CATALYZING CLIMATE FINANCE

LESSONS LEARNED FROM THE SHANDONG GREEN
DEVELOPMENT FUND

Michael Lindfield, Frédéric Asseline, Hubert Jenny, Yihong Wang, and Anouj Mehta

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Michael Lindfield is an economist and financial analyst with over 30 years of experience in international sustainable urban development policy formulation and financing. He was formerly a principal urban specialist and chair of the Urban Community of Practice at the Asian Development Bank (ADB), and currently serves as an urban advisor to a number of international development institutions as well as a senior consultant for various ADB projects.

Frédéric Asseline is a principal climate change specialist (climate finance) at the Sustainable Development and Climate Change Department, ADB.

Hubert Jenny was formerly principal infrastructure finance specialist at the East Asia Department, ADB.

Yihong Wang is a senior investment officer at the East Asia Department, ADB.

Anouj Mehta is a principal infrastructure specialist at the Southeast Asia Department, ADB.

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6 ADB Avenue, Mandaluyong City, 1550 Metro Manila, Philippines
Tel +63 2 8632 4444; Fax +63 2 8636 2444
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ABBREVIATIONS

ACGF	ASEAN Catalytic Green Finance Facility
ADB	Asian Development Bank
AFD	Agence Française de Développement
AIF	ASEAN Infrastructure Facility
ASEAN	Association of Southeast Asian Nations
BAU	business-as-usual
CBRC	China Banking Regulatory Commission
CCM	CICC Capital Management Co Ltd.
CFF	Climate Finance Facility
CICC	China International Capital Corporation
CO ₂ e	carbon dioxide equivalent
DBSA	Development Bank of Southern Africa
DFI	development finance institution
DMC	developing member country
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
EIRR	economic internal rate of return
ESMS	environmental and social monitoring system
EU	European Union
FMC	fund management company
GCF	Green Climate Fund
GDP	gross domestic product
GEF	global environment facility
GFCF	green finance catalyzing facility
GFF	green finance facility
GHG	greenhouse gas
IFI	international financing institution
IKI	International Climate Fund (Germany)
KfW	German Development Bank
M&E	monitoring and evaluation
MDB	multilateral development bank
MFF	multitranche financing facility
MEP	Ministry of Environmental Protection
MOF	Ministry of Finance
MRV	monitoring, reporting, and verification
NDB	national development bank
NDRC	National Development and Reform Commission
OECD	Organisation for Economic Co-operation and Development
PBOC	People's Bank of China
PFS	pre-feasibility study
PIC	private, institutional, and commercial (finance)
PPP	public-private partnership
PRC	People's Republic of China
PT SMI	PT Sarana Multi Infrastruktur (Indonesia)

SDG	Sustainable Development Goal
SDIHG	Shandong Development Investment Holdings Group
SGDF	Shandong Green Development Fund
SOE	state-owned enterprise
TA	technical assistance
tCO ₂ e	tons of carbon dioxide equivalent
UK	United Kingdom
US	United States
VGF	viability gap funding

I. INTRODUCTION

Despite science being clear that the planet is warming up to dangerous levels, years of underinvestment in climate mitigation and resilience have led to the situation where trillions in economic product and billions of people are now vulnerable to the impacts of climate change. Today, more than half of the global population live in urban areas. It is predicted that the world's urban population will increase by 1 billion in the next 15 years.¹ Urban areas contribute as much as 82% of the global gross domestic product (GDP) and this share is expected to grow to 88% before 2030. Cities are engines of economic growth and have great impacts on resource allocation. In fact, 67%–76% of global energy consumption and 71%–76% of carbon dioxide (CO₂) emissions from final energy use can be attributed to urban areas.² Growth in urban populations, economies, levels of energy consumption, and carbon emissions will be greatest in emerging and developing countries, such as the People's Republic of China (PRC), India, and those in Southeast Asia and sub-Saharan Africa (footnote 1). Cities around the world are already facing more severe and frequent storms, floods, wildfires, and heatwaves, and many will be inundated as sea levels rise. Thirteen percent of the world's urban population already lives in coastal areas that are less than 10 meters above sea level, and almost two-thirds of urban settlements with populations greater than 5 million are located at least partly in these zones.³ The infrastructure required to address these threats to the planet and to the economies that sustain billions will require additional investments in the trillions of dollars.⁴

This deficit will constrain growth and limit the pace of poverty reduction. Climate investment needs, however, far exceed what public resources can provide, even in the most optimistic revenue scenarios. The investment gap in sustainable urban infrastructure is estimated to be in the trillions of dollars annually and is particularly acute in emerging markets and developing economies. According to the Cities Climate Finance Leadership Alliance, the global need for urban infrastructure investment ranges from \$4.5 trillion to \$5.4 trillion per year with current levels of financing only reaching \$2.5 to \$3 trillion annually.⁵ Attracting more commercial finance and private expertise in infrastructure development is thus a critical challenge, and opportunity for the future development of the Asia and Pacific region. Meaningful increases in private investment will require removing key constraints on private sector participation in climate infrastructure and building effective institutional structures to mobilize such finance.

This working paper sets out ADB's experience in establishing scalable institutional structures for climate finance, focusing on: the policy rationale for them—setting out for governments why they are useful; the key elements of such structures—what organizational goals and forms are needed; and the important considerations in designing the operational systems of such institutions—how they are operated. It also sets out current and prospective future ADB roles in support of such structures and resultant value addition.

¹ United Nations Department of Economic and Social Affairs (UN DESA). 2014. World Urbanization Prospects (the 2014 revision). <http://esa.un.org/unpd/wup/DataQuery/>.

² K.C. Seto et al. 2014. Human Settlements, Infrastructure and Spatial Planning. In Edenhofer, O. et al. eds. Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. New York: Cambridge University Press.

³ G. McGranahan, D. Balk, and B. Anderson. 2007. The Rising Tide: Assessing the Risks of Climate Change and Human Settlements in Low Elevation Coastal Zones. *Environment and Urbanization*. 19(1). 17–37.

⁴ E. Ahmad et al. 2019. Scaling Up Investment for Sustainable Urban Infrastructure: A Guide to National and Subnational Reform. Coalition for Urban Transitions. London: The London School of Economics and Political Science. <http://newclimateeconomy.net/content/cities-working-papers>.

⁵ World Bank and UNDP. 2020. *Catalyzing Private Investment in Climate Smart Cities*. Washington DC: World Bank.

The objectives of the working paper are to: (i) review the experience in establishing the Shandong Green Development Fund (SGDF), (ii) examine the underlying rationale for the SGDF, (iii) detail its design and implementation process, (iv) assess its impact, and (v) examine how the concept can be extended and further developed—both in the PRC and in other countries in the Asia and Pacific region. The review draws extensively on the original concept documents on the description of the project undertaken for the Green Climate Fund and for the ADB appraisal process, and on experience in the project development processes under the SGDF.

II. CONTEXT OF THE GREEN FINANCE CATALYZING FACILITY IN SHANDONG

This section examines the policy context of the project, and the rationale for the design of the project in the context of potential ADB instruments that could have been brought for the financing of green projects. The review also lays the basis for a later discussion on possible extensions and upscaling of the concept.

NATIONAL AND PROVINCIAL CONTEXTS

National Policy Framework

As set out in ADB's Funding Proposal to the Green Climate Fund (GCF),⁶ the People's Republic of China (PRC) will play a pivotal role in managing the climate change challenge in the Asia and Pacific region, and can potentially act as a model for other countries in their efforts to build climate resilience, and in scaling up investments to support low greenhouse gas (GHG) development pathways. Cities in the PRC offer opportunities for effective investment in green growth. The PRC has doubled its urbanization ratio in the last 20 years to 57.4% in 2016 and has a target of 60% by 2020.⁷ Urbanization is a cornerstone of the structural reform of the economy, with an aim of reducing poverty and of transitioning to a more productive and service-based economic structure. Given the current structure of the economy and resulting level of GHG emissions,⁸ there is a huge need for investments in infrastructure and economic enterprise capital to henceforth be climate positive—that is, to reduce GHG output and/or increase the resilience of the economy (footnote 6).

To this end, the PRC is initiating systemic interventions to support such investments. In addition, numerous innovations have reduced GHG impacts especially as they relate to mobility: the use of transport-oriented development policies for intermodal connectivity (including last-mile bicycle sharing), increasing usage of disruptive digital payment for urban services, and renewable energy production. Further, environmental pollution co-benefits have, over the last 10 years, been a significant driver of action as the urban middle-class increasingly recognized and felt the impacts of air and water pollution. However, growth continues to be too carbon intensive and total GHG emissions have continued to increase. Thus, given the scale of the PRC economy, more effective action toward climate change mitigation is critical to achieving regional and global GHG reduction targets.

⁶ Green Climate Fund. 2019. FP082: Catalyzing Climate Finance (Shandong Green Development Fund).

⁷ Footnote 6, p. 11.

⁸ In 2016, PRC was the largest GHG emitter worldwide accounting for just under one-third of global emissions (10,151 metric tons of carbon (MtC) PRC versus 36,183 MtC Global). The Global Climate Risk Index ranks the PRC as the 12th most affected country by extreme weather events and estimates financial losses amounting to \$82 billion in 2016.

Under the 13th Five-Year Plan,⁹ the PRC actively promotes a paradigm shift from GDP-oriented development to a development model centered on quality of growth. To support this modal shift and the massive investments required, the PRC has, over the past 10 years, launched several strategic initiatives on climate change that build the foundations for strong supporting policies and regulatory frameworks. The *13th Five-Year Plan for Controlling Greenhouse Gas Emissions* has specific tasks to control GHG emissions by 2020; and set forth intermediary measurable emission control goals binding at the provincial and lower government levels. The associated policy, the *National Plan for Combating Climate Change (2014–2020)*, makes addressing climate change a major national strategy and requires integrating the requirements for mitigation and adaptation into the country's economic and social development (footnote 6).

Recently, the PRC announced new GHG emission reduction targets before signing the Paris Agreement¹⁰ at the Conference of Parties 21 in Paris. The Intended Nationally Determined Contribution details PRC's commitment to climate change actions by 2030 (footnote 6):

- to achieve the peaking of emissions around 2030 and making best efforts to peak early;
- to lower carbon dioxide emissions per unit of GDP by 60% to 65% from 2005 level;
- to increase the share of non-fossil fuels in primary energy consumption to around 20%;
- to increase the forest stock volume by around 4.5 billion cubic meters over 2005 levels; and
- to proactively adapt to climate change by enhancing mechanisms and capacities to effectively defend against climate change risks in key areas such as agriculture, forestry and water resources, as well as urban, coastal, and ecologically vulnerable areas; and to progressively strengthen early warning and emergency response systems and disaster prevention and reduction mechanisms.

In relation to green finance (See section on Landscape for Green Finance in the People's Republic of China for detailed discussion), a range of measures have been initiated. Plans for a green bond market were announced in 2013 as part of meeting the objectives of the 12th Five-Year Plan to transition to a low-carbon economy. Following the promulgation of country's Eligible Project Catalogue in 2015, the PRC became the largest issuer of green bonds representing a third of global green bond issuance, although it has subsequently fallen behind the United States (US) with a share of almost one-fifth.¹¹ In 2016, the PRC assumed the Group of 20 (G20) presidency and lead to a first-ever communiqué on green finance as a critical measure to support global sustainable growth. The same year, the State Council approved the "Guideline for Establishing the Green Financial System" to incentivize and promote green loans, green bonds, green funds, green insurance, and mandatory environmental information disclosure, among others. In 2017, the PRC launched the national carbon trading scheme which covers the world's largest carbon market, initially encompassing more than a third of the country's total CO₂ emissions per year (footnote 6). The details of references and summaries of these policy initiatives are discussed in the section on Landscape for Green Finance in the People's Republic of China.

Provincial Context

As set out in the ADB's Funding Proposal to the GCF (footnote 6), Shandong is a province with a large population (99.47 million in 2016) and makes a very significant contribution (approximately 8.9% in 2017) to overall national GDP and to growth.¹² Shandong is the eighth-ranked province in terms of provincial GDP per capita, and the provincial capital Jinan's GDP ranks 21st out of 34 PRC capitals

⁹ Government of the People's Republic of China (PRC), State Council. 2015. *The 13th Five-Year Plan for National Economic and Social Development*. Beijing.

¹⁰ United Nations. 2016. *Paris Agreement*. Paris.

¹¹ Climate Bonds Initiative. 2019. *Bonds and Climate Change: The State of the Market in 2018*. London.

¹² Shandong Statistical Yearbook 2017. <http://tjj.shandong.gov.cn/tjnj/nj2017/indexeh.htm>.

(footnote 6). Industrial development is strong and targeted for industrial transformation to support climate change adaptation and mitigation policies of the province (footnote 6). Shandong's workforce and extensive industrial investment are facing multiple climate vulnerabilities, especially climate-impacted water resources. Acceleration of urbanization combined with tight resource and environmental constraints will pose threats to Shandong's economic development and climate agendas. In January 2018, the State Council has approved Shandong as a comprehensive pilot area for shifting the growth paradigm in order to provide hands-on experience for the other provinces. Meeting the needs for economic transformation while achieving climate change targets requires better access to green finance, which the project aims to support.¹³

Shandong Province was selected as pilot for the project given its track record of focused efforts on climate issues and because the province is challenged by high GHG emissions deriving from its history of rapid industrial development.¹⁴ All provinces are required to incorporate the carbon intensity reduction goal into their economic and social development plans and annual plans. Shandong Province is required to reduce its CO₂ emission intensity by 20.5% by 2020, compared to 2015 levels, which is the toughest goal set at the provincial level. Under such pressure to reduce carbon intensity, Shandong is shifting from high-speed growth to high-quality development, and is in a critical period of transforming its development patterns, optimizing economic structure and transforming growth momentum (footnote 6).

ADB Response

ADB's country partnership strategy 2016–2020¹⁵ facilitates the government's reform agenda of "managing climate change and the environment." It is in this context that the ADB project in Shandong was conceived. Building on the concept set out in the ADB's Catalyzing Green Finance Report,¹⁶ and as further detailed in the succeeding sections, it was considered that a critical constraint to the climate positive investment needed was the supply of financial and project development support to such investments. Given its status both as a heavy emitter of GHGs and pollutants, and the commitment of the provincial government to address these issues, Shandong Province was chosen as the site of the first pilot of the green finance catalyzing facility (GFCF) concept set out in the report.

As set out in ADB's Funding Proposal to the GCF (footnote 6), the project aims to demonstrate transformative, advanced technology options and innovative and disruptive financing models that can contribute to achieving sustainable development, while achieving climate commitments. Further, given the PRC's high level of vulnerability to climate change and, in particular, that of Shandong where tens of millions of people and billions of dollars of economic product (estimated up to 3.5% of GDP lost)¹⁷ are impacted, it was considered very important that the facility would include the pilot of an effective adaptation financing mechanism, dovetailing with the PRC's own initiatives addressing climate impacts. Investments under the project will also contribute to several Sustainable Development Goals (SDGs): SDG 9, "Industry, Innovation and Infrastructure" building climate-resilient infrastructure and fostering new climate finance models innovation; SDG 11 "Sustainable Cities and Communities" making cities and communities more resilient, safe, inclusive, and sustainable; and SDG 13 "Climate Action" taking urgent actions to promote climate-related investments to combat the impacts of climate change. In particular, the project fosters a strategy of low-carbon infrastructure and industrial development, addressing the challenges posed by rapid urbanization, and upscaling action to meet the more ambitious goals of "ecological civilization."¹⁸

¹³ State Council of the People's Republic of China. Shandong to establish pilot zone for transformation of growth engines. http://english.www.gov.cn/policies/latest_releases/2018/01/10/content_281476008771590.htm

¹⁴ Shandong has the highest consumption of coal per capita/unit product in the PRC.

¹⁵ ADB. 2016. Country Partnership Strategy: *Transforming Partnership: People's Republic of China and Asian Development Bank, 2016–2020*. Manila.

¹⁶ ADB. 2017. *Catalyzing Green Finance: A Concept for Leveraging Blended Finance for Green Development*. Manila.

¹⁷ See Plan for Addressing Climate Change Shandong Province (2013–2020).

¹⁸ Harmony between human and nature resulting a low carbon economy. Green Climate Fund. 2019. FP082: *Catalyzing Climate Finance (Shandong Green Development Fund)*.

Thus, ADB aims to help establish the SGDF and to help develop a road map to catalyze private, institutional and commercial (PIC) funding both at the fund and subproject levels. It will provide up to 50% of funds contribution to qualifying projects for 5 to 10 years, lowering the risk profile of subprojects in order to leverage the remaining 50% of funding. SGDF will focus on (footnote 6):

- defining aggressive and time-bound umbrella climate change indicators in line with GCF investment criteria/framework and sector-specific transformational and advanced benefits' indicators to target better land use, water usage, sustainable and low-impact urban development and urban livability;
- developing a pipeline of bankable climate subprojects with at least 25% “transformational” and 50% “advanced benefits”—as defined by performance against the criteria¹⁹—beyond renewable power generation and including urban transport, water supply, sanitation, sponge cities and drainage, solid waste, recycling and waste-to-energy, and information communication technology for smart cities to reduce water and carbon footprints, and addressing the water–food–energy nexus at the core of its vulnerability;
- establishing a financing framework to incentivize such climate subprojects to explicitly crowd-in: (i) PIC finance into climate change projects and (ii) advanced technology to maximize environmental impacts and benefits to the population; and
- creating integrated monitoring, reporting, and verification (MRV) systems on both agreed climate and financial indicators based on climate investment eligibility criteria to measure climate impacts, and safeguards monitoring systems (the Environmental and Social Monitoring System [ESMS]).

LANDSCAPE FOR GREEN FINANCE IN THE PEOPLE’S REPUBLIC OF CHINA

The PRC has become a world leader in green finance which encompasses the needed climate finance investments. The PRC’s rapid economic growth in recent decades has relied on coal-based energy consumption, road-based transportation, and carbon-intensive industrial structure. The World Bank estimates that the (rising) cost of resultant environmental damages—including air, water, and soil pollution—will reach 3%–6% of GDP. The PRC’s government now recognizes the need to transition toward a green economy—for which transformation of the finance sector will be a central concern.²⁰

A key question is not whether the PRC can afford to make such a shift, but whether or not institutional arrangements are viable to make these investments. Critical in this regard will be the capacity of the financial sector to mobilize private sector funding for the green economy. In his book *The Economics of Air Pollution in China: Achieving Better and Cleaner Growth*,²¹ Ma Jun²² calculated that the financing demand for green transformation in the PRC would be around CNY4 trillion (approximately \$563 billion) annually between 2016 and 2020, and that the public could only fund 10%–15% of the funds needed.

The People’s Bank of China (PBOC) established a specialized technical advisory group under the China Society for Finance and Banking, i.e., the Green Finance Committee, to find the suitable

¹⁹ See Section 5.3.

²⁰ This section is largely taken from a position paper prepared for the European Union’s EC Link Project: M. Lindfield and M. Lund-Larsen. 2018. Blended Finance for Green Investment in China. EC Link. Beijing.

²¹ J. Ma. 2016. *The Economics of Air Pollution in China: Achieving Better and Cleaner Growth*. New York City: Columbia University Press.

²² Ma Jun is the chief economist of the Research Bureau of the PBOC (2014–2017), a current member of the Monetary Policy Committee of the PBOC, and chair of Supervision Workstream of the Central Banks and Supervisors Network on Greening the Financial System (NGFS),

solution for the PRC. The committee was mandated to lead the research on the role of financial market and the possibility of building a comprehensive green financial market. In 2014, the committee provided a set of recommendations to promote green finance, most of which were accepted by the top PRC decision makers in the Communist Party of China (CPC) and the State Council, and included in the *Integrated Reform Plan for Promoting Ecological Progress*,²³ released in 2015. In article 45 of this reform plan, “establishing a green financial system” was raised as a solution to promote ecological progress and a mandate to the PBOC for implementation.

Establishing the Green Financial System

Against the aforementioned background, the PBOC worked with six other ministries and jointly released the *Guidelines for Establishing the Green Financial System*²⁴ in 2016, setting up the world’s first comprehensive policy framework at the national level.

The guidelines were significant in several respects. First, they officially define “green finance” as financial services provided for economic activities that are supportive of environment improvement, climate change mitigation, and more efficient resource utilization. These economic activities include financing, operation, and risk management for projects in areas such as environmental protection, energy savings, clean energy, green transportation, and green buildings. They also define the “green financial system” as the institutional arrangement that utilizes financial instruments such as green credit, green bonds, green stock indices and related products, green development funds, green insurance, and carbon finance, as well as relevant policy incentives to support the green transformation of the economy, having pointed out the future directions for green finance innovation.

Second, the guidelines set forth additional “green” standards and criteria to determine what projects qualify as green projects and assets. Although the categories in the original guideline did not align with those adopted by the National Development and Reform Commission (NDRC), the PBOC’s 2020 green bond eligible project catalog now aligns with NDRC’s green industry catalog.

Third, they emphasize that the main purpose of building a green financial system is to mobilize and motivate more social (nongovernment) capital to invest in green industries, while also effectively curbing polluting investment. The guidelines promote incentives to support and encourage green investment and financing, including green credit to support fiscal subsidies, specialized guarantee mechanisms, re-lending, and the establishment of the National Green Development Fund. These are briefly described as follows.

Green credit serves as the foundation of the PRC’s green financial system. So far, the policy system for green credit has been established at the national level—the Ministry of Environmental Protection, China Banking Regulatory Commission (CBRC), and PBOC jointly issued the current Green Credit Policy in 2007. Further, relevant green economy sectors have adopted incentive policies to guide the investment of credit funds.

Locally, several pilot zones and some provinces or regions have encouraged green credit with monetary policy instruments. The total size of green credit remains stable, and 29 major banks in the PRC have been actively offering green credit services and formulating their own policy frameworks since signing an agreement in 2014. Banks in PRC have taken individual steps to promote green finance.

The Green Credit Policy also established a corporate credit database. The database contains a blacklist of companies that fail to meet environmental standards set by the MEP. Blacklisted companies are barred from loans due to their high energy consumption, pollution output, and/or environmental risks

²³ State Council of the People’s Republic of China. Full Text: Integrated Reform Plan for Promoting Ecological Progress. http://english.www.gov.cn/policies/latest_releases/2015/09/22/content_281475195492066.htm.

²⁴ The People’s Bank of China. Guidelines for Establishing the Green Financial System. <http://www.pbc.gov.cn/english/130721/3133045/index.html>.

they pose. A company can only be removed from the blacklist through proof of remedies for environmental violations. The MEP not only manages the blacklist of companies, but also communicates the list to the PBOC for inclusion on a corporate credit database. The CBRC then adds blacklisted companies to its compliance and monitoring systems. The CBRC also reinforced the policy by issuing instructions on assessing environmental risks in loan applications. Together, these instructions encouraged lending institutions to broaden the applicability of the green credits policy by classifying all projects in the PRC based on their environmental impacts.

Despite a decade of progress, the implementation of the Green Credit Policy in the PRC has had limited effect. Implementation could be improved with greater use of interest discounts and guarantees, better environmental information disclosure and sharing mechanisms to evaluate environmental risks, and prudent monitoring for incentivized green loans, which would help align the green credit definitions with other “green” standards. The policy is currently being revised.

Green securities have seen significant development since the release of the guidelines. Various incentive measures have made the PRC one of the world’s largest green bonds markets. In 2016, the PRC issued a total of CNY230 billion worth of green bonds in both the domestic and overseas market (39% of the global total). Still, the PRC’s green securities market faces challenges in its infancy.

More specifically, the PRC’s Green Securities Policy—issued by the MEP and the China Securities Regulatory Commission in February 2008—blocks companies or corporations in highly polluting industries from raising capital on stock exchanges by forcing them to disclose more information about their environmental record. This policy was reinforced by the introduction of a “green IPO” policy document in June 2008, which requires companies from 13 sectors that fall on the aforementioned blacklist to undergo an MEP environmental review before initiating an initial public offering (IPO) or obtaining refinancing from banks. This review is quite rigorous. The MEP launches a 10-day pre-IPO period that includes external consultations to gather public opinions about the IPO applicant. The added pressure of civil society and nongovernment organizations in consultations seems to be an effective tool for publicizing information and creating a more objective review of corporations.

