the project developer will demonstrate how it has met the conditions imposed within the agreement between the project and the GFCF (for example, there will be conditions precedent specifying which permits need to be obtained before disbursement occurs). It is expected that the disbursement profile will be very project specific and while the GFCF will endeavor to disburse monies in a timely manner, the directorate will also ensure that all milestones required have been met before releasing funds.

Project Monitoring

The project developer will be required to periodically [quarterly] submit progress reports to the GFCF. The GFCF Management and Financing Unit shall be responsible for regular monitoring and periodic evaluation of project compliance with agreed milestones and performance levels, particularly for the purposes of disbursing monies from the GFCF, for example ensuring green benefits are being generated by the project in accordance with expectations. The criteria to be monitored will be linked to the screening and due diligence undertaken for the project (i.e., the application of a methodology or standard to quantify emission reductions, or other green benefit will give specific monitoring points). The GFCF Project Preparation Unit can work with project entities to define appropriate monitoring plans prior to operation commencement. Results of monitoring and evaluation activities will be summarized ahead of each steering committee meeting.

Verification of Green Benefits

In addition to monitoring undertaken by the project for its successful implementation, the project entity should, on an annual basis, conduct the verification of the green benefits generated, verified by an independent third-party auditor. The green benefit indicators will vary from project to project, with the only common metric being emission reductions of greenhouse gases. However, the auditor would base their assessment on the specific project monitoring plan and verify the accuracy of the monitoring reports and give an independent assurance that, during a specific time period, the project activity achieved a certain amount of green benefits. This independent verification of results achieved will be a precondition for disbursement of the green benefit revenue support.

In case a project does not generate the anticipated green benefits, remedial action will be taken to work jointly with the project entity on necessary actions to meet targets in the future, and—if necessary—to adjust project covenants and realign revenue support payments for green benefits.

Capacity Building

Throughout the project processing cycle the facility directorate can provide targeted capacity building to projects, to support ongoing project performance, project monitoring and project restructuring. Where issues

are identified regarding project operation, for example, the green benefits being generated are falling short of expectations, the GFCF Project Management and Financing team can work with the project entity to implement remedial action plans to get the project back on track.

Overall there are five key areas the capacity building efforts of the GFCF would need to focus on:

(i) Project Level: Develop project level bankability models;
(ii) Project Level: Set timebound green targets for environmental sustainability and guidance on green infrastructure and design principles[40];
(iii) Local Government Capacities: Assist local governments build their capacities to manage the green projects, including being able to monitor green targets and manage revenue support disbursements;
(iv) Green Financing Solutions for an Evolving Market: Innovate green financing solutions to address areas, such as financing forestry projects (e.g., expansion of green cover), which might not have any direct or quantifiable revenue models; in such cases innovative bankability-enhancing tools, such as a shadow-revenue based on government health budget improvements, or carbon credits, would be needed to be developed; and
(v) Capital Market Access: Develop processes and tools for capital markets access of the GFCF as a pooled vehicle or specific projects early on in the roadmap, including creating ring-fenced special purpose vehicles or managing credit ratings for specific projects periodically, which are vital to any final approach to the capital markets.

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Catalyzing Green Finance

A Concept for Leveraging Blended Finance for Green Development

A large financing need challenges climate-adjusted infrastructure in developing Asia, estimated at $26 trillion till 2030. This necessitates crowding-in private sources to meet financing, efficiency, and technology gaps. However, a lack of bankable projects is a major hurdle. This publication suggests one possible innovative financing approach. The Green Finance Catalyzing Facility (GFCF) proposes a blended finance framework for governments and development entities to better leverage development funds for risk mitigation, generate a pipeline of bankable green infrastructure projects, and directly catalyze private finance. The GFCF provides useful inputs for the current debate on mainstreaming green finance into country financial systems.

About the Asian Development Bank

ADB's vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to a large share of the world's poor. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

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