Green insurance is a long-term mechanism to address environmental risks that has seen constant improvement in the PRC. Nationally, the MEP and the China Insurance Regulatory Commission jointly issued the mandatory pollution liability insurance system in February 2008. This reform, which obligates all industries with major pollution risks to undertake insurance, is undergoing public consultation and will soon be promulgated. Industries targeted by the policy include those that handle or dispose of high-risk chemicals and dangerous waste products; over 80% of large-scale heavy chemicals projects in the PRC are also located near dense urban centers or near environmentally protected areas. At the local level, 30 provinces have initiated pilot programs and/or guidelines for green insurance. Various regulations have since been issued to strengthen the policy and encourage the use of green insurance.

Beyond green credit, securities, and insurance, the PRC is experimenting with green taxes. The Environmental Protection Tax Law came into effect on 1 January 2018. Starting April 2018, the law taxes businesses and public institutions that discharge air, water, solid waste, and noise pollution. Such a system should induce a shift in the Chinese economy toward less-polluting activities and increase the share of green GDP. Importantly, the law replaces local pollutant discharge fees, of which the central government took a 10% cut. All the tax income now belongs to city governments. Cities could supplement this national tax law by offering tax preferences for green finance institutions and green bond investors.

The PRC is also considering imposing green taxes on fossil fuels such as coal, oil, and gas, in proportion to their respective environmental costs (a greater weight would be applied to coal, which is more carbon-intensive than gas). A fuel tax would be similar to a carbon tax and relatively easy to implement; it could encourage a shift of capital investments toward cleaner and alternative energy production sources for transportation, heat, and power generation. However, the tax would place a heavy burden on the more fragile segments of Chinese society. Taxing sulfur dioxide or other particulate matter is also a complex affair, similar to carbon trading.

Opportunities, Challenges, and Potential Pathways for Green Public–Private Partnership Models

Since 2010, the PRC has considered establishing a national green fund. Early policy efforts by the State Council to incentivize such a fund include:

- *Opinions on Policies and Measures for Investment and Financing Supporting the Development of Circular Economy* and the *Guiding Opinions of the State Council on Fostering Strategic Emerging Industries*, both issued in 2010.
- *Opinions on Strengthening Key work of Environmental Protection*, issued in 2011.

On 22 August 2016, the General Office of the CPC Central Committee and the General Office of the State Council also issued the *Implementation Plan of National Ecological Civilization Experimental Zone (Fujian)*. This explicitly promised support to “all kinds of green development funds and implementing market-oriented operation.”

Support for the introduction of PPP model to mobilize social capital is stated in Section 4 of the guidelines. Important points include (i) supporting the establishment of all kinds of green development funds and their market-based operations; (ii) local governments could support the projects invested by green development funds through measures such as relaxing market access restrictions, improving pricing of public services, granting franchises, implementing favorable fiscal and land policies, and improving benefit- and risk-sharing mechanisms; and (iii) supporting the introduction of the PPP model in the green industry; encouraging the bundling of energy saving and emission reduction projects, environment protection projects, and other green projects with related higher-return projects; and establishing a green service charge mechanism for projects with a “public goods” nature.²⁵ The MOF’s Clean Development Mechanism Fund (CDMF) has done good work thus far and represents a model for a single national fund. The National Green Development Fund Co. Ltd. was jointly launched by the MOF, the Ministry of Ecology and Environment and the Shanghai Municipality in July 2020, with a total registered capital of CNY88.5 billion.²⁶

As of 2020, the PRC’s overall policy framework supporting green finance is comprehensive. However, the implementation of policies needs better coordination across stakeholder authorities and needs to be pilot-tested at local level. Key constraints to overcome include:

- highly siloed institutional structures inhibiting collaboration and innovative combinations of instruments;
- non-transparency creating a less efficient application process for, and allocation of, funds;
- insufficient coverage of institutions—in particular, a national green bank and lack of project preparation capacity;

²⁵ China Daily. Guidelines for Establishing the Green Financials System. https://www.chinadaily.com.cn/business/2016hangzhou20/2016-09/04/content_26692931.htm.

²⁶ MSN News. National green development fund company established in Shanghai. <https://www.msn.com/en-xl/news/other/national-green-development-fund-company-established-in-shanghai/ar-BB-16N7LU>.

- fragmented and illiquid markets for key instruments; and
- a lack of knowledge and capacity relating to the financing and funding of green projects on the part of key implementation agencies—especially at the city level. New systems and tools can help fill gaps.

Going forward, both central and local governments as well as the private sector must agree on green development paths. The PRC should look to the following consensus that has emerged in the world of international finance:

- On the supply-side: new systems, competencies, and cultures are needed in financial institutions in order to green debt markets via product innovation (e.g., green bonds) and increase equity participation in green investment. In turn, this requires robust and unified standards, regulation, and potential tax incentives to advance long-term green investment flows and associated outcomes. Better information is crucial for embedding sustainability considerations in risk assessment and investment decisions.
- On the demand-side, cities and provincial agencies need to be strengthened in order to establish sustainable funding structures for green projects, and to choose the most effective and efficient financing for those projects.
- On the regulatory side, it is necessary to ensure (i) suitable precautionary measures are taken by financial institutions to avoid an accumulation of “stranded” polluting assets; and (ii) that fiscal policies are designed to provide targeted and efficient incentives to both financial institutions and implementation entities for investment in projects that will yield significant environmental/ sustainable development benefits.

A systematic approach to developing green finance in the PRC, with targeted policies focused on supporting cities that are developing a viable pipeline of green finance projects, could both unlock domestic opportunities for green economic growth and spark related developments internationally. Urban green development policies could build on major existing policies and initiatives for greener cities:

- The Ministry of Housing and Rural Urban Development eco-city pilot program to promote urban sustainability, part of the 11th Five-Year Plan (2006–2010).
- The NDRC has launched 81 low-carbon pilot cities in six provinces since 2010.
- The MEP and State Council issued tougher controls on urban air pollution in 2012–2013.
- The State Council’s National New-type Urbanization Plan. Issued in 2014, it sets indicators and targets for urban infrastructure and urban socioeconomic development.
- 21 Chinese cities in the Alliance of Peaking Pioneer Cities, which launched in 2015.

The policy support for new green financing instruments is in place, and considerable urban development experience, both positive and negative, has been gained. Thus, the GFCF modality, if implemented in Shandong, has a very high potential to be upscaled and replicated in other provinces. The application of the model will have to be flexible, however, as in other provinces it will meet a much wider variety of circumstances relating to the scale and capacities of potential host organizations and clients—both government and private sector. Such potentials are further discussed in Section IV.

ADB INSTRUMENTS

This subsection examines the options the ADB can deploy to support climate change investments and their potential use in relation to the SGDF. The range of potential instruments, similar to modalities also available to other international development banks, is wide. The key ADB instruments relevant to the development of the SGDF-type facilities are set out as follows, summarized from the ADB publication on Products and Financing Modalities.²⁷ The main instruments used are sovereign or sovereign-guaranteed loans, but it can provide a wide range of public and private sector structures such as bond purchases in the private sector, guarantees to both public and private sector entities, and equity contributions either directly or through funds.

Sovereign Operations

The main modalities of sovereign operations are:²⁸

- **Project lending.** Stand-alone sovereign and sovereign-guaranteed loan for an investment project.
- **Financial intermediation (FI) lending.** Direct lending to financial intermediaries to finance specific development projects whose individual financing requirements are not large enough to warrant the direct supervision of ADB. Financial intermediation lending can be provided on a stand-alone basis, or as components of sector development programs or sector or project loans.
- **Sector lending.** Assistance to a developing member country (DMC) for project-related investments based on considerations relating to a sector or subsector of the DMC as a whole. It is appropriate when a large number of subprojects in the sector or subsector are to be financed.
- **Multitranches financing facility (MFF).** Financial resources are provided in a series of separate financing tranches (loans, grants, guarantees, or administered cofinancing) over a fixed period of time. An MFF enables ADB to provide assistance programmatically by aligning the provision of financing with project readiness and the long-term needs of a client, thus facilitating a long-term partnership between ADB and its clients.

Project lending, focusing on one geographic area and usually in a very limited and institutionally related (i.e., one agency under the local government) set of investments, is useful for establishing methodologies for investment in relation to particular sectors and for pilots of particular technical approaches, and continues to be used in some provinces in the PRC. But given the sophistication and scale of issues involved in climate change investment, other more sophisticated approaches are needed.

Sector lending would be difficult to structure in relation to the multisector nature of climate change investments—these investments span a range of infrastructure sectors and of investments in enterprise capital which result in improving green outcomes. The MFF modality applied through a financial institution could be structured, but the pilot nature of the project, restricting the confidence relating to projections of future investment pipelines that would be the subject of subsequent tranches, argued for a single lending operation. While the sector or MFF modalities could have been chosen for the project (and subsequent related projects will indeed use alternative forms), the FI modality was chosen as most appropriate because it allows both the flexibility in relation to sectors chosen, the opportunity to

²⁷ See details at <https://www.adb.org/sites/default/files/institutional-document/33469/files/financial-instruments-procedures.pdf>.

²⁸ ADB. 2011. *Summary of ADB Financial Instruments and Approval Procedures*.
<https://www.adb.org/sites/default/files/institutional-document/33469/files/financial-instruments-procedures.pdf>.

build capacity for further such investment in the channeling institution, and the opportunity to leverage PIC finance if correctly structured. This modality also allows the required flexibility in achieving the subproject financing structures. For these reasons, and the fact that a sovereign guarantee was available given the strategic nature of the project, the FI modality was chosen for SGDF support.

Other potential sovereign modalities are (footnote 28):

- **Program lending.** Assistance for developing a sector (or subsector) and improving the performance of a sector through appropriate policy and institutional improvements. In the future, such a modality may be useful in establishing the enabling framework for GFCF-like interventions in countries where this is not present.
- **Sector development program lending.** Combination of an investment (project or sector) component and a policy-based (program) component as well as, where appropriate, related technical assistance (TA). Sector development program lending is considered when a sector requires both an investment component and a policy reform component, and where the former is unlikely to be accomplished in full and on time without the support of a policy-based lending component. Again this approach may be useful in establishing or expanding GFCF-like interventions.
- **Guarantees** (e.g., partial credit guarantees and political risk guarantees). Allow ADB to share a wide range of risks that are inherent to its own lending operations. Guarantees can only be provided where the ADB is “participating” in the financing in some form other than the guarantee. Any ADB financing instrument (such as project loans, program loans, MFF, sector loans, sector development programs, equity, project grants, TA grants, or any other financing form that the Board may approve) can satisfy the participation requirement for a guarantee provided that both the guarantee and ADB’s anchor intervention have the same development objective and relate to the same sector or project, and that the guarantee is processed according to standards that are no less rigorous than those for direct, noncontingent investments by ADB. In the future where financial institutions have some experience in, and are building their capacity in GFCF-type interventions, appropriate guarantees may be effectively deployed, especially to leverage international institutional funds (see Section IV).
- **Emergency assistance lending.** Provision of immediate short-term transitional assistance to mitigate immediate losses to priority assets, capacity, or productivity rather than to provide relief or comprehensive reconstruction. This modality is, as currently constituted, not applicable to GFCF-type operations. But the World Bank in Brazil is working on the structuring of a product for a national development bank (NDB) engaged in municipal finance in a range of cities, where the “emergency” would be a significant default by one of the borrowing local governments. The structure is in fact a guarantee, but potentially cheaper, and could be applied to an NDB offering a GFCF-type facility.

While not applicable to the circumstances in Shandong, these instruments could be part of an appropriate financing response in another context.

Nonsovereign and Private Sector Modalities

Where sovereign guarantees are not available, ADB’s nonsovereign and private sector operations can provide support to appropriate nongovernment financial intermediaries to undertake GFCF-type operations in the following forms (footnote 28):

- **Nonsovereign/private sector financial intermediation lending.**
- **B loans.** ADB provides B loans to private sector projects and enterprises to mobilize a larger amount of debt than would otherwise be possible with a project loan.
- **Equity investments.** ADB provides equity investments in order to facilitate the launching of new ventures or the privatization of state-owned enterprises. ADB can choose to invest directly, or through financial intermediaries such as investment funds.
- **Partial credit guarantees.** Partial credit guarantees provide comprehensive cover for a specified portion of the commercial debt provided by cofinanciers that the intermediary cannot manage.
- **Political risk guarantees.** Political risk guarantees are designed to facilitate commercial cofinancing by covering specifically defined sovereign or political risks that the intermediary cannot arrange cover for.

Due to the innovative nature of the SGDF operation and the policy importance attached to the development of a financing facility that would include a wide range of international participation including the first use of GCF investment funding by the central government, ADB and the NDRC determined that a sovereign lending modality would be more appropriate than use of ADB's private sector instruments in the case of the SGDF. Nevertheless, it would certainly be possible to structure such an approach using private sector institutions, and such an alternative approach can be considered in future operations as appropriate. Further discussion relating to the use of these instruments in relation to the extension of the GFCF concept is undertaken in Section VI.

STRUCTURAL BASIS FOR INTERVENTIONS PROMOTING GREEN FINANCE

Why is this Facility Important?

The urgency of upscaling investments in climate change mitigation and in adaptation to climate impacts is now a critical policy issue worldwide. Central to providing those investments are financial systems that provide both the resources for investments in required mitigation and adaptation measures (collectively “climate positive” investments) and incentives to maximize the impact of such measures. These resources far exceed those available to governments under present taxation regimes. Fortunately, many of the required investments are, or can be equitably structured to be, profitable to the private sector. In these cases, private finance is in principle available and such finance can make up a large part of the deficit in government resources. The SGDF case illustrates how a green fund is an integral part of a systemic response to upgrading the green finance system.

Key Constraints to Upscaling Climate Finance

While private sector finance may be in principle available, there are many instances where financial systems constitute a constraint to channelling such finance to climate investments. This may be because one or more of the following apply:

- project sponsors have insufficient capacity to formulate and structure climate positive investments,
- the local capital market is unfamiliar with financing the type of investment needed and

misprices risk,

- the local capital market is too short term for the longer-term payback periods required by many climate investments, or
- the capital market instruments are inappropriate for the types of investments required—either in scale or scope.

It is important to note that these constraints apply on both the demand and supply side of the market. It may be that the financial institutions supplying finance do not have the mandate, capacity, or instruments required, or it may be that agencies requiring investment finance may lack the technical and/or financial expertise to design and structure projects, or both. Any climate financing mechanism seeking to have a structural impact on upscaling climate positive investment needs to take into account both these sides of the market.

Despite these challenges, it is also true that in almost every country some priority is being placed on climate positive investment—usually driven by both policy and civil society—and that there is both interest and capacity to respond to this imperative on the part of the financial system.

Shandong Green Development Fund as a Model for Addressing Constraints and Catalyzing Green Finance

The successful establishment of a green fund is dependent on a conducive basic policy environment, but this process can also strengthen this environment. Key elements of this process are: (i) the regulatory framework; (ii) expertise to establish the fund; (iii) establishment of a pipeline of green projects; and (iv) mobilization of local and/or international cofinance.

Regulatory Framework

In the PRC, under the 13th Five-Year Plan,²⁹ the PRC actively promotes a paradigm shift from GDP-oriented development to a development model centered on quality of growth. To support this modal shift and the massive investments required, the PRC has, as we have seen, launched over the past 10 years several strategic initiatives on green finance that build the foundations for strong supporting policies and regulatory frameworks, for example, the *13th Five-Year Plan for Controlling Greenhouse Gas Emissions* (footnote 6).

Green finance policies—which typically include incentives for both climate investment and investment used to reduce pollution in any of its forms—generally provide a good basis for climate investment. Many climate interventions also address pollution and/or health and safety issues (i.e., they have important co-benefits). In the PRC, these policies are very advanced, but a more generic and less detailed environmental/green policy is a sufficient basis for the establishment of a fund. In Shandong, the national and provincial governments, given the policy commitments discussed above, were very supportive of using the fund to increase the climate performance. Assessment systems used in such a fund can be tailored to incentivize climate impact and thus to serve as a model for other elements of a green finance system. As shown in Figure 1, a green fund plays an important role in expanding the range of green investments that can be financed in the local capital market—particularly to encompass climate-focused investments.

²⁹ Government of the PRC, State Council. 2015. *The Thirteenth Five-Year Plan for National Economic and Social Development*. Beijing

Figure 1: Green Fund as Compliment to Greening the Financial System

Source: Author

Fund can act as catalyst for existing institutions to move into the space by de-risking and changing perceptions of risk as institutions successfully participate in financing. They can also address investments that are not currently able to be funded by existing institutions, piloting approaches that can provide the basis for regulatory reforms. To do this they need to be as flexible as possible in terms of investment scope and instruments used in order to maximize learning.

Given this capacity, the establishment of such a facility can be used to further develop the green policy framework within a country, agreeing on the definition of “green,” i.e., a green taxonomy and performance criteria, establishing realistic objectives for financial institutions, and supporting the development of a road map to green the financial system.

Implementation Capacity

Important to success is a structuring institution with sufficient resources, appropriate financial instruments, and capable of deploying significant concessional finance. In the case of the SGDF, ADB partnered with the Government of Shandong to undertake this role. It is not sufficient that the financial institution has the requisite technical and financial resources. Structuring such a facility requires strong cooperation on the part of the hosting institution and its regulators.

ADB was able to field a team of experts with experience in the PRC, and with ADB modalities under the mandate of the MOF and the Shandong provincial government. The process took over a year and utilized over \$500,000 in TA. The adoption of a standard “pass through” modality whereby the conditions of the ADB sovereign FI loan are mirrored from the MOF to the Shandong government meant that no special arrangements were needed. The existence of an established financial institution which had experience with ADB lending on these terms was also important. The Shandong team were able to elicit cooperation of potential project sponsors for pipeline development (see succeeding sections).

Such arrangements are possible and relatively routine in many of ADB’s DMCs and thus can be replicated. Where capital markets are deeper, more sophisticated structures are possible using the range of ADB instruments set out above.

Pipeline Development

The viability of the concept depends on the availability of bankable green projects. Given the strong policy context and commitments set out in the preceding sections, government implementing agencies,

state-owned enterprises (SOEs), and private enterprises were attuned to the need to identify such projects and to the prospects of obtaining appropriate finance for them from such a facility. However, the key problem encountered was, as expected, that project proponents had only a hazy idea of what constituted a green project. Further, given that the facility was intended to catalyze private sector funding, proponents were not clear on how projects could be structured so as to provide appropriate returns to private finance, while achieving a viable financing solution to the project.

Using TA resources, ADB assessed a range of projects at the pre-feasibility level, documenting estimated climate, environmental, economic, and financial performance (Section III). It is recognized that such a level of project development support will not be sufficient for some projects as they move forward to financing under the SGDF. To address this need, a project development facility was budgeted under the project. Loan resources will be used to deliver TA to project proponents in order to maximize the “green” nature of the project and for documentation. The TA will be folded into the financing of a project and is thus reimbursable.

Such a structure can be utilized in other countries, but where projects are less commercially viable and/or the concept to green investment is nascent, a separately funded project development entity may be more appropriate. Such an entity could use development assistance grant funds and/or highly concessional loans.

Mobilization of Local and/or International Cofinance

Shandong has a very sizable fund focused on providing support to the structural transformation of the provincial economy. These funds, in addition to the funds contributed by other international financing institutions (IFIs), constituted the remainder of the “patient capital” of the SGDF. The availability of local funding sources, mostly shorter term and higher cost, was established by ADB and the SGDF was structured to be able to incorporate such funding at both the fund and project levels.

The scale and terms of commercial cofinance varies widely across countries, but the structure of a green fund can be adjusted to cater to existing circumstances in the country concerned. Examples of different types of structures are set out in Section VI.

III. STRUCTURAL CONSIDERATIONS IN FUND DESIGN

After canvassing in detail the constraints that apply generally to green and/or climate finance, this section, which summarizes the main design considerations set out in the ADB's Funding Proposal to the GCF (footnote 6), examines in more detail the rationale for the project, both in relation to the specific circumstances of the Shandong government and enterprise in the Chinese capital markets, and in relation to the characteristics of climate change investment in the province that make it more difficult for city and private sector project proponents to access finance. This section concludes by setting out how the project responds to the constraints identified.

CONSTRAINTS TO CLIMATE INVESTMENT³⁰

Systemic Constraints to Climate Investment

Private sector finance for green infrastructure has been difficult to catalyze in developing countries. The key messages emerging from project sponsors in these countries and set out in ADB's Catalyzing Green Finance publication, describe a dearth of financing from local and international capital markets, particularly for greenfield projects. Institutional investors are reluctant to finance infrastructure; commercial bank lending for projects is stalled in many countries; and the expansion of green bond markets is constrained by inadequate regulatory frameworks and a lack of bankable and standardized green projects. Market returns matter to private, institutional, and commercial (PIC) financiers, as does scale—the occasional, poorly documented project, green or not, is not attractive. There are thus structural constraints to the market in private sector finance of infrastructure projects—to which, in the case of green infrastructure, is added a range of additional constraints reflecting risks inherent in green infrastructure. In particular, three aspects of green projects are cause for reticence on the part of PIC financiers. The ADB study summarizes these “market failures” as (footnote 16):

- **Green costs versus green revenues.** Incorporating green targets in performance requirements for infrastructure projects often add to project costs (as compared to a business-as-usual [BAU] specifications) in one or more of three ways: (i) through requiring more advanced (and thus more expensive and/or more risky/unproven) technology; (ii) through requiring more effective supervision of process and/or quality of inputs; and (iii) through better (and thus more expensive) quality and outcome monitoring, reporting, and validation (MRV) systems. Against this, green projects, particularly GHG mitigation projects, will often save significant money during their operational lives as compared to BAU projects.
- **Affordability issues.** In addition, the fact that many green projects will take place in sectors that are considered as “public goods” and have not traditionally recovered the full cost of provision through user charges/ tariffs constrains the ability to recover additional upfront costs. At base, this constraint is often limited by local affordability considerations.
- **Non-monetized benefits.** The third issue in green infrastructure is the lack of ability to monetize direct and indirect green benefits resulting from a project. These benefits, such as reduced air pollution, improved ground water qualities, or faster traffic flow rates, do not lead to increased revenues for the project. Real savings that do result, for example reduced regional health costs in the areas benefiting from the project, cannot be attributed to the eBus project

³⁰ This section is adapted from Part B, Section 3 of ADB. 2017. *Catalyzing Green Finance: A Concept for Leveraging Blended Finance for Green Development*. Manila.

generating the benefits. While there are theoretical ways to capture these “lost green revenues” through valuations of carbon credits, ecosystem services, co-benefits and contributions to SDGs, etc., there is no practical solution to this issue in almost all developing countries at the moment (Figure 2).

Figure 2: Market Constraints to Bankability in Green Infrastructure Project Financing

Source: ADB. 2017. *Catalyzing Green Finance: A Concept for Leveraging Blended Finance for Green Development*. Manila.

While these are the main risks relating to the finance market, available products, and project finance, there are a range of other constraints that apply to green infrastructure projects. These are grouped in Figure 3.

Figure 3: Green Finance Challenges and Constraints

Source: ADB. 2017. *Catalyzing Green Finance: A Concept for Leveraging Blended Finance for Green Development*. Manila.

Figure 3 illustrates the other major categories of constraints that compound the market, product and project risks, being:

- **Unsupportive institutional framework.** Political and economic uncertainty compound these market constraints. Such factors have a major impact on government revenues, infrastructure spending, and investor risk perceptions. In many high-income countries, lower levels of economic growth combined with constrained fiscal policies and ageing populations have contributed to national government spending constraints across all sectors. In many low- to middle-income countries, political conditions and poor institutions, sometimes combined with a hostile external environment, have reduced investor confidence.

In addition, the issue of price distortions, while beyond the scope of this paper, represents an important area of both necessary policy intervention and opportunity for shifting investment into more sustainable infrastructure. Removing fossil fuel subsidies can free up revenue for investment in green infrastructure. Putting a price on carbon together with enabling institutions such as carbon markets can incentivize the transition to a low-carbon economy.

Investors interested in green finance are concerned about uncertain political environments, where stability and the assurance of a continued policy focus on a green growth agenda might be absent. Finance for green projects is often made difficult by national systems where subsidies and tariff setting lead to market distortions in favor of environment-unfriendly practices. Certain sectors or subsectors are not sufficiently regulated and much-needed reforms have been blocked, preventing the use of legally binding regulations that could have sent clear signals to industries, consumers, and financial markets. Particularly in Asia, state-owned institutions continue to dominate the infrastructure finance and supply sectors, making the entrance of other actors into the market difficult (footnote 16).

- **Lack of capacity in project finance.** The enabling framework and regulatory environment for the green finance sector is often lacking. Relevant agencies need to issue guidelines to define what constitutes “green” in relation to specific financial products (refer to section on SGDF as a Systemic Response to Constraints to Climate Investment). Regulatory barriers limiting the scope and type of instruments or projects in which potential financing actors (insurance companies and pension funds in particular) can invest often preclude any infrastructure project let alone a green infrastructure project. Subsidized lending by government financial institutions may limit the entry of commercial banks into the market. The lack of competition may, in turn, stifle innovation, especially as it relates to green finance products. These constraints limit the liquidity of markets for specific instruments, for example, green bonds. Such lack of liquidity means that there is a lack of exit routes from a particular investment. Many types of PIC investors will thus be constrained in their investment in green projects.
- **Lack of capacity on the part of project sponsors.** These constraints involve a lack of capacities in project identification, prefeasibility assessment, and project 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 (footnote 16).

Public entities—which in many cases are responsible for large-scale infrastructure development projects—lack a collaborative style of cross-sector coordination and planning required by green projects, and this, in turn, 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 financing of their projects by investors and other potential private sector partners—either on their own or in public-private partnerships (PPPs). Further, for many such entities, options for asset-based financing (e.g., land value capture and property taxes) are often underutilized, beyond their legal mandate, or politically constrained, reducing their funding base (footnote 16).

The abovementioned constraints are often compounded by a perception that local governments do not have the basic skills to adequately prepare projects with ensuing 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 high in comparison to traditional projects.

Low levels of financial structuring capacity in many public sector authorities has meant an inability to structure sophisticated life cycle-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.

In the PRC, as discussed in the previous section, the institutional constraints in relation to regulation are being addressed. There are (significantly delayed) plans for the introduction of a carbon price. Various restraints, sometimes seemingly arbitrary, remain on what specific financial institutions can and cannot invest in. But in general, the institutional context is well advanced. In relation to project finance, the range of government policy and commercial banks is formidable and all are interested in green investment even though it currently makes up a small proportion of their portfolios. As discussed, the major constraint to expanding their portfolios is in fact the supply of bankable projects. Project sponsors are also interested in developing green projects, but both the rules-based regulatory framework and their capacity for structuring such projects constrains such development. But the key constraints occur at the market, product, and project level. At the product level, financial institutions are not set up to provide green project finance and from the demand-side, the same rules-based regulatory framework and skills constraints, reflecting the training of engineers and other professionals, constrains the formulation of truly green projects. Long-term projects with high upfront costs are thus difficult to both finance and formulate.

Operational Constraints to Cities and Local Governments

In this context, there is a particular set of constraints that apply to cities and local governments. Deriving from the market failures in the wider economy previously discussed, the ADB's Catalyzing Green Finance publication identifies six broad barriers that are important contributors to the lack of adequate supply of climate finance at the city level. Some of these barriers are commonly faced by all cities, while other barriers are more specific. The barriers identified include:

- Lack of upfront public capital. Many local governments lack the upfront capital to fund its investment priorities.

- Institutional inertia in local government funding and finance. The difficulty of changing investment patterns due to constraints on taxation types and levels, on charging fees (together with levels of fees), on levels and use of transfers, and on contractual forms for project procurement which limit potential project structuring options.
- Institutional capacity and mandate. National governments often constrain the ability of local governments to undertake and finance the project structuring activities needed, and many regional and municipal governments do not have the skills and resources to initiate projects or to act as bankable counterparties.
- Investors perceive local governments as significant riskier than national entities (often with good reason).
- Investors are likely to take a more pessimistic view of potential returns in relation to city-level projects especially in respect of their ability to make debt repayments and realize asset appreciation, relative to other sectors and asset classes.
- Investors possess insufficient information on the opportunities that exist, and track records of investments, at city level, undermining their ability to make a more informed view of a particular opportunity.

A large proportion of finance for investment in climate positive urban development will require public funds, as the direct returns on investment are insufficient to offset capital costs. This is particularly the case for low- and middle-income countries where consumer incomes may be too low to recover operational costs, let alone capital investments. This raises the risk for investors because they see that projects will require ongoing support of governments over a considerable time period. In some countries there is a lack of clarity and stability in the legal and regulatory environment for infrastructure investment at the subnational level, and thus the threshold risk-adjusted returns for private investors are further raised.

The Cities Development Initiative for Asia, as a project development entity focused on linking city investments to finance, did a comprehensive assessment³¹ of the operational barriers for cities to access/attract climate finance. Their conclusions were that the major demand-side barriers for cities to access climate finance fell into three categories:

- challenges in project development,
- institutional and governance barriers, and
- financial and funding barriers.

More recent, but more general, analysis has confirmed the thrust of the Cities Development Initiative for Asia analysis.³² The Cities Climate Finance Leadership Alliance has also identified several challenges to city climate finance which fall under these headings.³³

There are four dimensions which constitute structural shortfalls in existing climate financing mechanisms which prevent them from effectively engaging with cities. These mechanisms need to address the shortfalls in these dimensions to be applicable to cities.

- **Structures of access.** In many countries, assistance to negotiate with the main entry points for climate finance is needed by most cities. Local governments have few structural relationships with such agencies and speak a different technical language. Although local governments

³¹ P. Beltran. 2012. *International Financing Options for City Climate Change Interventions*. Cities Development Initiative for Asia. Manila.

³² For example, see The Global Commission on the Economy and Climate. 2014. *The New Climate Economy Report 2014*. Chapter 2 Cities.

³³ See CCLA. 2015. *The State of City Climate Finance 2015*. City Climate Finance Alliance. New York.

increasingly have environmental officers, they are generally institutionally removed from financing units. The structure of access to financing requires, in the first instance, applications which relate to objectives couched in language familiar to city officials and require data possible for them to collect. Such information can be supplied by specialized consultants, but cities have limited consultant budgets. More consultant inputs may be required to verify performance during implementation, requiring more consultant budget and budget for collecting the information required. There are long lead times and approval processes—difficult when officials are elected for 3 years. In summary, it is necessary to reduce the very high transaction costs of access to climate finance for local governments and groups of local governments.

- **Planning and project development.** Cities' planning processes did not, in general, consider climate issues and thus provided a poor basis for funding applications. This is changing, but cities still need support. Similarly city project development systems need to be structured to foster green design solutions and include climate finance into the design of the funding mix and the required MRV systems into the project design. These are specialist skills that many cities will never need "in house"—but must be available to them if they are to access climate finance.
- **Types and structures of instrument.** Once approval has been secured, financing comes for, and as an integral part of, a specific project. Failure may involve (as with Clean Development Mechanism) paying back financing, success means that you can apply for another grant—with the same transaction costs. These costs and potential costs are significant deterrents to many local governments. Where finance is dependent on market pricing, cost uncertainty deters investment decisions. Financing decisions may involve long approval times—providing opportunities for interruptions in the investment process on the part of new administrations. Cities often also require help in putting together the underlying financing of the project. In summary, the financing provided needs to be scalable and PPP-friendly.
- **Funding flexibility and partnerships.** Funding sources to repay finance and to cover that part of investments not financed are perhaps the major constraint to upscaled urban climate finance. Given most available sources of finance do not cover all aspects of project preparation and implementation, cities have to cobble together a combination of funding sources to develop and construct the project. This is difficult given varying objectives and access criteria. Further, cities' ability to use a wider range of funding sources such as land value capture is often limited, and, if available, the taxation rates are capped. Cities need to be able to access appropriate funds and to have the ability to leverage/ combine them for more impact.

Such shortfalls constitute major problems to cities accessing climate finance at all. They are even more of a problem if we consider what would be needed to allow cities to achieve the transformational investments needed to address climate change.

In the PRC, all of the above constraints operate at the local government level. Some cities have higher levels of project development and structuring capacity—or the resources to contract such skills. But all suffer from some level of constraint in (i) capacities to plan, design, and implement high-performing green projects; (ii) project development systems that link projects to optimal financing sources and ensure sustainability of underlying funding; (iii) poor structures of access to green finance and appropriateness of instruments; and (iv) a lack of clear green investment guidelines relevant to city projects.

SHANDONG GREEN DEVELOPMENT FUND AS A SYSTEMIC RESPONSE TO CONSTRAINTS TO CLIMATE INVESTMENT

Challenges and Project Response

Even with the breadth of green finance regulatory framework currently in place, traditional sovereign financing and banking systems have little incentive to cater to specific climate change investment needs (requiring financing to be longer-term, flexible as to structuring, and competitively priced as discussed further in Section V). A new approach is needed to unlock significant sub-sovereign finance for cities (especially from the PIC sectors). The project supports what ADB envisages as a long-term engagement in the PRC to finance a new generation of climate-resilient infrastructure subprojects with higher-risk profile that would otherwise rely on exclusively long-term sovereign funding or not proceed because of the public funding gap (footnote 6).

The project responds to six interlinked challenges to climate finance in the PRC that reflect those discussed in the preceding sections. These are the need to (footnote 6):

- (i) develop coherent, prioritized programs of investments to address key climate change impacts and vulnerabilities to mainstream climate finance into all infrastructure financing given the huge climate change impacts (estimated up to to 3.5% GDP loss);
- (ii) attract advanced technology, new construction techniques, and improved operational efficiency to develop transformational and advanced benefits for faster achievement of climate-related targets;
- (iii) broaden PIC financing, especially the growing pension and insurance funds to facilitate the flow of nongovernment (PIC) infrastructure investment finance to climate change subprojects to address the shortfall in public finance—including the lack of capacity of financing institutions to do sub-sovereign climate finance, climate change, and environmental co-benefits not translating into sustainable revenues; and a lack of liquid capital market instruments;
- (iv) address the “perceived” higher-risk profile of climate-resilient subprojects, from delays in approvals, land acquisition, and resettlement; construction risk from new technologies; enabling regulatory and tax conditions; demand risk in operations; unquantified co-benefits not translating into revenues; and a lack of liquid capital market instruments; all constraining PIC flows; and
- (v) strengthen low capacities to leverage sovereign funds through innovative finance structures; and
- (vi) delineate climate mitigation and adaptation project criteria, guidelines, and technical tools under the existing green finance framework.

To understand how these challenges have arisen, the supply and demand sides of the climate investment in the PRC are reviewed in the following sections.

Capital Market Constraints³⁴—Supply-Side Issues

Financial institutions and capital markets in the PRC have continued to grow rapidly to support economic growth. The banking sector, with total assets equal to more than three times the country’s GDP, is now one of the largest in the world. Capital markets, starting from a much lower base than the banking sector, have

³⁴ From Association of Southeast Asian Nations (ASEAN) Bond Market Initiative. 2018. Promoting Green Local Currency Bonds for Infrastructure Development in ASEAN+3. ADB. Manila.

stock market capitalization and total local currency bonds outstanding, each equivalent to about two-thirds of GDP (footnote 6).

While most savings continue to flow into the banking sector, ongoing reforms have supported growth in contractual savings. Insurance company assets now exceed 20% of GDP, reflecting real growth of more than 40% over the last 4 years. There are more than 4,000 social insurance funds administered by governments and state-owned enterprises, which traditionally have invested in bank accounts. Management of some of the larger funds is being passed to National Social Security Fund, which adopted investment policies more suitable for the long-term obligations of these social insurance funds. Enterprise annuities have grown modestly since inception. Mutual funds have grown fourfold over the last 3 years and are now equivalent to more than 12% of GDP (footnote 6). However, while capital markets are developing, the green finance component remains small—for example, on all Chinese exchanges only 0.6% of total debt outstanding is green bonds³⁵—and of debatable focus.³⁶

Table 1. People's Republic of China Financial and Capital Markets Overview, 2018

Financial and Capital Markets	Number	Assets (CNY billion)	Assets (\$ billion)	Assets (% GDP)
Banks and other deposit-taking entities	4,025	210,916.4	31,860.5	234.3%
Insurance companies	229	18,330.5	2,769.0	20.4%
Pension and social insurance funds				
National Social Security Fund	1	2,097.2	316.8	2.3%
Enterprise annuities		1,700.0	256.8	1.9%
Structured funds	5,580	12,896.1	1,948.1	14.3%
Stock market-listed company market capital	3,584	56,708.6	8,566.3	63.0%
Debt				
Government debt outstanding		32,985.7	4,982.7	36.6%
Corporate debt outstanding		1,400.5	211.5	1.6%

Notes: Data as of end-2018 except number of banks, number of insurance companies, and National Social Security Fund, end-2015. Number of banks at end-2018 comprised 3 policy banks; 6 large commercial banks; 12 joint stock commercial banks; 134 city commercial banks; and 3,870 other deposit-taking institutions including private banks, rural commercial banks, and rural cooperative banks. Exchange rate end-2016 (\$1 = CNY6.62), av-2018; GDP end-2018 (CNY90,031 billion).

Sources: All China Statistical Yearbook 2019 except St. Louis Fed database for debt statistics and KPMG for corporate pension assets.

In the initial discussions with potential project partners at the fund level and subproject sponsors at the project level, the inability of the banking system and capital market to supply the required finance for perceived higher-risk climate-related projects was a common theme—even from organizations that routinely tap such funding sources (footnote 6).

The financing made available under the project is targeted (climate-related investment), time bound (5 to 10 years), and transitional (SGDF finances up to 10 years with PIC refinancing afterward, if need be) to achieve the transformational and required leveraging effect. The project leverages public

³⁵ Z/Yen and Finance Watch. 2019. *The Global Green Finance Index 3*.
https://www.finance-watch.org/wp-content/uploads/2019/03/GGFI_3_Full_Report.pdf.

³⁶ See, for example, *Forbes Magazine*. 2017. Greenwashing: The 'Eco-Friendly' Scam Winning Over China's 1.3B Consumer Marketplace. 26 October. <https://www.forbes.com/sites/augustrick/2017/10/26/greenwashing-the-eco-friendly-scam-winning-over-chinas-1-3b-consumer-marketplace/#6ea1ca0facfb>.

and catalytic funds with PIC financing and does not create permanent market distortion as the climate-resilient projects would not be bankable without SGDF funding. Those projects are then re-financed with PIC funds once they have established steady commercial returns. Therefore, the project establishes bankability support conditions; incentive structures linked to climate resilience results; financial conditions and principles for on-lending based on government's policies; and exit and refinancing terms (footnote 6).

SGDF seeks to upscale the use, and maximize the impact, of green bonds (including climate bonds). Green bonds have also been much discussed as a solution for climate finance and have seen an increase in annual activity from 2014 to 2016 when almost \$100 billion worth of green bonds globally were issued. However, while green bonds raise funds from institutional and retail investors, if they have been mostly placed in the markets by governments, banks, or corporations on the strength of their sovereign or corporate balance sheets rather than the strength of underlying green projects, then their ability to channel funds to low-carbon development is limited by the fact of a limited bankable pipeline of climate-resilient projects. The PRC is the largest global green bond issuer, with a 40% share of the green bonds market (\$17 billion) in 2016 alone. SGDF seeks to raise capital for climate-resilient projects through the issuance of a targeted green bonds in the capital markets through asset-based securitization of the climate-resilient portfolio financed by SGDF, and well-balanced targeting 25% transformational (with "perceived" higher risk); 50% advanced benefits (medium risk); and 25% business-as-usual (lower risk) (footnote 6).

As discussed in the previous paragraphs, the majority of issued green bonds have resembled green "use of proceeds" or asset-linked bonds and not climate resilient bonds. But the project endeavor provides a vehicle for a much more targeted approach toward climate finance. Given their strict eligibility criteria, the climate-resilient projects will continue to meet government guidelines that will likely be tightened. Thus, it is envisaged that both the project itself could be recapitalized by bond issuance and that projects developed and financed by SGDF can utilize bonds either in their initial funding structure or to replace more expensive debt used during the project development phase. The SGDF's sub-funds also provide further avenues for bond issuance. Examples would be single-project bonds that provide exposure to specific low-carbon projects, or bonds that directly fund asset portfolios in climate-resilient sectors, such as offshore wind, solar energy, and energy efficiency (footnote 6).

SGDF is helping to overcome barriers such as affordability constraints, first-mover risks, behavioral and perceived risks, and low technology penetration rates; catalytic funds are proposed to be used as a 'seed' money (direct investment in climate-resilient projects and green businesses, key municipal and sectors' sub-funds, incentives, knowledge and policy support, preparatory technical assistance, etc.) to attract and mobilize PIC finance with staying power through de-risking structures and transformative interventions supported by SGDF as a mixed financing investment vehicle for the provincial government to achieve peaking CO₂ emission by 2027 (footnote 6).

Climate Finance Investment Needs in shandong province—Demand-Side Issues

The *Low Carbon Development Work Plan of Shandong Province (2017–2020)* is a detailed road map to reduce CO₂ emissions and meet carbon intensity goal in Shandong Province. The plan proposes that by 2020, the carbon emissions per unit area of GDP will drop by 20.5% from the 2015 level. Shandong also sets the goal for CO₂ emissions to peak around 2027, earlier than the national goal of around 2030. Specifically, the cities of Qingdao and Yantai strive to peak around 2020; Jinan and Weifang strive to peak around 2025 with specific timetables and road maps formulated. Shandong Province continues to promote industrial low-carbon upgrading through structural adjustment, focus on high-carbon industries, and reduce excess

production capacity. Meanwhile, as it intensifies energy-saving transformation from high-carbon industry to advanced, energy-saving low-carbon industry, advanced technologies are needed to upgrade the traditional heavy industries, such as cement and steel (footnote 6). Large-scale investments will be needed in the following sectors:

- **Renewable energy.** Shandong is making great efforts to decarbonize its economy. The province is accelerating the development and utilization of new energies: wind power, solar energy, biomass, bioenergy, and geothermal energy. By 2020, the proportion of new energy and renewable energy consumption will double to 7%. Through planning and implementing key projects such as Regional Energy Transformation Demonstration Project, Distributed Renewable Energy Demonstration Project, and New Energy Microgrid Application and Demonstration Project, Shandong Province continues to increase its supply of clean energy, shift energy development patterns, and boost the rapid development of renewable energy (footnote 6). Large-scale patient capital is needed for these projects.

Table 2: Key Indicators for Renewable Energy in Shandong Province

Energy Utilization	Utilization Scale			Unit
	2015	2020	2030	
Electricity Production	1,116	2,740	6,090	10,000 kW
Grid-connected wind power	722	1,400	2,300	
Solar	133	1,000	2,500	
Biomass	153	230	500	
Hydro	108	110	790	
Heat Supply (Cooling)				
Solar heat utilization	10,000	14,000	22,000	10,000 m ²
Geothermal energy	5,700	14,000	30,000	
Fuel				
Biomass briquettes	50	150	300	10,000 tons
Ethanol for motor vehicles	120	120	120	10,000 tons
Total utilization	1,103	3,349	5,426	10,000 tons standard coal

kW = kilowatt, m² = square meter.

Source: Green Climate Fund. 2019. *FP082: Catalyzing Climate Finance (Shandong Green Development Fund)*.

<https://www.greenclimate.fund/sites/default/files/document/funding-proposal-fp082-adb-china.pdf>.

- **Energy conservation.** Centering on key areas, including high-efficiency boilers, motors, distribution transformers, lighting products, comprehensive utilization equipment, new energy transportation tools, atmospheric treatment, and water treatment, Shandong Province looks to vigorously upgrade energy-saving and promote the industrialization of energy-saving transformation. Related provincial initiatives include planning to implement special park recycling reconstruction and green factory creation subprojects (footnote 6). Much investment in this area will need to be carried out by relatively small-scale enterprises unfamiliar with formal financing mechanisms and lacking the capacity to formulate, pitch, and implement green projects. Investments may thus need to be in intermediary facilitators which provide appropriate support and incentives to such enterprises.

- **Low-carbon buildings.** Shandong intends to establish a life cycle management model for green buildings, to implement green building standards for all green buildings, and develop prefabricated concrete slabs and steel structure buildings. By 2020, the green building design standards will be fully implemented within the scope of urban planning. Newly added, fully green buildings will be over 200 million square meters (sqm), and the proportion of two-star or above green buildings will be over 30%. The proportion of prefabricated building materials used in new buildings in both Jinan and Qingdao will exceed 50%. The newly built energy-saving buildings will exceed 400 million sqm. Over 30 million sqm of existing residential buildings with energy-saving retrofits and over 10 million sqm in public building energy-saving retrofits will be completed (footnote 6). As aforementioned, key challenges for implementation of these investments are the decentralized nature of the investment decision-making and the small scale of the individual investments. Thus, the challenge is to establish financing mechanisms that can aggregate, finance, and implement such investments.
- **Low-carbon transportation.** Shandong is setting up an urban climate-resilient transportation system and speeding up the construction of a modern integrated transportation system with “zero-distance transfer” for passenger transport; and “seamless connection” for freight transport based on low-carbon infrastructure. The province continues to promote the construction of non-stop electronic toll collection and service system on expressways; steadily promotes the construction of charging stations and charging poles in expressway service areas; develops intelligent traffic capabilities; encourages the use of rental agency modes to encourage clean energy transportation equipment; and innovate networking transportation; and other efficient transport organization modes, including hydrogen cells for mobility and solar roads (footnote 6). Very large-scale patient capital is needed for these investments and, given that they are public infrastructure and that many Chinese local governments are at the limits of their borrowing capacity, financing structures that do not involve local government debt will often be needed.

Shandong's *Implementation Plan for Accelerating the Ecological Civilization Construction (2017)* proposes a number of active measures for climate change adaptation. Efforts will be made to implement construction subprojects to adapt to climate change; and improve the adaptability of urban and rural infrastructure and the management of key sectors such as water resources, agriculture, marine resources, and public health. Large-scale investments will be required in (footnote 6):

- **Infrastructure.** Improve urban and rural development adaptability. Integrate low-carbon concepts into urban planning, such as low-impact development and construction with climate change factors fully considered. Strengthen the construction of urban lifeline systems such as water supply and drainage, heating, power supply, gas supply, and communications, and strengthen risk assessments for safe operations and improve adaptation capabilities. Strengthen the risk assessment of major transport facilities to adapt to climate change; improve design and construction standards for transportation facilities such as roads, railways, airports, and ports; and optimize the site selection plan and route design. Comprehensively strengthen the planning; at the same time, construction and management of urban underground comprehensive pipe corridors is encouraged.
- **Water resources.** Further protect water resources through water quality improvement, control underground water overexploration, and prevent sea water erosion. Utilize various water resources by expanding capacity of reservoirs, rainwater and flood water utilization, sewage treatment and reclaimed water reuse, seawater desalination, and direct utilization. Implement

water-saving and water conservation subprojects and strengthen the use of high-standard water-saving technologies such as agricultural sprinkler irrigation, drip irrigation, and micro-irrigation, and focus on building a number of highly efficient water-saving demonstration zones.

- **Agriculture.** Increase adaptive capacity of crops through farmland water conservation facilities, fertile soil engineering, and conservation tillage, as well as well-facilitated farmland.
- **Coastal protection.** Strengthen the integrated management of coastal zones. Implement coastal rehabilitation with 95% shoreline damaged by constructing high-standard shoreline breakwater embankments and seawall breakwater embankments; over 1,400 kilometers of new and improved breakwaters are already built and upgraded. Shandong can now concentrate on the construction of important ecological function protection areas and seawall highways and wetlands, and strengthen the establishment of coastal basal forest belts, protective forests, and wave-removing (purification) forest belts to build a coastal ecological corridor. Focusing on traditional ecosystems and important fishery waters at estuaries and bays such as the Yellow River Estuary, Laizhou Bay, and Jiaozhou Bay, Shandong is carrying out coastal wetland protection and restoration subprojects and shoreline restoration subprojects with a target of over 40% for the province's natural coastline retention rate by 2020.

The key issue for all these investments is that most are not of themselves either revenue-generating or cost-saving—which is often the case with mitigation investments. Thus, there is a fundamental issue relating to the financing of such projects, which must either have a sustainable source of ongoing subsidy or be structured so as to incorporate new revenue streams—either from better use of existing resources or from new forms of funding (e.g., value capture taxes/levies). In turn, the development of such projects are more complex and need more support.

In summary, the financing of climate investments such as energy efficiency, distributed energy, green building, low-carbon transport, and adaptation infrastructure have proved difficult in the absence of government subsidies—which are, in many cases, decreasing at the national level and restricted by constrained financing at the local government level. Longer-term, competitively priced finance is very constrained in the Chinese capital markets in general and for new types of green projects, in particular. Even with subsidy, adaptation investments are difficult to structure as revenue sources are often not obvious. The SGDF needs to respond to this context.

HOW THE SHANDONG GREEN DEVELOPMENT FUND ADDRESSES THE IDENTIFIED CONSTRAINTS TO CLIMATE CHANGE FINANCE

A problem tree (Figure 4) of the key issues was developed that responds to the four key causal constraints summarized in the previous analysis.³⁷

³⁷ This section is summarised from the ADB's Funding Proposal to the GCF Section C.1

Figure 4: Problem Tree for Shandong Green Development Fund

GHG = greenhouse gas, M&E = monitoring and evaluation, PIC = private, institutional, and commercial, TI = Transformative Investment.
 Source: Green Climate Fund. 2019. *FP082: Catalyzing Climate Finance (Shandong Green Development Fund)*.

The SGDF project was designed to respond to key causes and challenges identified in the preceding analysis. SGDF needs to both encourage the development of climate-positive subprojects and leverage its public funds to address the scale of the challenge. The objective is to tap new funding sources and leverage existing sources of finance into a pipeline of viable climate change investments by (footnote 6).

- Ensuring that SGDF addresses priority climate impacts and vulnerabilities in Shandong through the development of a portfolio-targeting mechanism informed by climate analysis, and by the development of green project assessment systems establishing clear definitions, guidelines, and incentive systems for climate finance following international best practices to ensure transformational change and a portfolio-targeting mechanism.
- Incorporating a project development facility to develop a pipeline of transformational, sustainable, and replicable projects based on high levels of performance against Green Climate Fund (GCF) investment criteria.
- Providing financial incentives for transformational projects based on technical, organizational, and/or financial innovation.

- Incorporating structures for leverage of PIC finance:
 - » using a mixed finance approach to extend existing financing mechanisms with the potential for pooled investment, take-out financing, and securitization;
 - » providing risk mitigation, reducing higher and upfront subproject risks;
 - » fostering capital market access and participation, with a road map to raise climate finance after the construction and establishment stage; and
 - » facilitating the participation of pension, social security, and insurance funds.

The project extends a long-term engagement between ADB and the PRC to finance a new generation of climate-resilient, low-GHG emissions subprojects with higher-risk profiles. Such subprojects either relied exclusively on long-term sovereign funding or stopped because of the public funding gap. From 2011 to 2016, ADB provided \$2.88 billion of climate financing from its own resources to the PRC, of which mitigation financing constituted \$2.07 billion. This represented 17% of ADB's total climate financing for the period. Estimates for 2017 show that out of \$4.5 billion in total climate financing, ADB invested \$1.1 billion to mitigate GHG emission reductions in the PRC. ADB-PRC-funded climate-related subprojects in the energy sector approved in 2017 alone will result in annual GHG emissions reductions of 12 million tons carbon dioxide equivalent (CO₂e). ADB intends to increasingly utilize its funding to the PRC to support its efforts to expand its climate finance initiatives and to make them more effective at addressing both climate and pollution challenges (footnote 6).

The catalyst role played by the international financing institutions (IFIs), in general, and GCF, in particular, is critical to the success of SGDF and therefore to support the low-carbon development policies of Shandong and the government's Intended Nationally Determined Contribution. The use of ADB (and cofinanciers) catalytic finance to provide a high level of cofinancing channeled through a financial institution is particularly well suited to support the PRC's climate investments needs. Such an approach can accommodate a wide range of interventions based on (footnote 6):

- (i) a robust strategic road map—tailored to Shandong's progressive climate change policies for mainstreaming climate finance;
- (ii) strong policy reforms and incentives through involvement in project formulation and through lending conditions covenanted in debt agreements;
- (iii) flexible financing instruments that can evolve with phased policy changes;
- (iv) improved support to local governments developing climate-related subproject pipelines, bolstering market and sponsor readiness; and
- (v) confidence in financing flows from PIC sources.

In this context, the project operates in an already established and rapidly evolving system of climate finance in the PRC. ADB is involved in several financing initiatives relating to investments in specific environment-related sectors including: (i) Air Quality Improvement in the Greater Beijing–Tianjin–Hebei Region; (ii) Low-Carbon City Program; and (iii) Yangtze River Economic Belt Framework. Based on these experiences and in partnership with PRC agencies, the project is designed to have a catalytic, qualitatively different role in relation to climate finance that will be complimentary to other facilities and institutions (footnote 6).

By addressing bankability and finance risk, being fundamental constraints on large-scale PIC financing, the project's blended finance approach supports the development of the PRC's vision on green finance. The project also supports the use of existing financing mechanisms, such as government

incentive funds, green financial instruments, and others (such as securitization) in green investments identified for financing under the project.

Quality and Efficiency Goals

Then there is the issue of quality. It is important to incentivize investment that pushes the boundary of technology and innovation—with the ultimate goal to get the maximum mitigation and/or adaptation benefit from the minimum investment cost. This may not be possible from the first investment in a particular technology. An assessment of potential is needed to assess investment viability, and such an assessment is included in the project assessment methodology set out in the succeeding sections.

While the mobilization of private sector money do not take place within the research and development (R&D) stage, given the existence of venture capital funds, private investment soon after the R&D stage is possible. High levels of failure need to be accepted.

Finally, there is the issue of efficiency. From an economic viewpoint, it is also important only to give the minimum incentive needed to achieve financial viability or compensate for external benefit. The former is a commercial judgment and thus the need for an experienced facility manager. The latter can be judged by the economic internal rate of return (EIRR) of the project. Ensuring that the EIRR is higher than a given hurdle rate indicates economic efficiency, given that the environmental benefits will be enumerated and compared to resource input costs (rather than monetary revenues and expenditures) that the project is economically viable.³⁸ The project is also evaluated against the cost per mitigation and/or adaptation benefits provided.

There is a clear need for catalytic action to address these three areas of systemic constraints, incentivizing innovation and fostering economic efficiency. To undertake the required actions, new financial structures are needed. ADB has developed an approach to designing facilities—referred to as green finance catalyzing facilities (GFCFs)—which can provide these structures.

In summary, the SGDF project responds to key challenges to climate finance in the PRC—being the lack of pipelines of viable climate positive projects, particularly new technology projects, inability of the capital market to address higher-risk profiles of climate investments and to attract PIC finance into such investments, and inadequate systems for defining, monitoring, and evaluating climate investments—identified by the Ministry of Finance (MOF) and ADB. Given, the scale of the problems faced in relation to green investment in Shandong Province and its previous track record with IFI financing, the MOF approved Shandong as a pilot for the GFCF concept in the PRC and thus the establishment of the SGDF.

³⁸ Ideally, social cost-benefit analysis would be used to take into account distributional implications, but the processes involved in measuring benefits among stakeholders are difficult and contentious. More direct methods of achieving social benefits and avoiding potential costs, such as setting targets for participation of certain groups (such as women) and using a safeguards regime such as the Equator principles or other multilateral development bank [MDB] safeguards) are more practical.

IV. FINANCIAL, INSTITUTIONAL, AND PROJECT FINANCING STRUCTURES OF SHANDONG GREEN DEVELOPMENT FUND

FINANCIAL STRUCTURE

Objective

Designing the structure of the SGDF required the assessment of available financing mechanisms within the PRC capital markets and combining them to address the structural problems set out in Section III and respond to the financial, prudential, and risk needs of the various potential participants. These key characteristics, as set out in the ADB's Funding Proposal to the GCF (footnote 6), responding to the constraints set out in Section III, can be grouped under three categories:

- (i) Ability to catalyze PIC finance. The structure must therefore be (a) open to other investors that almost certainly have different sector preferences, return requirements, and/or risk profile to that of the Shandong government and IFI investors; and (b) credible to such investors, both in terms of its ability to operate independently in relation to its choice of investments, distribution of profits, etc., and in terms of the capacity of its management.
- (ii) Ability to provide “green” project investments. The structure must therefore contain the ability to catalyze, monitor, and report on such projects, in turn requiring (a) the ability to support green project development and (b) an internationally-credible MRV system including agreed green indicators.
- (iii) Ability to engage with governments at various levels in order to encourage the development of an improved enabling environment based on an ability to feed back knowledge of what works to policy makers, and thus requiring capacity within management to assess such good practice, based on an MRV system that can provide relevant performance information.

Within the PRC capital markets there is a wide scope of potential hosting institutions and participants. This ranges from policy banks at both national and provincial level (e.g., China Development Bank and provincial development banks); Chinese commercial banks (e.g., the Industrial and Commercial Bank of China), foreign commercial banks; state-owned enterprise (SOE) government fund managers (e.g., Shandong Development Investment Holdings Group [SDIHG]) and Chinese commercial investment banks/financing companies, both acting on their own and as fund managers (e.g., China International Capital Corporation [CICC]); to finance companies and trusts that are not owned by banks (e.g., Ant Financial).

The challenge is to design a structure that provides the maximum range of potential participation—both at the fund level and at the level of project investments. Recent developments in prudential regulation have restricted the flexibility of certain institutions in terms of what type of financing they can enter into. Such restrictions potentially also limit the range of investors interested in projects. Thus, institutions with most flexibility need to be chosen as host.

Given the initiating role of the province, a Shandong institution was considered important as the core partner. Consequentially, the SDIHG was suited for the role, especially as it had the flexibility to establish a fund (the SGDF) under its umbrella with sufficient flexibility to allow participation of other

financiers. This modality is opposed to a “window” established at a policy or commercial bank. Such a structure is more conducive to the participation of other (debt or equity) investors.

The level of provincial SOE financial entity was also the lowest level that could benefit from the “passing through” of ADB’s public sector resources (using the financing institution modality), requiring a “back-to-back” guarantee from the MOF (guaranteeing ADB’s loan) to the province (guaranteeing the SDIHG’s use and repayment of the ADB’s loan to the MOF). ADB’s nonsovereign resources could be used for other entities, but at the cost of reducing potential concessionality, and thus reducing the range of potentially innovative projects financed.

A provincial SOE-anchored fund also allowed the participation of city and district governments within the province in the capitalization of the fund—both Qingdao City and the Laoshang District participated in a very significant way.

The fund structure under the SDIHG also facilitated the participation of a fund manager credible to a wide range of investors in terms of private sector experience and track record in innovation and financial performance—in these areas, CICC is well qualified (see section on Learnings on Design of the Management Structure for the Facility).

The resulting structure is described in detail as follows.

Structure

SGDF consists of a \$1.5 billion public–private financing facility targeting higher-risk climate-resilient infrastructure subprojects, green and high technology manufacturing businesses, and investment in municipal and sectoral sub-funds in Shandong Province.³⁹ All SGDF investments follow the principles, terms, and conditions agreed and approved by ADB and the cofinanciers, including subproject eligibility criteria, governance, implementation arrangements, environmental and social management system (ESMS), gender consideration, and monitoring and evaluation (M&E) and verification. The sub-funds adopt the same investment criteria and systems as SGDF does (footnote 6).

SGDF is structured as a limited partnership (closed end) and set up for 20 years under PRC laws and regulations. It is developed as a dedicated ring-fenced investment fund, managed by a fund management company (FMC) to (footnote 6):

- mobilize at both fund and subproject level additional capital from public and private sources, and
 - contribute to capacity development in the PRC, in general, and Shandong, in particular, for climate finance and climate resilience.
- » The Shandong Provincial Government (SPG) is establishing SGDF under an experienced financial intermediary, Shandong Development Investment Holdings Group (SDIHG), a state-owned enterprise wholly owned by SPG as implementing agency. SDIHG operates under the PRC Company Law and is financially autonomous. As a provincial investment platform to support infrastructure development and industrial transformation, SDIHG has experience in ensuring that planned investments meet broader policy requirements. Qingdao Municipal Government will invest in SGDF to: (i) strengthen Qingdao as a regional green investment center; and (ii) leverage its contribution with PIC finance to fund climate positive urban infrastructure and businesses locally. A fund manager incorporated in the

³⁹ Some investments may take place outside Shandong Province but would originate from Shandong.

PRC, CICC Capital Management Co., Ltd. (CCM), a subsidiary of a leading investment bank China International Capital Corporation Limited (CICC), was selected to manage SGDF (further discussion of CICC can be found in Section 5.8). Integrity due diligence was performed⁴⁰ on the project's stakeholders.

The financing plans to fund \$1.5 billion (CNY10 billion) for SGDF with public funding (over \$800 million), including catalytic funds from IFIs (about \$500 million). PIC funds invest as limited partners (about \$650 million) over multiple closes during the 20 years duration of SGDF. This results in a public–private fund with an overall ownership structure of 56% and 44%, respectively (footnote 6):

- **33%:** Catalytic funds (ADB, Agence Française de Développement [AFD], KfW—and the GCF) through SDIHG (Public);
- **25%:** Shandong Provincial Government and local governments (Public);
- **41%:** PIC investors mobilized by SDIHG (under multiple close fundraising); and
- **1%:** SGDF Fund Management Company as general partner (consistent with market practice).

Figure 5 illustrates the initial design structure of the SGDF without GCF participation.

Figure 5: Initial Shandong Green Development Fund Structure

ADB = Asian Development Bank, AFD = Agence Française de Développement, CCM = CICC Capital Management Co., Ltd., EA = executing agency, FMC = fund management company, KfW = Kreditanstalt Für Wiederaufbau, IA = implementing agency, MOF = Ministry of Finance, PIC = Private, institutional and commercial, PRC = People's Republic of China, QMG = Qingdao Municipal Government, SDIHG = Shandong Development Investment Holding Group, SPG = Shandong Provincial Government.

Source: ADB. 2019. *Shandong Green Development Fund Project: Project Administration Manual*. Manila.

⁴⁰ ADB. 2015. *Staff Instruction Integrity Due Diligence for Sovereign Operations and Cofinancing*. Manila.

The proposed structure of the SGDF features:

- wide participation of cofinanciers which could be further enlarged;
- separation of concessional finance streams that allows for judicious use of concessional funds (only sufficient to ensure the viability of the investment and that its external benefits match concessionality), tailored reporting, and verification of green impact;
- flexible (multiple) fund structures catering to differing requirements of investors;
- capacity to crowd-in private sector/ PIC partners at either the fund, sub-fund, or project level; and
- potential for additional cofinance at the project level.

SDIHG is discussing with several private and institutional stakeholders to invest funds into SGDF. Each investor, including SDIHG investing the catalytic funds from the IFIs, into SGDF is a limited partner. SDIHG and ADB agreed to jointly develop the SGDF with cofinancing from AFD and KfW, representing about \$500 million in catalytic funding. These catalytic funds from IFIs are mixed with public and PIC funds from various sources and managed by a FMC to finance climate-resilient subprojects. The FMC is structured as a co-general partner with SDIHG as a one co-general partner (50%). A professional fund manager—China International Capital Corporation (CICC)—has been recruited on a competitive basis from among the top-tier of asset managers in the PRC. The management fee (expected between 0.5% and 2% based on current market practices) was part of the competitive basis for selecting the co-general partner (footnote 6).

SDIHG has a dual role as limited partner into SGDF and as co-general partner in the FMC of SGDF. The governance structure of SGDF is presented in Figure 6 below (footnote 6).

Figure 6: Organizational Structure

CCM = CICC Capital Management, CFO = chief financial officer, ESMS = environmental and social monitoring system, GM = general manager, IT = information technology, M&E = monitoring and evaluation.

Source: Green Climate Fund. 2019. FP082: *Catalyzing Climate Finance (Shandong Green Development Fund)*.

The loans from the IFIs are senior loans with sovereign guarantees from the PRC. The Ministry of Finance (MOF) signs an on-lending agreement with the Shandong Provincial Government (SPG) against a counter-guarantee issued by Shandong Finance Bureau. SPG then signs an on-lending agreement with SDIHG against security (assets owned by SDIHG). The on-lending agreements between MOF and SPG and between SPG and SDIHG are signed to transfer the loans proceeds *pari passu*. SDIHG assumes the foreign exchange risk and the security risk (assessed at 3%), which will be recharged to SGDF. All the IFI loans are disbursed over 5 years and proportionally allocated to financing subprojects. The flow of funds is shown in Figure 7.

The Shandong government has sought participation from other governments in the province. Significant interest was shown from cities (and districts) wanting to establish credibility in green finance, a key policy initiative within the current 5-year plan period. Qingdao City, a city of some 8 million people located on the coast of Shandong, agreed to participate with some 25% of required equity of the fund. This flexibility in funding augurs well for the replication of the model—showing that, at least in the PRC, such facilities could conceivably exist at city level.

Cofinancing for the SGDF comes from AFD and KfW. Both agencies participated in ADB project development missions and reviewed ADB's due diligence, and will accept the reporting and safeguards processes of ADB during implementation. KfW helped fund the project preparation technical assistance of the ADB. Both cofinanciers' contributions are channeled, as with ADB, as sovereign lending to the MOF, with back-to-back loan from the MOF to the Shandong government and then to SGDF. This requires negotiating some regulatory complexity within the PRC development cooperation management

system, but such issues can be overcome. Both AFD and KfW have an extensive green mandate with ambitious targets and thus the project falls squarely in line with policy and lending priorities. The project also provides a vehicle for substantial funding and thus achieve economies of scale, which would be difficult to channel and achieve individually due to the tendency of governments to “spread around” concessional funding in small amounts. The fund also provides very significant leverage for AFD and KfW funds. In addition to these cofinanciers, other potential cofinancing is possible and expected from such entities as the European Investment Bank (EIB) on a project-by-project basis.

Green Climate Fund participation. The structure and systems of the fund were designed as compliant with the requirements of the GCF with a view to the GCF’s participation in the SGDF.⁴¹ ADB has conducted due diligence with the fund and the project has obtained a favorable opinion from the Independent Technical Advisory Panel. The revised fund structure design including GCF is shown in Figure 8.

Figure 8. Financing Structure of the Shandong Green Development Fund

CCM=CICC Capital Management Co., Ltd.; EA=executing agency; FI=financial intermediation; FMC=fund management company; GP=general partner; IA=implementing agency; MOF=Ministry of Finance; PIC=private, institutional and commercial; PRC=People’s Republic of China; QMG=Qingdao Municipal Government; SDIHG=Shandong Development and Investment Holding Group; SPG=Shandong Provincial Government.

Source: Asian Development Bank. 2019. From Concept to Project: Shandong Green Development Fund. *Presentation to the Ministry of Environment and Ecology*. 15 November. Beijing.

⁴¹ GCF approved participation in the project at its 24th Board meeting on 14 November 2019.

The GCF funding enhances the mixed-financing model of the SGDF because (footnote 6):

- GCF participation will allow more flexibility in assessment and final selection of climate-related projects based on the project's own climate mitigation and adaptation benefits (which will be maximized) and bankability (which will be improved), rather than the strength of the balance sheet of the project sponsor;
- funding from GCF will provide the necessary critical mass of catalytic debt (30%–50% of the project) to achieve a meaningful leveraging effect (at least 5 times) over a significant number of more ambitious climate-related projects (total projects financed at least \$7.5 billion over the 20 year-life span of SGDF through the revolving and reinvested funds); and
- the level of catalytic finance of the GCF's funding enables SGDF to enter sectors which cannot undertake structural change or interest the private sector, owing to the higher cost of climate positive investment, such as low impact development for sponge cities, urban sanitation, and circular economy; and produce more transformational and advanced benefits projects.

SGDF structured investment in sub-funds. Subject to satisfactory due diligence results and no objection from ADB, SGDF intends to invest into three municipal funds in the provincial capital of Jinan (2016 population: 6.33 million), Qingdao (2016 population: 7.91 million), and Yantai (2016 population: 7.06 million), and five sector funds. As low-carbon pilot cities under the government program, Qingdao and Yantai strive to peak CO₂ emissions around 2020, and Jinan around 2025 with specific timetables and road maps. The sub-funds are structured as limited partnership with a 10-year life span. The sub-funds complement SGDF's direct investment strategy. While the sub-funds will be managed by dedicated fund managers, SGDF takes an active role in the sub-funds, which all commit to comply with SGDF covenants and principles set and agreed to in the loan agreement with ADB and the cofinanciers. To date, one sub-fund has been agreed for Qingdao with the resources of that city, and can be organized on either a geographic or sectoral basis according to need (footnote 6).

The geographically focused sub-funds (for example, Qingdao) will be based in a specific city. The sector funds will focus on a particular type of investment (e.g., offshore wind energy). This flexibility has the potential to maximize the participation both of local governments and of investors interested in particular sectors. It also allows the fund to build up expertise in particular fields, reducing the due diligence and other transaction costs for the fund.

The fund management company. A fund manager incorporated in the PRC, CICC Capital Management Co., Ltd. (CICC Capital), a wholly owned subsidiary of China International Capital Corporation Limited, was selected based on the following requirements: (i) top-tier asset manager in the PRC; (ii) licensed by the regulator to operate a fund in the PRC; (iii) over 8 years of experience, including opening and closing a fund; and (iv) experience with public and donor funding mechanisms.

Private sector participation. As shown in the detail of fund structures under the FMC in Figure 8, there is scope for one or more additional funds. These funds are likely to be necessary if private sector investors are not using the same terms and conditions as the public sector investors, or have additional requirements as to choice of sectors or investment instruments. Private sector participation will also be seen at the project level either in the form of direct participation in the equity of the project or the taking on/ provision of additional debt.

SGDF support to green business. SGDF also looks for opportunities to invest into transformational climate businesses that support the Shandong’s policies of “Transition of Old to New Driver: Industrial Transformation” and “Coal Substitution and Low Carbon Action Plan.” The transformational aspects of the project represent a paradigm shift over the current climate investment business as usual, and are necessary for Shandong to meet its aggressive mitigation (and adaptation) targets identified in the mitigation and adaptation priorities. It does so by: (i) accelerating investments in new technologies, (ii) innovative applications of existing technologies, and (iii) mobilizing both private sector financing and private sector service delivery models. Paradigm shifts include transformational subprojects that may pose higher subproject risks, and the project strikes a balance between the mitigation/adaptation benefits and project risk by first applying green indicators based on GCF’s investment framework and then rewarding subprojects with high ‘green’ returns with access to catalytic financing (footnote 6).

Some of the potential transformational businesses are still in the research and development (R&D) stage and require strong public funding support and policy decision to go ahead, considering the large economic and environmental co-benefits associated with this type of subprojects. However, those subprojects could be funded within the lifetime of SGDF. Those transformational businesses headquartered in Shandong Province are a testimony to the commitment of the provincial government to develop policies targeting climate resilience, coal substitution, and low-carbon economy, and support businesses in line with those policies. Additional joint ventures promoting transformational and advanced practices for climate resilience are considered for cofinancing (footnote 6).

Investment Plan

SGDF’s proposed asset allocation consists of (footnote 6):

- 60%–80% into direct investment of climate-resilient infrastructure subprojects and green and high technology manufacturing businesses;
- 20%–40% into climate sub-funds for specific municipalities or sectors; and,
- treasury investment into AAA (domestic)-rated green bonds and other capital market products for liquidity management, if needed.

Any downstream investment of SGDF in climate infrastructure subprojects, green manufacturing businesses, and sub-funds will abide by the covenants and principles set and agreed with ADB and the co-financiers, including but not limited to governance, subproject eligibility election criteria, ESMS, gender, M&E, and verification. The funding of \$1.5 billion set out in the preceding tables is allocated as follows.

Table 3. Investment Components

Component	Subcomponent	Amount for the entire project (\$ million)	Amount for the entire project (CNY million)
Component 1.1: Financing Direct investment	Climate Infrastructure subprojects and Green Manufacturing	1,190	7,933
Component 1.2: Financing of Sub-funds	Municipal and Sectoral Sub-funds	300	2,000
Total project financing		1,490	9,933

Source: Green Climate Fund. 2019. *FP082: Catalyzing Climate Finance (Shandong Green Development Fund)*.

Additional components of the project generating outcomes relating to overcoming the key constraints to PIC finance identified in Section C and detailed in Section H are set out in the following table (footnote 6).

Table 4. Capacity Development Components

Component	Subcomponents (see detailed budget)	Amount for the entire project (\$ million)	Amount for the entire project (CNY million)
Component 2: Project Development	TA for design and financial structuring support	3.5	23.3
Component 3: Knowledge and Capacity Development	3.1 Capacity Development 3.2 M&E System Development 3.3 Green Rating System Development	6.4	42.7
Component 4: Policy Development	3 Policy Seminars	0.1	0.7
Total Project		10.0	66.7

M&E = monitoring and evaluation, TA = technical assistance.

Source: Green Climate Fund. 2019. FP082: Catalyzing Climate Finance (Shandong Green Development Fund).

ADB will provide funding for components 2, 3, and 4 under the TA program.

Review of Other Potential Forms of Participation and Instruments

While this structure has the flexibility to engage with most stakeholders, two specific areas are not covered. These are:

- guarantees and first-loss mechanisms; and
- exit/refinance mechanisms.

As Shandong is lower investment grade-rated, guarantees could provide a mechanism for attracting institutional finance for institutions needing higher levels of credit rating. International pension funds are such institutions (for a discussion of their potential resources, refer to Section IV).

For PRC institutions, a first-loss mechanism could be sufficient to provide the required risk mitigation. Although such sources are, as yet, very little used, their potential is very large—as attested by the extensive use of such structures to “crowd-in” PIC finance by the EIB.

Regarding exit mechanisms, loans mature and equity can be sold if there are available buyers, but SGDF envisages that some enterprises and projects will be profitable before loans mature or there is a liquid market in the shares of investee companies. In this case, the companies can issue green bonds to redeem SGDF investments.

It may also be possible for SGDF to securitize its revenue/dividend streams either as a portfolio or on a project basis by issuing its own climate/green bonds or asset-backed securities. SGDF estimates it may be in this position within 5 years. This mechanism will allow it to recapitalize and ramp up its financing of green investments.

Other structures could be added to provide for a wider range of risk preferences—including the tranching of bonds used to capitalize the facility.

These additional options for participation and use of other instruments were considered, but ADB decided that, for the first facility that was to focus on high-quality climate-related projects within the green finance space, it was prudent to keep the structure as simple as possible. Further discussion on structuring options are set out in Section VI.

KEY LEARNINGS FOR THE DESIGN OF A FACILITY

Given that the regulatory, capital market, and demand conditions vary from country to country and among regions and cities within a country, different administrations and agencies have different capacities on the demand-side. On the supply-side, different parts of the financial system are developed differently in terms of their ability to finance different sectors of the economy and different types of administrations. There is therefore no one-size-fits-all approach to the design of a facility.

However, there are several structural elements which all facilities have in common.

Structural Elements of a Facility

In general, the facility is set up as a separate “window” (line of credit) in a local financial institution—often a national development bank (NDB). Such a structure both grounds the facility in an institution that has the mandate for, and experience in, on-lending development assistance funds. In principle, there is no reason that such a facility could not be set up in another type of financial intermediary—a commercial bank or investment bank/ fund manager. The transaction cost of doing so would probably be significantly higher for all concerned, but there are potential gains in operational efficiency in some countries.

Given the characteristics of climate projects set out above, the facility will be in some regard “blended.” In other words, it will contain some amount of “concessional” finance which will be blended with market-based finance. The principles that determine the amount of blending are set out in the following paragraphs, but it should be first noted that there are different forms of concessional finance and different forms of market-based finance—again depending on the circumstances of the national capital market concerned.

The Facility⁴² should aim to blend finance at both the level of the Facility itself and at the project level (and also at the level of sub-funds under the Facility, if there are any). In other words it should attempt to attract non-concessional finance into the capital of the Facility and should leave space for such finance in the financial structuring of projects.

For the SGDF, the Shandong provincial government nominated an experienced financial intermediary, the Shandong Development Investment Holdings Group (SDIHG), a state-owned enterprise fully owned by the provincial government as the anchor institution. SDIHG is operating under PRC’s commercial law and is financially autonomous. SDIHG’s track record of successful investment, including co-investment with the private sector and in financing of private sector enterprises, provides a sound base for piloting the program. ADB integrity due diligence confirmed that SDIHG has experience in ensuring that planned investments meet broader policy requirements, including more stringent criteria applied under IFI financing (footnote 6).

⁴² We capitalize the word “facility” when referring to a specific organizational structure established for the purposes of climate investment.

Concessional and Non-concessional Finance

Depending on the levels of constraints applicable in the local capital market, a differing mixture of grant funds and concessional lending will be appropriate to capitalize the Facility. Concessional lending can vary from very low interest rate loans offered by some bilateral agencies, which in fact are below the notional cost of capital to those agencies, to MDB lending which is merely cheap by virtue of the fact that the MDBs can raise funds from the international capital market at very low cost because of their AAA rating and the fact that, because they do not have to earn a given return on equity and because they have a privileged status as lenders, they can pass these rates on to their clients in their lending. In principle, but rarely in practice, such concessional funds could be used as equity funding for the Facility.

“Market-based” funds are derived from private, institutional, and commercial (PIC) sources. Private funds are usually derived from private companies injecting equity into projects and/or undertaking to raise finance on their own balance sheets. Other sources of private funds are private foundations and contributions from communities directly, although, given the scale of investments required, it is most likely such contributions will not be a significant component of funding except at the local level. Institutional funds are derived from pension funds, insurance companies, and sovereign wealth funds. Commercial funds are from commercial banks and various types of listed and unlisted funds. Depending on their risk/return profiles and portfolio makeup, PIC funders may have very different preferences as to the type of investment made—debt or equity, eligible sectors, tenor, arrangements for exit, etc. These differences have implications for the structuring of the Facility.

Critical to the operation of the Facility is its mission as a catalytic financier. The Facility will thus wish to exit from an investment after some period which is less than the total investment period. This is central to the process of crowding-in PIC finance because it requires project sponsors to refinance. Again, this process will have implications for the structuring of the Facility.

Overcoming Structural Constraints in the Capital Market

The design elements of a Facility that address the key constraints to channeling finance to climate investments are:

- project development support to project sponsors which have insufficient capacity to formulate and structure climate positive investments,
- provision of risk mitigation appropriate to the local capital market,
- provision of long-term financing appropriate to the longer-term payback periods required by many climate investments, and
- provision of instruments appropriate for the types of investments required—either in scale or scope.

Funding, either as part of the loan or through an independently structured grant, is required for a project development mechanism and integrating this into the modus operandi of the operation of the Facility—generally, access to the mechanism is approved in parallel with the initial approval for a project to enter into a due diligence process. Project development support comes in two main types—actual planning/engineering design of a project to make it technically “green” and support to structuring the project so that the blended nature of the concessional/market-based finance sources used will be appropriate to the project.⁴³ While in principle if project sponsors had sufficient capacity, such a mechanism would not be needed, in practice it is ALWAYS needed.

⁴³ Generally in terms of leveraging the maximum amount of private finance possible with the minimum amount of concessional finance.

The provision of risk mitigation appropriate to the local capital market can be achieved in a variety of ways. The first level of risk mitigation is the “halo” effect of developing such a facility with an IFI. Most governments are extremely reluctant to allow defaults on projects sponsored by IFIs. Of course, this halo operates more effectively at the Facility level than it does at the project level. The effect of the halo is that PIC investors are more likely to provide funds and to do so at lower cost and longer tenor. The next level of risk mitigation is to use concessional funds to engage in various types of “investee-friendly” finance. Equity in the form of common stock or subordinated loans are two most common, ranking last and second-last in the recovery process in the event of a bankruptcy. Again, PIC investors are more likely to provide funds and to do so at lower cost and longer tenor. The third level of risk mitigation is for the Facility to offer, or arrange, for explicit guarantees to participating financiers. In this case, it is possible to target specific investors considered appropriate for the project or program concerned. For example, specific guarantees could be extended to international pension funds to provide guarantee “wrapping” of their participation in specific investments. These mechanisms also address the need for provision of longer-term financing appropriate to the longer-term payback periods required by many climate investments.

The introduction of a Facility that is capable of assisting project proponents in structuring projects, flexible in relation to debt versus equity versus guarantees, and one which has a significant scale is important in addressing the variety of scale and scope of financing required for the wide variety of climate investments. Facilities in the range of tens of millions of dollars cannot hope to be catalytic of projects that will have significant impact on mitigating GHGs in a particular area or in increasing the resilience of urban and rural populations. Further, different sectors have very different needs in respect of mobilizing the needed capital. E-bus projects may only need structuring through unbundling the provision of buses and secured availability payments to cover that provision. Resilience projects may need significant upfront grant input and financial structuring of a development corporation to tap long-term funding through property tax increments.

The design of the SGDF ensures that it addresses priority climate impacts and vulnerabilities in Shandong through the development of a portfolio-targeting mechanism informed by climate analysis, and by the development of green project assessment systems establishing clear definitions, guidelines, and incentive systems for climate finance, following international best practices to ensure transformational change and a portfolio targeting mechanism. It also incorporates a project development facility to develop a pipeline of transformational, sustainable and replicable projects based on high levels of performance against GCF investment criteria (footnote 6). Further it provides financial incentives for transformational projects—based on technical, organizational, and/or financial innovation; and incorporate structures to leverage PIC finance.

V. OPERATIONAL STRUCTURE

KEY CONCEPTS

Definition of “green”. The term is generally accepted to cover both environmental aspects (pollution, biodiversity, and water or air quality issues) and climate change-related aspects (reduction in GHG emissions, for example, energy efficiency and renewable energies, and the prevention and mitigation of severe events connected to climate change). It is generally accepted that processes in capital markets

need to be adjusted to meet green finance objectives, including in maturity transformation (green bonds, e.g., tend to be short- to medium-term, while pension funds and insurance companies need longer-term instruments), and in taking an holistic approach to risks.

In summary, the foundational definition for green finance is what constitutes “green” and “green investment” and encompasses any investment that mitigates GHGs, fosters adaptation of vulnerable communities to climate change, or reduces environmental pollution. In brief, it is “climate plus pollution.”

Critical to the consideration of what constitutes green finance is the distinction between “green finance instruments” and the “finance (and funding) for green investments.”

A green finance instrument, such as a green bond, is a financing mechanism that is available to those who warrant to spend the proceeds on a set of investments defined as “green”—see taxonomy of green investments in Section VI. Thus, these instruments typically mandate monitoring, reporting, and verification (MRV) systems which help verify that the proceeds were indeed spent on such investments—and sometimes rate the performance of the investments or entity using the instruments.

Finance for green investments need not necessarily use green finance instruments. Investment projects that fit within the agreed taxonomy can be categorized as “green” and any finance that facilitates these investments can surely be called green finance. This orientation is broad—let us use the term “green finance market” to distinguish what we are talking about from instruments—and, considering the supply-side of the market, the concept offers the opportunity to tap the much larger (both in number and size) corpus of financing sources that are potentially available for green investments.

In addition, this focus on markets raises the possibility of considering the demand-side of the market and the funding of projects—that is, the revenue streams that are needed to pay back financing. “Green funding” offers a socially acceptable brand that can encompass such unpopular things as surcharges on user charges and tax increments, but also targeted incentives (subsidies) such as floor space ratio bonuses.

Taxonomy of investments. Various taxonomies have been developed to define what sectors or subsectors and/or investment types count as “green” or “sustainable.” The European Union has drafted a comprehensive approach,⁴⁴ China’s Peoples’ Bank has its own definition (established in concert with a wide variety of PRC institutions), and the Climate Bond Initiative has a widely adopted taxonomy (Figure 9).

⁴⁴ See EU Taxonomy set out at https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/eu-taxonomy-sustainable-activities_en.

Figure 9: Climate Bonds Taxonomy according to the Climate Bonds Initiative

BRT = bus rapid transit, EE = energy efficiency, RE = renewable energy.

Source: Adapted from Climate Bond Initiative's Climate Bond Taxonomy. <https://www.climatebonds.net/standard/taxonomy>.

ASSESSMENT OF GREEN PROJECTS

Given that a project comes within a qualifying sector, the next question is: how good or green is the project? This question implies the setting of criteria and assessing projects against them. This is more complex than it appears. There are sets of indicators that have been developed for environment, social and governance reporting. But these indicators are too broad in the criteria they use for assessment to provide a good picture of “green” impact, not specific enough to reflect the quality and impact of a particular green project. Other approaches use the taxonomy referred to in Figure 9 and define which technologies constitute better practice. This begs the question: what about a better technology which is poorly designed and/or executed? The most comprehensive, performance-focused assessment methodology with international standing is the GCF’s investment framework which has six categories of criteria: (i) impact; (ii) paradigm shift potential; (iii) performance on economic, social, and environmental sustainability; (iv) justification of need; (v) ownership; and (vi) efficiency and effectiveness. The section on Criteria Overview will explain these in detail.

Projects can be assessed on these criteria and their performance graded. Such an approach was undertaken in relation to the ADB's SGDF which is structured for GCF financing and the methodology is discussed as follows.

As discussed in the foregoing paragraphs, incentivizing investment that pushes the boundary of technology and innovation is an important objective. Project selection and determination of eligibility for green financial instruments has previously been determined by whether or not the project falls within a given taxonomy. The Climate Bond Initiative is a good example of such a taxonomy. But taxonomies are only a general description of the categories of projects that are eligible by sector. They cannot, of themselves, incentivize innovation within these categories. To do this, each project needs to be measured in some way against best practice in the sectors that fall within a green taxonomy.

Best practice is, unfortunately, multidimensional. Innovation does not only involve technological change, but also change in systems and organization of provision. To assess performance in this multidimensional space requires these dimensions. To do so, a series of indicators are needed. Currently, the best and most comprehensive⁴⁵ set of such indicators is provided by the GCF's investment framework. This framework provides indicators over six areas of performance. In principle, projects can be scored in these—and are scored by GCF's Independent Technical Advisory Panel. The panel's scoring system is not documented, but a scoring system was developed for SGDF using both quantitative and qualitative criteria—depending on whether the criterion can be measured. The methodology for describing benchmarks for measured criteria is described as follows.

Benchmarks

Sectoral technical performance benchmarks can be established for each major investment sector, and a methodology is available to establish such benchmarks where these are not appropriate or in other sectors. The concept used in respect of GHG emissions rating established, in each sector, a base good technical practice or business-as-usual (BAU) GHG performance—for example, GHG (Scope 2) emissions of Euro 5 for buses in the public transport sector—constitutes the baseline for level 1 performance. The spectrum from current BAU to zero limit is then divided into three segments—corresponding to levels 1, 2, and 3 (best). The base concept used in respect of adaptation rating establishes, in each sector, current levels of impact in terms of people affected in a significant way—either directly or indirectly. For adaptation projects, a BAU project of good current practice (as established by experts in the sector) then establishes the BAU baseline (say, a 5% improvement in drainage coverage for a given area). The “zero limit” is then set—for example, reducing the area impacted by flooding by 30%. The spectrum from current good practice BAU to zero limit is then divided into three segments as with mitigation. The SGDF green assessment guidelines set out this process in detail.

In order to foster economic efficiency and provide the minimum incentive needed to achieve the potential external benefits of the investments, projects also need to be assessed against benchmarks. As discussed in the preceding paragraphs, the two key indicators relating to this issue are the economic internal rate of return (EIRR) and the benefit per dollar spent. In regard to the economic rate of return criterion, there is much debate about the hurdle rate. ADB guidelines allow 6% for an environmental project—which is considered to be very high by many experts in the field. SGDF adopts this value as a target, but allows for EIRRs to 4.5% in line with international practice.

Measuring the benefits per unit cost criterion is more complex—particularly for adaptation. For mitigation, the standard benefit indicator is considered to be the cost (usually in dollars) per ton CO₂ equivalent (tCO₂e). The international median level benchmark for this is considered to

⁴⁵ Although not perfect.

be \$60 per tCO₂e with a range of \$40 to \$80. For practical reasons, SGDF adopts the \$60 figure. Measuring adaptation efficiency is fraught with measurement issues. Ideally, the actual benefit to each beneficiary should be estimated and compared to the capital cost incurred. Methodologies to achieve this have been developed and, for example, the European Bank for Reconstruction and Development (EBRD) has clearly set out Climate Resilience Benefit methodology. The required data are extremely difficult to obtain in developing countries and establishing the benchmarks is by no means straightforward. As data accumulates on performance on this indicator, it will be possible to establish such benchmarks. However, given the level of resources available to most project proponents, estimating this figure is beyond what SGDF can require. Instead, it uses the measure of adaptation benefit required by the GCF—the number of people who directly and indirectly benefit from the project—divided by the capital cost. Even this level of assessment, admittedly crude, cannot yet be benchmarked, but the SGDF will have sector data to attempt such benchmarking.

Not only do indicators have to be developed, but these indicators have to be used and reported on. And performance against them should have consequences—both positive and negative. Systems that utilize agreed indicators need to be set up in the green finance market so financial institutions use common metrics to judge projects and government can design incentives to foster good performance. Further, on the demand-side, institutions should be incentivized to formulate and implement pipelines of “dark green” projects. In both cases, MRV systems need to be integral to business processes.

CRITERIA OVERVIEW

The SGDF has developed a set of criteria based on the GCF’s investment framework as the basis for project assessment. These same criteria should also guide project development. The priority for SGDF includes:

- Shifting to low-emission sustainable development pathways through investments such as:
 - » low-emission energy access and power generation;
 - » low-emission transport;
 - » energy-efficient buildings, cities, and industries; and
 - » sustainable, low-carbon land use and forest management.
- Increasing climate-resilient sustainable development for:
 - » enhanced livelihoods of climate-vulnerable people, communities, and regions; and
 - » investments to promote increased health and well-being, and food and water security as compared to under current climate trend.
- Resilient infrastructure and built environment to climate change threats.
- Resilient ecosystems.

The SGDF can potentially support investments in all these areas and, if the rationale is established, all other sectors under the green bond taxonomy.

By keeping SGDF criteria as close to the GCF criteria as possible, the SGDF has (i) adopted the only internationally recognized comprehensive green project assessment framework; and (ii) given the SGDF wanted to attract GCF funding either to the fund itself, the capacity to easily check and demonstrate that it is satisfying the GCF criteria. The GCF requires the preparation of a concept note

and a funding proposal that describe and assess any project on these criteria, but because these criteria are incorporated into the SGDF assessment, such documentation is not necessary for any SGDF project if the GCF participation is at fund level. The criteria and indicators are summarized in the Figure 10.

Impact potential: The project proponent must specify the climate mitigation and/or adaptation impact. The two core indicators for impact potential are (footnote 6):

- **Mitigation core indicator.** Total tCO₂e to be avoided or reduced per annum.
- **Adaptation core indicator.** Expected total number of direct and indirect beneficiaries and number of beneficiaries relative to total population (e.g., total lives to be saved from disruption due to climate-related disasters).

These core indicators should be based on supporting evidence for the project/program, including prefeasibility or feasibility studies. The methodology used for calculating the values should also be provided so that the values and underlying assumptions may be validated during the review process. Finally, the project proponent should provide a benchmark in a comparable context (e.g., country, sector, and/or technology) against which the indicator(s) can be compared—this will be used for ranking the performance.⁴⁶

In addition to the core indicators, project proponents are encouraged to provide specific values for other indicators as they see fit. As with the core indicators, the methodology used for calculating the indicators and values should be provided. For example, a renewable energy project or program may wish to provide the expected number of megawatts (MW) of low-emission energy capacity installed, generated, and/or rehabilitated (footnote 46).

⁴⁶ ADB. 2019. *Shandong Green Development Fund Project: Project Administration Manual*. Manila. p. 90.

Along with quantitative indicators, project proponents may wish to supplement with more qualitative information, such as the degree to which the proposed activity avoids lock-in of long-lived, high-emission infrastructure (mitigation) or long-lived, climate-vulnerable infrastructure (adaptation). The project proponent has significant leeway to respond to quantitative and qualitative factors that will strengthen their application (footnote 46).

Paradigm shift potential. In terms of paradigm shift, the application should address its achievement in relation to the factors below. The project proponent should provide the estimates and details of specific activities/ investments that will achieve the following:

- **Scaling up and replication for mitigation and adaptation.** The application should present specific values for scaling up and replication (e.g., a 30 MW hydroelectric power station that can be replicated at four different specific sites in the region). A proposal with a high potential for scaling up, for example, an early warning system for an individual province that can be scaled up to several surrounding provinces, should present a concrete plan to do so. A proposal with high replication potential, for example, a hydroelectric power station in a region with several potential sites identified in a supporting technical study, should also present specific replication opportunities that can be explored. Scaling up and replication potential will have a number representing the multiples of initial impact size combined with supporting justification (footnote 46).
- **Innovation.** Innovative ideas or elements should be highlighted and described by the project proponent. For example, fostering new market segments, creating business models, and/or developing or adopting of new technologies. Innovation is context-specific, and the application should specify the circumstances in which the innovation takes place (footnote 46).
- **Knowledge and learning.** Any potential for knowledge sharing or learning at a project or institutional level should be highlighted. For example, if the project/program will generate useful lessons learned, a plan should be elaborated that specifies how those lessons can then be captured and shared with other individuals, projects, or institutions, including through the monitoring and evaluation of the project or program (footnote 46).
- **Improving the enabling environment/improving regulatory framework and policies.** The sustainability of outcomes and results beyond the completion of the intervention should be highlighted by the project proponent. The application may elaborate on the arrangements that provide for long-term and financially sustainable continuation of key outcomes and activities. In circumstances where the planned activities do not generate financial reflows, a thorough explanation of long-term financial sustainability is needed. Project proponents may also wish to highlight the aspects of market development and transformation in which the project or program creates new markets and business activities at the local, national, or international levels. If the project or program addresses or eliminates systematic barriers to low-carbon and climate-resilient solutions, or changes incentives by reducing costs and risks, these aspects can be highlighted (footnote 46).

If the project or program advances national or local regulatory or legal frameworks and is expected to bring significant benefits in this regard, the project proponent should elaborate. Of particular interest is the shift or alignment of incentives to promote investment in low-emission or climate-resilient development, and/or the mainstreaming of climate change considerations into policies and regulatory frameworks at all decision-making levels (footnote 46).

Sustainable development potential: The project proponent must provide the expected environmental, social and health, and economic co-benefits. Also, it must provide an assessment of the gender impacts, which will aim to reduce gender inequalities in climate change impacts. These co-benefits and wider positive impacts may be drawn from an economic analysis of the proposed activities and can be strengthened with more qualitative factors. As with the impact potential indicators in the previous subsection, quantitative indicators should be used where possible, supported by an analysis or study. The calculation methodology should also be provided. Examples of sustainable development indicators include the following (footnote 46):

- Economic co-benefits, for example:
 - » total number of jobs created,
 - » amount of foreign currency savings, or
 - » amount of government budget deficits reduced.
- Social co-benefits, for example:
 - » improved access to education,
 - » improved regulation or cultural preservation, or
 - » improved health and safety.
- Gender-sensitive development impact:
 - » proportion of men and women in jobs created.
- Environmental co-benefits, for example:
 - » improved air quality,
 - » improved soil quality,
 - » water savings, or
 - » improved biodiversity.

Proponents may propose their own indicators that highlight the sustainable development potential of the project or program. In addition to the indicators mentioned, the project proponent may wish to include other indicators to support a strong narrative of sustainability—for example, support targeted and minorities or ethnic groups.

Needs of recipient: The two sub-criteria are:

- **Justification of SGDF financing.** For example in the absence of alternative sources of financing—project proponents may describe the barriers that created the lack of alternative funding sources for the project or program, and/or the unsuitability of the terms of finance such as tenor of loan (footnote 46).
- **Vulnerability levels.** Note that, while this issue will need to be addressed in a GCF funding proposal application, this sub-criterion somewhat duplicates issues addressed under the Impact and Sustainability criteria—this sub-criterion can be skipped for a non-GCF application in which case the criterion conflates to “justification for SGDF financing.”

The project proponent must describe the scale and intensity of vulnerability of the country and beneficiary groups, and elaborate how the project or program addresses the identified needs. Examples include: vulnerability of the country and beneficiary groups (adaptation only)—the

application may address the scale and intensity of exposure to climate risks for the beneficiary country and groups, which could include the exposure of people and/or social or economic assets or capital to risks derived from climate change. Exposure could be expressed in terms of size of population and/or social or economic assets or capital. The proposed activities may support specific beneficiary groups that are identified as particularly vulnerable in national climate or development strategies, which should then be highlighted with relevant sex disaggregation (footnote 46).

Ownership: Ownership is critical to the success of the project. The project proponent must provide details of:

- **Coherence and alignment with national and provincial climate strategy and priorities.** The application should detail how its objectives are aligned with the priorities in the country's national climate strategy. The project proponent may refer to nationally appropriate mitigation actions (NAMAs), national adaptation plans (NAPs), technology needs assessments (TNAs), or others, as appropriate (footnote 46).
- **Capacity of project proponent to deliver a green project.** The project proponent should provide a brief description of how the project will be implemented (e.g., local developers, partners, and service providers), and the roles these respective entities will play. The track record and relevant experience of the entities in similar or relevant project or program circumstances can be elaborated. The use of green procurement will be an important determinate of the performance in this indicator (footnote 46).
- **Stakeholder engagement process and feedback received from civil society organizations and other relevant stakeholders.** The consultative process must be emphasized in the description of the country ownership, both with the relevant national designated authority and with the wider group of stakeholders (footnote 46).

Efficiency and effectiveness. Economic and financial analysis primarily drives the efficiency and effectiveness criterion, and the application should make the case for strong cost effectiveness and financial soundness. The efficiency and effectiveness of the proposed financial structure is particularly important, as the requested funding should be the appropriate amount necessary, and in the proper form (i.e., proposed financial instrument) to make the project or program viable, but not more (footnote 46). These two indicators are standard tests for any development financing institution:

- Economic internal rate of return (EIRR)—the rate of return to the economy considering the economic costs and benefits of a project; and
- Financial internal rate of return—the financial return to the implementing enterprise.

Efficiency and effectiveness includes two core mitigation indicators. The project proponent must provide values and supporting justification, including the calculation methodology and citations of relevant studies, for these core indicators, if applicable:

- For mitigation, the estimated cost per tCO₂e (total investment cost/expected lifetime emission reductions)—a benchmark needs to be established, preferably by sector. These could be based on McKinsey PRC Cost-Abatement calculations or standard cost per tCO₂e as recommended, for example, by the World Bank's High Level Commission on Carbon Prices;⁴⁷—and for adaptation of the Climate Resilience Benefit as defined in the EBRD methodology is used to determine performance.

⁴⁷ World Bank. 2017. Report of the High-Level Commission on Carbon Prices. https://static1.squarespace.com/static/54ff9c5ce4b0a53deccfb4c/t/59b7f2409f8dce5316811916/1505227332748/CarbonPricing_FullReport.pdf.

- Expected volume of finance to be leveraged as a result of the fund's financing, disaggregated by public and private sources

In general, the economic and financial analysis, including the financial model, if applicable, should guide the preparation of the response to this criterion. Project proponents should set out, in particular, the assessment of financial viability and the appropriateness (need for) of using concessional funds; and of how the proposed financial structure (funding amount, financial instruments, tenor, and term) is adequate and reasonable to achieve the goals of the project.

Performance Assessment

Using a weighted set of these criteria, a project (broken down by components) is assessed according to both qualitative and quantitative benchmarks as falling into one of three categories—Good Practice (lowest), Advanced Benefits, and Transformational. Three levels were chosen as the maximum that can be used in practice and such a threefold division aligns with other practice, for example, in green bond assessment categories go from “light green” (lowest) to “medium green” to “dark green.” This is in contrast to the practice of the GCF's Independent Technical Advisory Panel which in effect uses a five-level assessment—low, low-medium, medium, medium-high, and high. Detail on the criteria for assessment is provided in Appendix 1. An assessment format is shown in Figure 11 together with the format used to track performance in the M&E system.

Figure 11: Assessment Format

Investment Criterion/Sub-Criterion	Component Assessment						Project Assessment		
		1	2	3	etc.		Average	Component Weighted Average	Overall Weighted Score
	Weight	.03	.03	.04					
Impact (E1)	25%								
GHG mitigation (tons)	0.12						#DIV/0!	0	0
Beneficiaries of increased resilience to climate impacts – direct	0.13						#DIV/0!	0	0
Beneficiaries of increased resilience to climate impacts – indirect									
Paradigm Shift (E2)	20%								
Scaling up and replication	0.05						#DIV/0!	0	0
Knowledge and learning	0.05						#DIV/0!	0	0
Enabling environment and regulatory framework (about policies adopted/implemented by institutions)	0.05						#DIV/0!	0	0
Innovation	0.05						#DIV/0!	0	0
Sustainable Development Potential (E3)	15%								
Economic	0.05						#DIV/0!	0	0
Social	0.05						#DIV/0!	0	0
- Gender									
Environmental	0.05						#DIV/0!	0	0
Needs of Recipient (E4)	10%								
Justification of additional financing	0.01						#DIV/0!	0	0
Level of vulnerability									

Figure 11 continued

Ownership (E5)	10%								
Ownership level	0.01						#DIV/0!	0	0
Capacity to implement									
Engagement with relevant institutions and civil society									
Efficiency and effectiveness (E6)	20%								
Economic effectiveness	0.05						#DIV/0!	0	0
Financial effectiveness	0.05						#DIV/0!	0	0
Cost effectiveness	0.05						#DIV/0!	0	0
Co-financing leverage	0.05						#DIV/0!	0	0
Score									
Check total criteria	1								
Check total sub-criteria	1								

GHG = greenhouse gas, SGDF = Shandong Green Development Fund.

Source: SGDF Green Assessment Guidelines. Taken from ADB. 2019. *Shandong Green Development Fund Project: Project Administration Manual*. Manila.

Figure 12: Reporting Format

SGDF Assessment Criteria - Consultant Assessment							
Investment Criterion/Sub-Criterion	Unit	Component Assessment					Total Project
	See Section 3.2 for indicators and standards	No. 1	No. 2	No. 3	etc.		
Impact (E1)							
GHG mtigation (tons)	tCO ₂ e						NA
Performance Indicator Assessment	1, 2, or 3 in relation to indicator eg., tCO ₂ e						
Beneficiaries of increased resilience to climate impacts – direct	people						
Beneficiaries of increased resilience to climate impacts – indirect							
Performance Indicator Assessment	1, 2, or 3 in relation to indicator eg. % population covered						
Sustainable Development Potential (E3)							
Environmental	pollution cobenefits total e.g. reduction in NO _x , coal						
Performance Indicator Assessment	1, 2, or 3 in relation to indicator eg. standards achieved						
Efficiency and effectiveness (E6)							
Cost-effectiveness	Euro/tCO ₂ e						
Performance Indicator Assessment	1, 2, or 3 in relation to indicator eg. McKinsey						

GHG = greenhouse gas, NO_x = nitrogen oxide, SGDF = Shandong Green Development Fund, tCO₂e = ton of carbon dioxide equivalent.

Source: SGDF Green Assessment Guidelines. Taken from ADB. 2019. *Shandong Green Development Fund Project: Project Administration Manual*. Manila.

PROJECT DEVELOPMENT AND POLICY ACTIVITIES

Support to Project Development Capacity

The Design, Review, and Advisory TA package supporting the establishment of the SGDF will provide resources to: (i) review project applications and feasibility studies; (ii) Green Assessment for projects using the Green Assessment Guideline; (iii) provide technical and sector expertise to project applicants and the fund management to increase projects' green rating, and provide access to innovative technologies and green the supply chain; (iv) provide green procurement advice; and (v) provide the technical inputs to the environmental and social monitoring system (ESMS) needed for biannual and annual reporting. The Design, Review, and Advisory contract will be implemented over a period of 60 months (footnote 6).

Policy Support Activities

A policy development consultant will work with SGDF to review projects developed and financed in order to derive lessons learned and best practice in the sectors concerned. The consultant will formulate recommendations on policy in relation to (i) dissemination of best practice in order to upscale and increase the efficiency and effectiveness of similar projects; and (ii) mechanisms to overcome policy, administrative, and financial constraints to increasing the efficiency and effectiveness of green investment in the sectors concerned. The consultant will design, organize, and facilitate workshops to promote policy reform in relation to the identified opportunities and constraints (footnote 6).

Knowledge and Capacity Development

Parallel technical assessment will undertake (footnote 6):

- **Capacity development.** TA consultants will support SGDF capacity development in relation to the identification and assessment of “green projects,” and options for financial structuring of such projects, in accordance with the definitions and processes of the GCF, in particular.
- **Monitoring and evaluation.** A monitoring, evaluation, and verification (MEV) contractor will be procured to assist SGDF with the reporting requirements of ADB and other SGDF investors. The tasks of the contractor will be to: (i) prepare a workplan, and training program for MEV, (ii) review project monitoring plans and monitoring reports, (iii) assist SGDF to prepare the semiannual ADB reports and support SGDF staff in MEV, (iv) assist SGDF to prepare the annual performance report (GCF format), and (v) make recommendations on focus areas for improved performance given an analysis of MEV data.
- **Green rating.** A Green Rating system will be developed by a credible, internationally recognized rating entity in order to: (i) demonstrate that fund-financed projects are both a green and a viable investment proposition; (ii) enhance transparency and facilitate an increase in the breadth of participation, the number of investors, and quantum of investment in projects; and (iii) aggregate knowledge on project performance to improve the programming of the fund, i.e., for project selection and for improving MEV of projects.

INTEGRATED MONITORING AND EVALUATION SYSTEM FOR SHANDONG GREEN DEVELOPMENT FUND

The design and development of an IT system to support the management of SGDF's portfolio of investments was incorporated into ADB's technical assistance.⁴⁸ The resulting SGDF INDEX⁴⁹ PPMS platform was developed from August 2018 to May 2019. In the process of its development, as described herein, SGDF INDEX came to incorporate aspects of a program performance monitoring system and of a project portfolio management system, hence be referred to as a PPMS. As such, it covers two sets of functions:

- (as a Project Portfolio Management System) to support the business processes of the FMC for investment creation and management; and
- (as a Program Performance Monitoring System) to support the FMC's reporting requirements to all stakeholders Shandong Provincial Government (SPG), PRC central government, ADB, and other lenders to the fund, and to fulfil public information.

Figure 13: Overview of Shandong Green Development Fund INDEX Functions and Key Stakeholder Entities

⁴⁸ Through ADB TA 9398-PRC: Green Finance Catalyzing Facility

⁴⁹ SGDF INDEX is a highly customized configuration of the IFCL INDEX platform, a cloud-based relational database management system used for development program, project, fund, and facility management.

Key Elements of System Design and Configuration

A key design concept was that the fund design should be completely integrated with SGDF's operational business processes. An analysis of the mandated monitoring and reporting requirements set for the fund by the ADB TA consultants was undertaken at the outset of the system design process. This entailed a report-by-report and data field-by-field cataloguing of the information management required under the environmental management system (EMS), environmental and social management system (ESMS), and project administration manual (PAM) written under the TA. This analysis revealed that these ADB project design documents together required the FMC to complete and submit periodically no fewer than 50 separate forms and reports (including, in the aggregate, several hundred individual pieces of data) for each fund investment.⁵⁰

These individual fields all must be stored, some in time sequences as they are measured and reported on at various points during the life of an investment, discretely in the database. Therefore, a painstaking process was undertaken to specify these fields; their data types (text, numeric, date, single, or multiple choice from stored pick-lists); as well as storing the possible choices. At all times, the basic tenet of database design was strictly adhered to, that each piece of data should be stored in only one field. Data are reported and recombined in several ways throughout the system, but at all times, there is only a "single truth" or single value for each data element.

An analysis of the proposed FMC's business processes was undertaken to ensure that the system could support all phases of fund operations, from initial evaluation of investment opportunity through to final repayment and exit. The FMC, being a new venture being undertaken by a public agency with no previous fund management experience, had no processes at that point, so the system design also became the de facto operations design for the FMC.

⁵⁰ One lesson learned is that in the future, ADB and its partners should take a much more holistic approach to fund design and operational planning, identify potential redundancies and contradictions among these three overlapping documents (EMS, ESMS, and PAM) and consolidate them into a single integrated and rationalized project planning document. This will also significantly reduce the costs and time needed for preparation of fund projects and similar facilities and programs.

Figure 14: Example of Fund Management Company Business Process Design

ADB = Asian Development Bank, AFS = audited financial statements, BOD/IC = board of directors/ investment committee, CAP = compliance action plan, CDM = clean development mechanism, DD = due diligence, DFI = development finance institution, EHS = environmental health and safety, FMA = financial management assessment, FP = financing proposal, GCF = Green Climate Fund, GRM = grievance redress mechanism, IA = implementing agency, ISO = International Standards Organisation, IEE-EMP = initial environmental examination – environmental management plan, NDA = nondisclosure agreement, PAM = project administration manual, PIAL = Prohibited Investment Activities List, PPMS = project performance monitoring system, RP = resettlement plan, SGDF = Shandong Green Development Fund, TAC = transaction assessment checklist.

Note: Top row shows documents and data specified in the ESS, ESMS, and PAM required as input or resulting as output of each step.

Source: Author

Key Functional Specifications

In the case of SGDF, ADB alone—in the EMS, ESMS, and PAM—requires the fund manager to submit at least 50 individual forms and reports per year, many with duplicated and redundant information. Many bilateral and multilateral funders (e.g., the GCF) require reporting of much the same information, but in a different format. Specific programs and projects often have their own data requirements, e.g., Green Investment Frameworks, to appraise or monitor investments.

The objective of the INDEX system was to ensure that the system would:

- avoid duplication of reporting (one entry per source of data for multiple reports);
- use a single source of truth principle (one database as source of data for all reports);
- provide user-friendly standardized reports structured by stage of project development; and
- provide a flexible management tool with the ability to filter overviews of the project portfolio view based on entity, project, sector, country, and other variables.

SGDF INDEX was configured to meet the following functional specifications, as developed in consultation with SPG and ADB:

- ease of data entry organized according to steps in the fund manager's business processes (Figure 2);
- monitor and report on projects in the portfolio, screened, filtered, and aggregated using any combination of financial and non-financial attributes (including green/climate indicators and green rating);
- create and validate financial planning and projections to model and structure optimal blended project financing (equity and debt), at the level of individual investees as well as of SGDF as a portfolio. Because SGDF itself is financed largely not through grant or equity contributions but through PRC central government borrowings from ADB, AFD, and KfW, most investments of SGDF will be in the form of loans to investees. Thus, the repayment flows of and yield on investments by the fund and (through SGDF investments) must be carefully matched to the fund's own liabilities to repay the loans;
- after program investments are completed, monitor financial status of investee projects, including cofinancing flows;
- report to funders and other stakeholders on individual projects as well as on the overall achievements of the fund and compliance with its indicators (financial, green/climate/carbon, social, environmental, etc.)
- ease of production of standard management and funder reporting in formats as specified in the EMS, ESMS, and PAM documents;
- for ad hoc data analysis, ease of navigation by fund management analysts around and through complex multi-tiered data;
- need to be able to see both the forests and the trees—aggregated investee and project data and also be able to drill down intuitively to the respective details;
- need for a customizable dashboard to show relevant overall portfolio data for portfolio management (to identify distribution or concentration of assets versus portfolio restrictions and guidelines) in various types of charts and map interfaces.⁵¹
- ease of filtering data for “cross-sectional” views across the portfolio (e.g., aggregation of financial information about investees or the fund's investments across a selection of, for example, investees in a particular sector, projects/investments at particular stages of preparation or implementation, or with other characteristics);
- the ability to aggregate chosen data within the group of selected projects or investees;
- the ability to easily build simple or complex reports to display/analyze the resulting aggregated data;

⁵¹ As INDEX's default Google Maps API will not function in the PRC, an alternative using Nokia's Here Map API was developed.

- switchable bilingual user interface based on internal dictionary tables to ensure precise consistent translations; and
- the ability to maintain user-entered data in Chinese language text fields as well as numeric fields.

Figure 15: Criteria Data Base, Geographic Information System Tagging, and Graphical Output

login.ifclindex.com/component/details/20814		
GHG Mitigation (tons)		Description
	Transformational	The combination of removing major truck traffic from city streets and replacing them with low/ zero emissions vehicles, and providing facilities for longer-haul more energy efficient freight vehicles is very best practice in the sector.
Beneficiaries of increased resilience to climate impacts – direct		Description
	Advanced Benefits	The construction of the break bulk areas, including the use of porous surfaces, will contribute to the reduction in runoff and the saving in water will be a useful contribution to the sustainability of water districts servicing the Stops. Estimated people
Beneficiaries of increased resilience to climate impacts – indirect		Description
	Transformational	NA
Other relevant indicators		
Scaling up & replication (about institutional structures)		Description
	Advanced Benefits	The project is designed to be financially viable, given the ability to charge for use of logistics hubs and vehicle fueling. The project is thus potentially replicable across the province and likely across large parts of China
Knowledge & learning		Description
	Advanced Benefits	The detailed operational knowledge will be retained by A2, but A2 sees, in addition to the potential for its investment in other expressway Rest Stops, the potential for providing consultancy services to replicate such investments.
Enabling environment and Regulatory Framework (about policies adopted/implemented by institutions)		Description
	Advanced Benefits	The Shandong Provincial government has indicated its willingness to pass enabling regulations to provide incentives for the use of such hubs - for example, strictly enforcing vehicle emissions and noise standards; and providing planning permission for upg
Innovation (about operational or financial technology – includes ICT		Description
	Transformational	The synergistic combination of operational technology proposed is path breaking both in China and globally.

\$ per state of preparation

All amounts in USD

Unclassified	158,931,029	21.65 %	Only concept available	143,700,000	19.57 %
Design and cost estimates ready	66,500,000	9.06 %	Technical option not established	31,500,000	4.29 %
Design is under preparation	333,500,000	45.43 %			

GIS = geographical information system, M&E = monitoring and evaluation, SGDF = Shandong Green Development Fund.
Source: SGDF M&E System Manual.

The system is designed to be transferable to other types of funds and to other countries/languages.

REVIEW OF THE GREEN PROCUREMENT FRAMEWORK

It is not just that the projects funded by the GFCF need to be “green,” it is also important that the process used in procuring the construction, fit-out, operation, and decommissioning of these investments must also be green. It is important that such issues be addressed by a Facility that can and wishes to tap international sources of green finance. In this regard, the European Union (EU) has a well-documented, well-developed, and comprehensive approach to green procurement and its guidelines are adopted as the basis of the approach set out as follows.⁵²

Only the main issues relating to green procurement are discussed. Standard good procurement practice is assumed.

Defining environmental technical specifications

Technical specifications have two functions:

- to describe the contract to potential bidders; and
- to provide measurable performance criteria against which tenders can be evaluated—this will involve specifying minimum compliance criteria. Offers not complying with the minimum technical specifications have to be rejected—unless variants are specifically authorized.

Technical specifications should be formulated by reference to Chinese, European, or other international or national standards and/or in terms of performance or functionality. The SGDF project encourages the use of EU Green Procurement Process criteria which are designed to be inserted directly into tender documents and include information on verification methods. Specifications may also refer to appropriate criteria that are defined in “labels”—for example, a “green star” rating indicating levels of environmental performance in buildings. When reference to a standard is used, the EU standard states that the reference should be caviated by the words “or equivalent”—in case a tenderer wishes to use an alternative valid standard (as determined by the tendering body). Technical specifications chosen should be formulated specifically in terms of the environmental and climate performance levels required of a product, service, or work. For example, a procurement may require that vehicles used do not emit more than a certain quantity of pollutants (specifying the Euro 6 label, for example).

A standard may also specify the production processes or methods for a good, service, or work. The environmental impact will often be greatly influenced by what a product is made of, how it is produced, or how a service or work is performed. Thus, materials and methods of production or provision can be taken into account when defining technical specifications—even if these are not the primary items purchased, for example, the tender may require the use of electricity which is produced from renewable sources.

Evidence of compliance with a standard is required. Such evidence may be in the form of a test report or certificate from a conformity assessment body. A tenderer may also seek to rely upon a manufacturer’s technical specification if it is not possible or feasible to obtain third-party evidence. The contracting authority must then determine whether the tenderer has complied with the tender conditions. Key determinants of how standards are used under the EU guidelines are:

- choice of performance-based or functional specifications,
- approach to use of variants,

⁵² EU Green procurement see: https://ec.europa.eu/environment/gpp/index_en.htm.

- selection and exclusion criteria,
- determining environmental technical capacity, and
- quality of environmental management systems.

Supply chain management measures

Since many environmental impacts of an item being procured are not the result of the use of the specific item but in the production of the item, it is important to consider its supply chain. For example, a PV equipment often may contain components that include metals and other substances which have a high risk that they have been produced using processes that cause environmental damage in their extraction and processing. As a result, the tender may have to specify how tenderers can establish the integrity of suppliers. The same can apply to “downstream” activities—for example, construction contractor may need to ensure that smaller subcontractors will implement sustainable practices on a works project. A key issue to be addressed in respect of supply chain management is the determination of exclusion criteria.

Award Criteria

For most contracts let under GFCF projects, more than one organization will be involved in a particular tender. In particular, companies bidding for contracts may decide to bring in specialist expertise to address green requirements—for example, a facilities management company may work with an environmental advisor to manage buildings in a more sustainable manner. In this case, the technical capacity and experience of all companies involved in the tender is relevant at selection stage. Tendering entities will thus need to assess both the primary contractor and any relevant collaborating entities to ensure that environmental requirements of the tender are met. The obligations of the collaborating entities should be made explicit by including in the awarded contract specific clauses and operational performance standards relating to subcontractors.

Where relevant at the selection stage, tendering entities should request:

- the proportion of the contract which the primary contractor intends to subcontract; and
- a clear description of the supply chain management and tracking systems that the primary contractor will apply when implementing the contract.

This information will help to establish how strong the environmental management systems of the contractors are, and thus the relative suitability of the prospective contractor on this criterion.

There is considerable scope designing environmental award criteria appropriate to the objectives of the tendering entity in general and to the specific project in question: These include:

- weighting approaches among established award criteria,
- the use of environmental management systems, and
- the use of life cycle costing.

Contract performance clauses for the supply of goods

For supply contracts, environmental standards can be included in the terms of delivery. Simple ways to improve the environmental impact of a supply contract include:

- having the product delivered in the appropriate quantity to minimize transport and handling impacts, and to minimize waste;
- requiring that goods be delivered outside of peak traffic times to minimize the contribution of deliveries to traffic congestion;
- requiring that the supplier takes back (and recycles or reuses) any packaging that comes with the product; and
- requiring the supplier to report regularly on the GHG emissions caused in delivering the product.

The EU procurement guidelines include standard green procurement contract performance clauses for the provision of works or services.⁵³

ENCOURAGING TRANSFORMATIVE INVESTMENT

Investments in the fund will be focused on the key climate priorities of the SPG as informed by the climate impact and vulnerability analysis conducted by the project. Based on the feedback from the capital market review discussed and discussions with potential clients in the province, a provisional financing plan was developed for different types of projects. The planned distribution of investment and potential exit strategies from these investments are set out in Table 5.

Table 5. Distribution of Investment

Use	Instrument	Percentage in Funding	Tenor	Return Expectation	Exit
Mitigation	Equity	<30%	N.A.	>12%	IPO/secondary sale/M&A
	Debt with equity component	30–50%	3–7 years	In line or at discount to benchmark lending rates, with equity upside	Redemption/conversion into equity
	Debt	Similar to below			
Adaptation	Mainly debt	<50%	3–7 years	In line or at discount to benchmark lending rates	Payback by project sponsor

IPO = initial public offering, M&A = merger and acquisition.

Source: Asian Development Bank. 2019. From Concept to Project: Shandong Green Development Fund. *Presentation to the Ministry of Environment and Ecology*. 15 November. Beijing.

The level of catalytic and financing terms and conditions provided by SGDF to a subproject is directly related to the climate-related categorization of the subproject in line with GCF investment criteria/framework, and cross-referenced with the financial indicator to secure bankability (footnote 6). Linking terms of finance to performance is critical in the project design. Performance at the level of advanced benefits attract the weighted average cost of funds for the SGDF, while good practice will incur a slightly higher (but still attractive) interest rate and transformational practice will be rewarded with a discount.

⁵³ See, for example: http://ec.europa.eu/competition/calls/2012_001_draft_service_contract_en.pdf.

Table 6. Incentive Finance—Linking Climate Performance to Investment Terms

Debt	Max Funding	Max Tenor	Interest Rate**	Equity	Max Funding*	Invest. Horizon
Transformational	67%	8 years	Discount	Transformational	50%	<8 years
Advanced Benefits	50%	6 years	In line	Advanced Benefits	30%	<6 years
Good Practices	25%	5 years	Premium	Good Practices	-	-

Source: Asian Development Bank. 2019. From Concept to Project: Shandong Green Development Fund. *Presentation to the Ministry of Environment and Ecology*. 15 November. Beijing.

PIPELINE DEVELOPMENT

Project Sourcing and Screening

Technical

ADB validated the SGDF Green Climate Assessment Guidelines (footnote 9) and the CO₂ emission reduction as well as the environmental and social co-benefits on 10 subprojects concepts, including three prefeasibilities studies on (i) Transformational Energy Management for Zero Energy—Zero Waste at Expressway Service Centers in Shandong Province: Low-carbon circular economy of service stations along the expressways based on micro-grid for energy production and distribution from renewable energy available locally and systematic enhancement of energy savings measures, allowing the setting up of service stations in isolated and remote areas without access to electricity; (ii) Solar Smart-Grid for Inclusive Access to Information Communication Technology in Shandong Province: Inclusive Photovoltaic Power Generation for telecom towers for mobile phones, WiFi and Internet of Things equipped with solar panels; and (iii) Large Scale Biomass Delivers Decarbonization and Improves Urban–Rural Linkages in Shandong Province: Carbon storage biomass renewable energy production in peri-urban areas (footnote 6). The total costs of the three representative projects is over \$600 million with total CO₂ emission reduction of 3.5 million tons per year corresponding to a displacement of about 178,000 tons of coal and resulting in the reduction of nitrogen oxide of 2,000 tons per year and sulfur dioxide by 3,700 tons per year. One subproject linked to fossil fuel (Improving Boilers Efficiency) was dropped and the other six subprojects are under preparation.

Economic and Financial Viability

Financial analysis was prepared to demonstrate that the SGDF funds will provide satisfactory returns from investments in climate positive subprojects. The analysis was prepared under the following assumptions: (i) type of financing debt/equity; (ii) climate performance good/advanced/transformational; (iii) tenure; (iv) financing terms and expected returns; and (v) subprojects and sub-funds. For debt financing, the assumptions were tailored to provide attractive funding to climate projects reflecting the catalytic terms of the funding from IFIs. The financial analysis shows that the investments will provide a return to the PIC investors that is commensurate with market standards and will provide a lower return for the funding from the IFIs and the PRC governmental investors, consistent with the project design: To use catalytic and public money to crowd-in PIC finance and provide affordable financing for climate positive subprojects. Under the assumptions made, the

financial analysis shows that SGDF funds will provide sufficient cashflow to SDIHG to repay the IFI debt and will provide the SGDF funds' private investors with a return on their higher cost of capital invested and return expectations (footnote 6).

Financial analysis of selected sample subprojects was prepared and demonstrated that satisfactory financial return of climate project investments can be achieved. Specifically, the analyses show that financial internal rate of return for the specific subprojects can be achieved at a level above 10%—estimated in nominal terms. Economic analyses prepared for the same sample subprojects include co-benefits of mainly GHG emission reduction valued based on recommendation by International Panel on Climate Change. Other co-benefits included reduction of air pollutants and gases as well as wastewater pollution. The economic analysis shows that the economic co-benefits added significantly value to the overall business case. Specifically, it demonstrates that the economic co-benefits added a minimum of 35% to the main financial related benefits. The EIRR analysis for the few specific projects analyzed showed returns at a level above 14% estimated in real terms (footnote 6).

Pipeline Project Examples

Prefeasibility studies have also been done on several green infrastructure projects in Qingdao. These projects are large and potentially transformational (and are rated as such, in preliminary due diligence). They form the basis of a transformative intervention described as a Green Corridor. The objective of the corridor is to reduce GHG emissions; increase resilience; and reduce pollution through coordinated investment in energy efficiency, public transport, and other climate-related sectors over a large area of the city. The two anchor projects for Phase 1 of the Corridor are:

Comprehensive Energy Efficiency Improvement Project for existing buildings in Qingdao

According to statistics, there are 25 million square meters (sqm) of public buildings in Qingdao that have not been retrofitted for improved energy efficiency, and there are 40 million sqm of old residential buildings with low level of thermal comfort and high energy consumption. Retrofitting these buildings has high potential for large energy savings. The Qingdao local Urban–Rural Housing Bureau has initiated a pilot comprehensive energy efficiency improvement project for existing buildings, which aims for energy saving and improving residents living conditions and now wishes to scale up this effort.

The project is designed to retrofit 15 million sqm of public and residential buildings in the next 5 years. The building retrofitting will meet government criteria on energy efficiency and conservation, and will utilize green building technologies—for instance prefabricated building technology and heating supply upgrading technology.

This project has two major components: (i) façade retrofitting, and (ii) upgrading heating systems. The project sponsor will utilize an “Engineering Gross Contract” for implementing the project. The estimated investment of this project is CNY2.2 billion in total, of which the project sponsor will self-finance CNY1.2 billion. The project sponsor is expecting to finance the rest of the investment through the SGDF, i.e., for CNY1 billion.

The project shall have a reliable income as local government will provide a subsidy of CNY150/sqm for the retrofitting work. The heating supply company will get user fee of CNY30/sqm after the building retrofitting.

The co-benefit of this project will be significant reductions of CO₂, NO_x, SO₂, and other particle pollutants. In addition, the energy conservation transformation will drive the development of relevant upstream and downstream green industries.

The focus area of the project will be aligned with one of the main transport corridors under the Green Public Transportation Demonstration Project, creating the backbone of a Green Corridor.

Qingdao Green Public Transportation System Demonstration Project

Qingdao is a “public bus demonstration city” nominated by the central government. Currently, there are about 6,000 buses in the city, operated by three major state-owned bus companies. The Green Bus System Demonstration Project has been designed to meet green and low-carbon development requirements, and also targets set under the low-carbon city program.

The Green Public Transportation system demonstration project comprises a number of subprojects: (i) network design optimization, investment is CNY2 million; (ii) bus lane planning in urban area (CNY1.5 million); (iii) ticket fare system research (CNY4 million); (iv) project risk research (CNY1.5 million); (v) bus depots construction (CNY240 million); (vi) purchase pure electronic buses to replace 953 traditional diesel buses (CNY1,048 billion); (vii) corridor development including intelligent electronic sign installation (CNY200 million), and other busway investments; (viii) charging piles installation (CNY126.8 million); (ix) vehicle battery recycling (CNY41.38 million); (x) smart dispatching system (CNY70.27 million); and (xi) energy efficiency management system (CNY6.9 million). The total investment for this project is CNY1.74 billion.

Among the subprojects, the project owner will implement components (i), (ii), (iii), (iv), (x), and (xi) by funding support from local government. The project sponsor is expecting subprojects (v) and (vi) to be financed by the SGDF. The financing requirement is CNY1.288 billion. The project has relatively stable revenue stream as there is ticket fare income approximated at CNY80 million per year, and additional income from advertisement and charging piles approximated at CNY120 million per year. As a public transportation system project, government will provide specific subsidies for the purchase of electronic buses and bus operation. The estimated subsidies are approximately CNY762 million for the procurement of 953 buses and a proportionate share of the existing CNY500 million per year for all bus operations.

As designed, the project is a good demonstration of green impact. The project will improve public transport services and encourage citizens to take public transport more frequently. The project will significantly reduce CO₂ emissions and, as a co-benefit, will reduce air pollution in general by replacing diesel buses and by exploring ways to apply renewable energy to replace electricity from coal power. Vehicle battery recycling will reduce environmental pollution and potential hazards caused by waste batteries. One of the main corridors in the project will be aligned with the focus area of the energy efficiency project creating the backbone of a Green Corridor.

LEARNINGS ON THE DESIGN OF THE MANAGEMENT STRUCTURE FOR THE FACILITY

The detailed structuring and operation of the facility will depend on an assessment of various factors. The major ones are:

- choice of host institution,
- choice of financing partners, and
- available options as to institutional form under the prevailing regulatory framework.

From these derive the operational workflow of the facility.

Host Institution Arrangements

The choice of host institution will often depend largely on government policy in the climate sector. Governments may have designated a lead agency in the climate finance sector and depending on its capacity, either a new financing window or a new legal entity operated by an organization more suited to the role may need to be constituted. This circumstance is, however, rare because the field is new and because many governments hope that a broad range of financial institutions will have a role in climate finance. In the absence of a designated entity, the choice of host institution will depend mainly on the mandate of the institution (specifically, its ability to finance both subnational governments and enterprises); its flexibility in choice of instruments (ideally, the ability to extend/ arrange various types of debt or equity and to extend guarantees and experience therein); and its capacity and experience as a partner with IFIs.

The host institution may be either a public or private entity. The most likely candidate institutions, given the said criteria, are national development banks (NDBs), but there is no reason that other public financial institutions or private entities cannot have such windows. If a multilateral development bank (MDB) such as ADB is lending to an entity through its sovereign window, then the use of a public national institution is often easier as procedures are often already established. However, sovereign guarantees may be extended to sub-sovereign entities in a number of ways and the use of sovereign modalities does not necessarily preclude the use of private institutions. Some usually very capable, private financial institutions also have experience with the groups within international financial institutions that engage with the private sector, such as the International Finance Corporation. The flexibility of the institutions concerned in relation to the range of potential partners, clients, and project scope and sectors will also have a bearing on the host entity chosen.

For the SGDF, the loans from IFIs (ADB, AFD, and KfW) are senior loans with sovereign guarantees from the PRC. The MOF signs an on-lending agreement with the Shandong Provincial Government (SPG) against a counter-guarantee issued by Shandong Finance Bureau. SPG then signs an on-lending agreement with SDIHG against security (assets owned by SDIHG). GCF financing will be channeled through ADB as the Accredited Entity for the project. The on-lending agreements between MOF and SPG and between SPG and SDIHG are signed to transfer the loans proceeds *pari passu*. SDIHG assumes the foreign exchange risk and the security risk, which will be recharged to SGDF. All the IFIs loans are disbursed over 5 years and proportionally allocated to financing subprojects. The Shandong government has also sought participation from other governments in the province. Significant interest was shown from cities (and districts) wanting to establish credibility in green finance, a key policy initiative within the current 5-year plan period. To date, Qingdao City (a city of some 8 million people located on the coast of Shandong and the Laoshang district (a district of Qingdao City) have both agreed to participate.

Financing Partners

The choice of partners for the facility has a critical role in determining the level of concessionality available, the attractiveness of the Facility to PIC financing, and the scale of finance available. Potential partners may be international or national entities from either the public or private sectors. There is no reason why all such entities cannot participate in such a facility. Indeed there are very good reasons—which have to do with scale, scope, and flexibility—that support the inclusion of the maximum number of these types of financing entities that is practical in the context of the capacities of the institutions involved and of the local capital market. For example, in certain circumstances it is practical to assume that such a facility could “crowd-in” a range of IFI financiers including the GCF, international institutional investors (probably subject to wrapping participation instruments in guarantees to ensure investment grade status), national institutions, commercial banks, private debt and equity funds, and private finance from energy performance contracting (EPC) and other companies. With the exception of the international institutions, SGDF has mobilized this coalition of financiers.

The choice of institutional form may, in some countries, be moot. There may be no alternative to the establishment of a credit line with an NDB. This is not the case, however, in most Asian countries. Capital markets are sufficiently developed that more ambitious structures that enable the crowding-in of a wider variety of participants are increasingly available. Factors in the choice of structure include:

- the size of resources on offer and the transaction costs and timing of availability of those funds—this will be the major factors in choice and prioritization of engagement with potential partners;
- the types of clients that are targeted; their status (government/SOE/enterprise), size, and creditworthiness in particular;
- the types of projects and sectors targeted; whether straightforward government or enterprise financing or PPPs; in what sectors (especially, as relates to the capacity for cost recovery and regulatory environment of the sector); and at what scale;
- the regulatory framework of the financing institutions participating in the facility; different financiers will often have differing requirements as far as the level of credit risk they are allowed to take and, in some cases, and have differing constraints on the types of instruments (debt/equity) and sectors in which they are allowed to participate; and
- given the aforementioned, the design of the legal entity or entities required for the Facility will follow.

The range of available options for legal entities is wide in most countries. If only local government infrastructure funded directly from taxes and cost recovery (such as water supply upgrades) are to be financed, a simple credit facility at an NDB is sufficient. But if enterprise financing or PPP structures are to be used, the capacity to structure and place private financing in projects will be important. The facility will then likely have to have the capacity to structure projects for such finance—requiring a project development mechanism—and the capacity to attract stocks of private funds available for debt and equity investments (and thus, in turn, the capacity to attract quality general partners)—and/or the capacity to include such finance at the project level.

Given the relatively advanced nature of the PRC capital markets and their familiarity with green finance principles, the SGDF is structured as a closed-end limited partnership (under a limited partnership agreement [LPA]) and is set up for 20 years under PRC laws and regulations. It is developed as a dedicated ring-fenced investment fund, managed by a fund management company (FMC) to (footnote 6):

- mobilize additional capital from public and private sources at both fund and subproject level; and
- contribute to building capacity for climate finance in the PRC, in general, and Shandong, in particular.

Critical to the operation of the facility and to the design of the institutional arrangements is its mission as a catalytic financier. The facility will wish to exit from an investment after some period which is less than the project life span. For the SGDF, this period is 7 years, but the period will be different in diverse capital markets. Given that ADB (and other concessional finance) is of much longer term than this, arrangements for exit and reinvestment need to be considered when structuring the facility.

Given the limited time horizon of facility investment and the range of risk or return profiles and sector preferences that such private financiers will have, it is highly likely that a number of funds may be necessary under the core facility. Thus, there will be two potential types of funds in the core facility. Given PIC investors will have divergent risk or return profiles, at least one fund will be required as the repository of such funds for the purposes of “blending.” Responding to the need to reinvest proceeds after exit, each “financing round” can also be structured as a fund.

In addition, if sufficient scale is likely to be achieved in a particular geography or in a particular sector, a sub-fund of the facility may be needed especially if there are key investors interested in that geography or sector. It is important that the governance arrangements, limited partnership agreements, and operational processes of the sub-funds mirror the conditions imposed by the mother facility.

The SGDF has two levels of funds—the operational core funds and the geographically focused Qingdao Sub-Fund. This structure allows the participation of the private sector at both the facility and project level, achieving a total leverage of the catalytic ADB and other IFI funds is estimated to achieve at least 2.5 million tCO₂e annual GHG emissions reduction, and at least 2 million people (of which 50% are women) benefiting from strengthened climate and disaster resilience.

Management Focus

Managing complex financing structures and deploying capital in a fair and transparent manner across a relatively large number of projects is a skill that not all investment banks possess. A qualified appropriate manager (general partners in fund structures) will be an important part of the Facility formation process. The SGDF established a clear set of qualifications and succeeded in selecting a quality general partner. Key aspects of the management of such a facility are:

- Attracting PIC finance at facility and project levels through contacts with established collaborating organizations and through contacts developed with organizations with a mandate to undertake green finance, and through the development of a qualifying pipeline of projects, structure appropriate investment vehicles under the facility that will allow it to bring together suppliers of finance and project sponsors needing finance.
- Administering calls for resource inputs from limited partners and others, and managing these inputs to ensure that the capital of all participants is utilized in a fair and efficient way and that such utilization is subject to quality due diligence which is shared with participants.
- Administering revenues from investments effectively, ensuring that proceeds are promptly and transparently allocated, as required, to debt service reinvestment, or to allocate proceeds according to the agreed distribution waterfall.

- Undertaking the project green assessment process: This involves setting up guidelines for project assessment and engagement of staff to manage the process and identification, and resources for specialist consultants that can provide guidance for, and opinions on, the self-assessments done as part of prefeasibility and feasibility studies work by consultants of the project sponsor; assist in the formulation of any important covenants which need to go into the financing documentation; and support progress review missions—ongoing monitoring of performance in relation to the assessment is important, as such performance has consequences for the terms and conditions of financing (Figure 16).
- Green procurement: Separate from the green assessment, but linked to it because use of this technique gives an advantage in the green assessment and fosters green procurement—the same staff for the assessment will oversee the process and again specialist consultants will need to be identified.
- Project development facility deployment and management: The criteria on which access is granted to the project development facility and the oversight of consultant procurement for project development will also need dedicated staff—given that this is a revolving facility, the contractual terms and conditions for its use and for payback of the financing will need to be established and monitored.
- Differential financing terms according to performance on assessment: Core to the incentive mechanism for innovation, efficiency, and scale of impact is a differential treatment of high-performing projects usually by extending the tenor and providing a better interest rate in respect of debt finance (incentives, such as forgoing dividends until a given return on sponsors' equity is reached, can also be used in respect of equity contributions)—the SGDF uses three levels of performance with the medium-performing projects attracting the (relatively low) cost of capital for the Facility with lower rates for high-performing projects cross-subsidized by higher (but still attractive) rates for the lowest⁵⁴ category of performance.
- Continuing regular supervision of projects in relation to both financial and green performance: Biannual⁵⁵ reviews should engage all staff and relevant consultants to check conformance with covenants and other contractual agreements.
- Taking appropriate action if review missions find breaches of agreements: Adjustment of financing terms if either financial or green performance flags, or undertaking mitigation action if safeguards standards are breached.
- Managing M&E/reporting systems: Establishing and maintaining these systems is a critical element of Facility management that can reduce reporting effort based on consolidation of information used: It is highly likely that, despite best efforts on the part of all to minimize the reporting burden, a significant number of reports⁵⁶ will have to be issued and that these reports will have to be tailored to the reporting needs of different organizations—it is important that such systems maintain a “single source of truth” approach, i.e., avoiding duplicated and potentially divergent data bases.
- Managing exit and refinancing (including incentives to refinance): GFCF-type facilities are structured as catalytic financiers and thus to exit after some period which is less than the project life, and while their concessional finance facilitates an investment, it also brings with it potential “moral hazard” relating to project sponsors wanting to continue utilizing such finance after the need for it is gone—mechanisms to encourage sponsors to refinance with non-concessional finance such as “step-up” payments and mandatory prepayment are available and should be utilized.

⁵⁴ Even lowest categories of performance eligible for the Facility will provide an impact better than BAU in the sector, as defined in the Green Guidelines.

⁵⁵ Or whatever is considered and appropriate interval.

⁵⁶ SGDF will require some 80 reports per year including environmental and social safeguards reporting under the mandatory ESMS.

For the SGDF, CICC Capital Management Co., Ltd. (CCM), a subsidiary of a leading investment bank, China International Capital Corporation Limited (CICC), was selected by SDIHG to manage the SGDF based on the criteria required by the IFIs: (i) top-ranked asset manager in the PRC in terms of track record, size of assets under management, governance, risk management, and management profile (Figure 16); (ii) licensed by the regulator to operate a fund in the PRC; (iii) more than 8 years experience, including opening and closing a fund; and (iv) experience with public and IFI funding mechanisms. CCM has assets under management of CNY300 billion across more than 20 funds with extensive experience in setting up and managing commercialized funds, including mandates from the central and local governments to realize strategic visions.

Figure 16. Overview of China International Capital Corporation

CICC = China International Capital Corporation, FICC = fixed income, currency, and commodity, FOF = Fund of funds, HKSE = Hong Kong Stock Exchange, IPO = initial public offering.

Source: CICC presentation, October 2019.

VI. CONCLUSIONS

This section examines the use of the GFCF structure as implemented in Shandong review options for extension of the model to other places given:

- the available sources of funding and instruments; and
- potential design of facility structures to increase the origination (pipeline/throughput) of projects on the demand-side of the green finance market and to accommodate to different types of capital markets on the supply-side.

It also draws together the conclusions of the review with respect to the value addition of the ADB and the lessons learned.

POTENTIAL EXTENSIONS OF THE MODEL—SOURCES OF FUNDING AND INSTRUMENTS

This section is framed in general terms—the sources of finance discussed are not all applicable to the PRC, but can be conceived as helping to frame approaches to applying the model in other contexts outside Shandong and outside the PRC.

The basis for an extension of the model are mechanisms for leveraging additional financing sources for climate finance and mechanisms for generating greater a larger pipeline of projects. These two issues will be discussed in turn.

Supply-side instruments

Additional Financing Sources

Additional financing can be sourced either nationally or internationally. Additional sources of national finance are concentrated in pension funds and insurance companies. While the PRC's large pool of savings would imply that it does not need international finance, the tenor and rates of finance available domestically are often unfavorable. Further, the participation of international finance acts as a seal of quality. The potential sources are reviewed in the next section.

International Public Green Sources

There have been several recent overviews of available sources of support to developing and implementing infrastructure projects, in general, and climate/green infrastructure projects, in particular. Notably, the Climate Policy Initiative⁵⁷ has provided a comprehensive overview of climate facilities, although not sources that can fund green projects. The Brookings Institution, New Climate Initiative and Grantham Research Institute IDB, and the Organisation for Economic Co-operation and Development (OECD) have undertaken a comprehensive study on finance for sustainable development setting out many of the key institutional constraints to accessing finance and suggesting policy reform road maps.⁵⁸ One of the key recommendations is to further strengthen the role of national development banks (NDBs). A comprehensive overview of a broader array of existing and potential financing sources for green projects is given in an OECD publication on financing infrastructure.⁵⁹

⁵⁷ For example, Climate Policy Initiative and Ministry of Finance, Republic of Indonesia. 2014. *The Landscape of Public Climate Finance in Indonesia*. Jakarta.

⁵⁸ See A. Bhattacharya et al. 2016, *Delivering on Sustainable Infrastructure for Better Development and Better Climate*. *Global Economy and Development*. The Brookings Institution, Washington, DC. and OECD. 2018. *Financing Climate Future: Rethinking Infrastructure*, Paris.

⁵⁹ OECD. 2015. *Infrastructure Financing Instruments and Incentives*. Paris.

The following diagram shows the complexity of the climate financing scene. Key institutions reviewed are as follows:

Figure 17: Global Climate Finance Architecture

continued on next page

Figure 17 continued

Implementing Agencies and Institutions		Multilateral Funds and Initiatives	
AfDB	African Development Bank	AF	Adaptation Fund (GEF acts as secretariat and WB as trustee)
AFD	French Development Agency	ACCF	Africa Climate Change Fund
ADB	Asian Development Bank	ASAP	Adaptation for Smallholder Agriculture Programme
BMZ	Federal Ministry of Economic Cooperation and Development	CBFF	Congo Basin Forest Fund (hosted by AfDB)
CIDA	Canadian International Development Agency	CDM	Clean Development Mechanism (implemented under the Kyoto Protocol)
DECC	Department of Energy and Climate Change	CIF	Climate Investment Funds (implemented through WB, ADB, AfDB, EBRD, and IADB)
DEFRA	Department for Environment, Food and Rural Affairs	CTF	Clean Technology Fund (implemented through WB, ADB, AfDB, EBRD, and IADB)
DFAT	Department of Foreign Affairs and Trade (Australia)	FCCP	Forest Carbon Partnership Facility
DFID	Department for International Development	FIP	Forest Investment Program (implemented through WB, ADB, AfDB, EBRD, and IADB)
EBRD	European Bank for Reconstruction and Development	GCCA	Global Climate Change Alliance
EIB	European Investment Bank	GCF	Green Climate Fund
Ex-Im	Export-Import Bank of the United States	GEF	Global Environment Facility
FAO	Food and Agriculture Organisation	GEEREF	Global Energy Efficiency and Renewable Energy Fund (hosted by EIB)
FFEM	French Global Environment Facility	JI	Joint Implementation (implemented under the Kyoto Protocol)
GIZ	German Technical Cooperation	LDCF	Least Developed Countries Fund (hosted by the GEF)
IADB	Inter American Development Bank	PMR	Partnership for Market Readiness
IFAD	International Fund for Agricultural Development	PPCR	Pilot Program on Climate Resilience (implemented through World Bank, ADB, AfDB, EBRD, and IADB)
JBIC	Japan Bank of International Cooperation	SCCF	Special Climate Change Fund (hosted by the GEF)
JICA	Japan International Cooperation Agency	SCF	Strategic Climate Fund (implemented through WB, ADB, AfDB, EBRD, and IADB)
KfW	German Development Bank	SREP	Scaling Up Renewable Energy Program (implemented through WB, ADB, AfDB, EBRD, and IADB)
MIES	Inter-ministerial Taskforce on Climate Change	UNREDD	United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation
MOFA	Ministry of Foreign Affairs		
NORAD	Norwegian Agency for Development Cooperation	Bilateral Funds and Initiatives	
ODIN	Ministry of Foreign Affairs	GCCI	Global Climate Change Initiative (US)
OPIC	Overseas Private Investment Corporation	GCPF	Global Climate Partnership Fund (Germany, UK and Denmark)
UNDP	United Nations Development Programme	ICF	International Climate Fund (UK)
UNEP	United Nations Environment Programme	ICFI	International Climate Forest Initiative (Norway)
USAID	US Agency for International Development	ICI	International Climate Initiative (Germany)
WB	World Bank	NAMA facility	Nationally Appropriate Mitigation Action facility (UK and Germany)
		REM	REDD Early Movers (Germany and UK)

Source: S. Nakhooda, C. Watson, and L. Schalatek. 2016. *The Global Climate Finance Architecture*. Overseas Development Institute. London. <https://cdn.odi.org/media/documents/11021.pdf>.

While we have seen that the GCF plays a significant role in the SGDF, the types of participation in the SGDF by no means exhausts the range of potential financing available from the GCF. It may, according to the country, sector, and project, provide a variety of grants for project development and/or capital investment. It may provide equity participation. However, the GCF requires the participation of a GCF Accredited Entity. While by no means the only climate finance source, and requiring significant commitment to undertake the approval process, it is currently the flagship climate financing institution and can provide substantial support (potentially to \$100 million and beyond).

Global Environmental Facility (GEF) Trust Fund—GEF funds include the Least Developing Countries Funds, the Special Climate Change Fund, and the GEF Trust Fund. The GEF invests directly as well as through accredited institutions. Such institutions include the World Bank as well as other regional partners. As an entity of the United Nations Framework Convention on Climate Change, the GEF receives guidance from and is accountable to the Conference of Parties. Its total resources committed are over \$8 billion with a new replenishment being implemented. The GEF focuses on building capacities, project development, and the use of seed capital, including blended finance models over the past 2 decades to

pioneer and scale up financing of new technologies in renewable energy, energy efficiency, urban transport, and other related fields. However, mobilization of private capital for blended finance schemes involving biodiversity and natural resources management—conservation finance, for short—is still incipient.⁶⁰ The GEF also has special focus programs such as the Sustainable Cities Integrated Approach—a \$140 million program that is expected to leverage \$1.4 billion in cofinancing—to encourage intelligent urban development in 22 pilot cities.⁶¹

Climate Investment Funds (CIFs) have committed some \$4.1 billion from 2010 to 2015. Across the multilateral development banks (MDBs), including the World Bank Group, the \$8.3 billion CIFs are on track to support at least an additional \$58 billion from the MDBs and public and private sources, with \$35 billion already committed for projects under implementation. These projects will deliver emission reductions of approximately 1.5 billion tCO₂e over the projects' lifetime and support more than 30 million people through climate resilience projects. However, the CIFs are already mostly committed and if they are to continue to play this catalytic role and support the World Bank Group and other MDBs to deliver on their climate mandate, they would need to be recapitalized in the near future.⁶²

Bilateral Climate Funds such as the German IKI (International Climate Fund) and the UK Climate Fund. IKI is interested to expand its activities in the urban sector. The most recent call for proposals cited urban initiatives as a priority.⁶³ It is likely that they would support similar GFCF-type initiatives.

International Blended Finance Sources

A 2015 World Economic Forum primer on blended finance defines it as “the strategic use of development finance and philanthropic funds to mobilize private capital flows to emerging and frontier markets.”⁶⁴ International blended finance mechanisms can be constructed in a particular facility from donor grant funds being contributed or, as with the facilities of the European Union (EU), set up as a facility to catalyze multiple uses of blended funds. Both modalities are useful for facilities such as GFCF.

EU Facilities: A relatively large scale initiative on blended finance is operated by the EU, initiated under the Multiannual Financial Framework 2007–2013. Blended finance has gradually evolved into a key tool of EU external cooperation and accounted for about 4% of the EU's development budget between 2007 and 2014—more than €2 billion. EU regional blending facilities have been established in all regions of EU external cooperation. Examples include the Asia Investment Facility, the Latin American Infrastructure Facility, the Investment Facility for Central Asia, and the Investment Facility for the Pacific.⁶⁵ All of these facilities can provide flexible grant and low-interest loan support to climate projects.

Other blended finance mechanisms are used by Australia, Canada, and the US, but are often country- and sector-specific.

⁶⁰ Global Environment Facility. 2018. *Conservation Finance*. Washington, DC. https://www.thegef.org/sites/default/files/publications/GEF%20Assembly_ConservationFinance%20Factsheet_9.4.18.pdf.

⁶¹ New Climate Economy. 2016. *The Sustainable Infrastructure Imperative*. Washington, DC. https://newclimateeconomy.report/2016/wp-content/uploads/sites/4/2014/08/NCE_2016Report.pdf.

⁶² World Bank. 2016. *Climate Change Action Plan 2016–2020*. Washington, DC. <https://openknowledge.worldbank.org/bitstream/handle/10986/24451/K8860.pdf?sequence=2&isAllowed=y>.

⁶³ International Climate Initiative (IKI). <https://www.international-climate-initiative.com/en/>

⁶⁴ World Economic Forum. 2015. *Blended Finance* Vol. 1: A Primer for Development Finance and Philanthropic Funders. p. 4.

⁶⁵ https://ec.europa.eu/international-partnerships/guarantees-and-blending_en.

International Non-Public Green Sources

The main untapped international sources of non-public green finance are pension funds, but there are a range of other sources that, if structured correctly, a GFCF facility may attract.

The finance industry has responded to the challenge, though so far the funds devoted to green finance are considerably smaller than the potential investments available. Institutional investors (especially pension funds), banks, credit unions, and insurance companies have all allocated some of their portfolio to green finance. Green finance opportunities that have been invested in include renewable energy, energy efficiency, environment-friendly real estate and infrastructure, green bonds, forests, and energy storage.

The International Finance Corporation, in partnership with the German Development Cooperation Agency (GIZ) has recently attempted a bottom-up comparison of the supply and demand for Green Finance.⁶⁶ They estimated that, in their sample of more developed capital markets, 15% of all loans could be deemed “green financing,” 41% of loans with some green share were for real estate, and 21% were for infrastructure and transport. The countries with the largest share of green loans identified in 2014 were in the US (\$56.8 billion), the UK (\$13 billion), and Australia (\$10.2 billion). In most developed countries, and in the PRC, green loans comprised about 10% of total loans, although India, the Republic of Korea, and Ireland achieved 30%, and Turkey 70%. Among emerging and developing countries, the PRC (\$7.2 billion) and India (\$6.7 billion) dominated.

A second source of green finance is “green bonds.” While the PRC is a world leader in the domestic issuance of green bonds, there is relatively little foreign participation. The Climate Bonds Initiative, in collaboration with HSBC, publish an annual report on the size of the bond market.⁶⁷ There are six main categories for climate-aligned bonds: transport, energy, buildings and industry, water, waste and pollution control, and agriculture and forestry. In 2016, the size of the global bond market was estimated at \$90 trillion, with \$694 billion in climate-aligned bonds, of which \$118 billion were labeled as green bonds (17%).⁶⁸

A huge but relatively untapped, source of finance for green investment is the institutional sector—specifically pension funds and life insurance companies. A recent survey of the 100 largest pension funds in the world (of which 20 are in Asia and the Pacific region), with funds under management totaling \$12.3 trillion, found that only a minority had so far developed a climate policy.⁶⁹ The funds rated highest for commitment to green finance in that survey were Fjärde AP-Fonden (AP4, Sweden); Fonds de Réserve pour les Retraites (FRR, France); New York State Common Retirement Fund (NYSCRF, US); and ABP (Netherlands). Of the funds surveyed, 24% recognized that they had a fiduciary duty to consider climate change in their investment decisions, while only 13% assessed climate risk in these decisions.⁷⁰ However, a recent survey of the world’s 80 largest insurers found that over 60% were already active in financing climate-related and green projects.⁷¹ The insurance companies ranked highest in their commitment to green finance were AXA, Aviva, Allianz SE, and Legal & General,

⁶⁶ International Finance Corporation. 2017. *Green Finance: A Bottom-up Approach to Track Existing Flows*. Washington, DC. https://www.ifc.org/wps/wcm/connect/12ebe660-9cad-4946-825f-66ce1e0ce147/IFC_Green+Finance+-+A+Bottom-up+Approach+to+Track+Existing+Flows+2017.pdf?MOD=AJPERES&CVID=IKMn.-t. The report also focuses on reporting processes and how to improve them.

⁶⁷ See Kaminker, Christopher (OECD), Sean Kidney (CBI), and Nicholas Pfaff (ICMA). *Green Bonds: Country Experiences, Barriers and Options*. http://unepinquiry.org/wp-content/uploads/2016/09/6_Green_Bonds_Country_Experiences_Barriers_and_Options.pdf.

⁶⁸ Footnote 145, p. 31.

⁶⁹ Asset Owners Disclosure Project. 2018. *Pensions in a Changing Climate*. <http://www.aodproject.net/changing-climate>.

⁷⁰ Footnote 147, pp. 24 and 33. Climate Risks Include Stranded Assets, Transition and Physical Risks, Regulatory Risks and Liabilities Under Carbon Price Scenarios.

⁷¹ Asset Owners Disclosure Project. 2018. *Got it Covered? Insurance in a Changing Climate*. <http://www.aodproject.net/insurance>.

while Tokio Marine, Legal & General, Credit Agricole, Allianz SE, Generali, NN Group, and Swiss Re have improved their performance in the last year.⁷² The 2019 Global Pensions Asset Study⁷³ found that global institutional pension fund assets in the 22 major markets covered by the study were estimated at \$40 trillion in 2018, representing an average growth rate 5.3% over the past decade.

While the potential sums are large, it should be clearly borne in mind that the proportion of pension portfolios available for investment both outside their home countries and in green/climate-related investment in emerging markets is limited by the need for portfolio diversification (although the same argument applies that SOME of the portfolio should go to such investments). It is further limited by the need to ensure returns—the future lives of many people depend on these investments—and thus requirements for investment grade ratings and an aversion to foreign exchange risk. In addition, the relative proportions of defined benefit and defined contribution plans in a given pension market shape investments. The latter type typically allows swapping of funds and thus there is a higher requirement for liquidity. This being said, the push for environmental, social, and governance reporting and the need to avoid “stranded assets” has provided a powerful stimulus towards green investing.

International Risk Mitigation Sources

Guarantees and other risk mitigation measures are potentially very useful for such facilities as GFCF in so far as they assist in enlisting untapped or underutilized sources of finance and/or can foster a lower net cost of funds (i.e., the savings in finance cost minus the cost of putting the guarantee in place). This has traditionally been difficult to achieve owing to a wide range of structural constraints and transaction costs, but there are some encouraging examples that point to ways that these can be overcome.

The World Bank Group has a dedicated guarantee agency, the Multilateral Investment Guarantee Agency (MIGA), and other MDBs (including the ADB) have guarantee mechanisms, but it is only the former which is very active (although guarantees involving local governments and/or infrastructure are a small part of MIGA's portfolio). Export credit agencies also have an extensive business in guaranteeing supplier financing (e.g., for the rolling stock in transport projects). There are a few private so-called “monoline” insurers left who are able to wrap debt instruments in their guarantees—but they are a shadow of their pre-2008 selves. Sweden has a guarantee mechanism managed by the Swedish International Development Agency. The EU is a significant source of funds for non-guarantee risk mitigation mechanisms—mainly first loss and subordinated loan finance implemented through the EIB. Other development finance institutions have been relatively reluctant to issue guarantees.

Financing Instruments

The standard financing instruments—loans and equity—are perfectly useful for financing climate projects in most circumstances. The justification for the use of instruments that extend this basic repertoire, which usually come at a premium on these basic instruments, can be established if they unlock funding by addressing issues important to organizations that are a significant potential source of needed funds (for example, defined contribution pension funds may prefer bonds because they are potentially more liquid) at an acceptable cost. Table 7 shows common types of instruments used and the most common are described in more detail.

⁷² Footnote 149, p. 4.

⁷³ Willis Towers Watson, Thinking Ahead Institute. 2019. *Global Pension Assets Study 2019*, Sydney.

Table 7: Financing Instruments and Their Application

Instrument Category	Extension Instrument	Notes on Application
Debt	Bonds (facility, project/ revenue, general obligation and green) Subordinated loans Tiered bonds Convertible bonds	Liquidity premium over most loans Quasi-equity—risk mitigation Tranched levels of risk/return Risk mitigation combined with upside potential
Equity	Coinvesting Tiered equity	Confers “halo” effect—risk mitigation Tranched levels of risk/return
Leasing		Usually used when context legislation gives tax advantage
Guarantee/risk mitigation	Credit enhancement First loss	Applies when incomplete information on project or sovereign rating causes mispricing of investment finance Credit enhancement for secured lenders
Grant Support	Capital subsidy Revenue guarantees	Justified by external non-priced benefits

Source: Author

A GFCF can potentially utilize all of these instruments, but to do so its mandate needs to be inclusive of such instruments; it needs the appropriate capital structure and prudential management systems; and its staff must have capacity to initiate, structure, negotiate, and administer them. Where subsidies are required to compensate for external non-priced benefits, the systems for deciding on the use of blended funds need to be adequate and transparent.

The key instruments are (footnote 16):

- **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). 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. 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. Mimicking examples such as utility joint ventures, this approach is commonly used by MDBs 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. 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 defaults, however, 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% internal rate of return. 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 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.
- **Green bonds:** 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. There have also been green project bonds, green “use of proceeds” revenue bonds, and green securitized bonds. MDBs have successfully issued green bonds of more than \$20 billion between 2007 and 2014. 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. 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. 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.
- **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). Partial credit guarantees and partial risk

guarantees could both be utilized to cover a portion of scheduled repayments against all risks of private loans or bonds.

- **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.

Given a pool of relatively mature investments, tranching securities, providing a “waterfall” of proceeds to different levels of investors who have differing risk/return requirements can be constructed. Such financing mechanisms can be used to “crowd-in” a range of PIC investor types—from institutions requiring safe investments of moderate return to private debt funds requiring higher returns but also willing to accept higher risk.

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

Extension Structures

While the focus of the discussion has been on the GFCF facility itself, some of the instruments mentioned may be better fielded by a separate entity. Depending on the scale of operations, an independent facility serving several financing facilities and/or clients of said facilities could be introduced. Separate provision also potentially aids transparency and accountability. Some useful structures are set out in Table 8.

Table 8: Types of Financing Structures and Applications

Mechanism	Use	Provider
VGF Fund	Targeted, preferably performance-based, subsidy	National government GEF
Blended finance facility	Grants/ soft loans/guarantees	EU
Bond fund	Green bonds/project bonds	Investment bank
Securitization of fund inflows	Green bonds	Investment bank
Securitization of project net revenues	Bond—possibly green	Investment bank

EU = European Union, GEF = Global Environment Facility, VGF = viability gap funding.
Source: Author.

These structures can be operated within the organization that houses the GFCF or elsewhere, depending on the relative sizes of the entity housing the GFCF and the need to provide support to other facilities.

Such structures can undertake a range of “combination financing” options that are particularly useful in the circumstances surrounding climate investments. Initial blended finance approaches suggested for the GFCF are (footnote 16):

- **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 internal rate of return 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.

POTENTIAL EXTENSIONS OF THE MODEL—BETTER PROJECT DEVELOPMENT AND FACILITY DESIGN OPTIONS

Support to Project Development and Pipelining—How to Upscale

Overview of Project Development Needs

In order to achieve the level of investment needed, significant institutional change is needed at the level of demand-side institutions—and such change needs to be coordinated. Such integrated and coordinated approaches are rare, but the PRC's promotion of "low-carbon cities" comes closest and much can be learnt. From the first eight pilot cities is instructive, the means used were:

- administrative measures (audits, etc.);
- strengthening the planning and legal framework;
- market-based Clean Development Mechanism;
- R&D support;
- knowledge support; and
- financial and tax-based incentives.

Financing these measures is, for many local governments and even in the PRC, non-trivial.

The PRC approach covers, but does not distinguish between, both the green urban infrastructure and green industry investments. PRC city governments have a mandate both to develop urban areas and transport, and to oversee economic development. In many countries, however, the latter mandate is not established and will need separate programs of institution building, capacity development, and financing. The current PRC approach has less developed support mechanisms at national level. Whether such mechanisms will be established is an open question, but the variety of measures taken by the cities suggests that centralized mechanisms for structured learning about good practice and to promote its use may be needed. Such mechanisms could include adaptation and resilience projects. There is a "Sponge City" fund established within the Ministry of Housing and Rural Urban Development to promote water resilience investments, although its added value has been questioned.

In view of the PRC experience, it is evident that achieving the synergy benefits requires an integrated approach to providing the mitigation (and adaptation) investments. This, in turn, implies integration of urban planning, program and project development, and project implementation systems, which constitute the bottlenecks to improved performance. Cities need to foster and resource such integrated approaches. Based on successful experience in financing large-scale cross-jurisdictional infrastructure in both high-income and developing countries, the institutional structures required are known and are set out in the succeeding paragraphs.

Further, the PRC has large-scale land development corporations that finance themselves over the long term with the development of their areas and they contribute to infrastructure development (on an ad hoc basis). This is a model that could be used in existing areas and be extended to other countries—many countries have appropriate development corporation legislation and models.

Generalizing from the PRC experience, explicitly reflecting the promotion climate-related investments, and in the context of international experience in the finance of large-scale urban renewal, a clear picture of the institutions needed for transformational change can be drawn. For countries other than the PRC, adjustments to the approach will need to be made reflecting the lack of national systems to promote and monitor low-carbon/climate-friendly investments and the lack of resources and capacity to implement such investments at the city level. Indeed, these issues are not irrelevant to the PRC in respect to the upscaling and sustainability of its interventions.

It is thus suggested that a coordinated approach is needed to developing (i) long term funding systems, and (ii) city implementation systems capable of mobilizing funds to provide a significant proportion of the capital expenditure and capable of effectively partnering with the private sector in urban development. Figure 18 sets out the structure.

National and local governments also need to put in place an effective enabling environment and to build key institutions. These enabling actions and institutional elements are set out as follows:

1. National and City Climate Change Policy and Planning

The focused financing of a climate investment program is to, first, foster national policy relating to resourcing cities to undertake such programs, and second, to fund the planning of these programs in cities. The expertise for such planning is not currently available to many cities and it may never make sense for such expertise to be in-house for smaller cities. Rational mechanisms for providing these

resources across the spectrum of primary and secondary cities are needed. The planning process needs to focus on activating climate change benefits available from integrated land-use transport development and minimizing the cost of climate change-related impacts.

The focus of financing climate investments is again to, first, foster national policy relating to standard setting and to the responsibility and capacity of cities to undertake economic planning—a role they have traditionally been excluded from—in order to foster a greener economy at the local level. Second, the national government needs to plan to resource local governments to bolster their capacity for infrastructure planning and the planning of other service supports to move the urban economy in the desired resilient and carbon-positive direction. The planning process needs to focus on what investments in local infrastructure and support facilities are needed to reduce the emissions of city industry and facilities and increase city resilience.

2. Project Development and Procurement

Financing the formulation of national programs which will foster the design and construction of energy-efficient and resilient buildings, public transport, and other infrastructure is a priority. This formulation process needs to provide scope for the “crowding-in” of private sector finance and for community involvement. There may also be a need to support the strengthening of procurement processes in order to implement such programs and projects. The same priorities apply to energy efficiency, green freight, and resilient logistics and infrastructure.

3. Design of Implementing Agencies for Sustainable Funding

Many climate investments will require the use of innovative, and additional, funding mechanisms such as the use of land value-capture mechanisms and the structuring of project special purpose vehicles for use of appropriate capital market instruments. These may need to be combined with performance-based transfer systems (such as challenge funds) to develop a sustainable system of financing the investments developed through the processes mentioned. Such funds have a key role in supplying viability gap financing (VGF) for climate positive investments. In view of the resource needs, space for PPP processes needs to be provided within this system. Further, the system needs to be flexible enough to cater to the varying mix and scale of investments. In addition, such implementing agencies, especially in Asia, will need to be able to provide appropriate small and medium-sized enterprises financing and to attract cutting-edge production technology through appropriate foreign direct investment and/or partnerships.

4. Operation Issues

Green investment programs will need finance for monitoring performance and potentially for remedial action if performance is not as projected. Specific financing issues, such as the exit of initial investors, also need to be addressed during the operational phase. In addition, as demonstrated in the PRC, ongoing funding will be needed for R&D and knowledge support. Lastly, it is important that enforcement capacity is adequate and correctly incentivized.

5. Integrated Investment Approaches

The spatial nature and governance structures of cities needs to be considered and specifically responded to—what institutions can provide such a response and what financing do they need? The core issue is that of the need to take a LONG-TERM perspective in an environment, which has incentives stacked high toward short-term thinking and action. Section III canvassed the generic constraints to finance of infrastructure in Asia. These constraints must be addressed by any suggested mechanism for climate finance.

Priority Implementation Issues on the Demand Side

The priority actions to implement climate investment programs are, in summary:

- Financing project development of climate investments to overcome transaction cost issues, and further justified by a need to demonstrate “paradigm shift” benefits for a sustainable economy and the climate.
- Financing, on the demand-side, the establishment and investment of “sustainable development corporations” (including planning, capacity development, and operations support).
- Ensure that such implementing entities can tap the full range of potential financing options available from, inter alia, a GFCF-type facility.

The Qingdao Green Corridor provides an example of the sort of project that should be implemented by a development corporation. The PRC experience of local development corporations provides a strong illustration of the effectiveness of such entities.

Potential Alternative Structures

There are three major potential areas for extension of the concept—and such facilities could include “developed” countries as they seek to foster a ‘green new deal’ and/or a ‘green recovery’ from the COVID virus. The concept can be extended:

- to other countries, other regions in big countries and to regional facilities;
- by increasing supply of finance—widening the range of potential financiers; and
- by increasing number of viable projects—fostering better demand-side institutions and diverse funding options for them.

ADB is currently looking at extending the concept to other countries in the Asia and the Pacific region (Appendix 2). Depending on the country, the concept may have to be simplified—in some South Asian and South East Asian countries a simple channelling facility through an NDB may be the extent of what can be achieved. In certain circumstances, a large capacity gap exists in the use of performance-based project evaluation. Significant TA may be required to put in place the performance-based green evaluation. Such a facility (as in the Indonesian Green Finance Facility (GFF at PT SMI), a development bank focusing on infrastructure) may have to operate based on a simple taxonomy of projects—at least in the initial stage. In other countries, an approach similar to that adopted in the PRC will be possible. The key constraint is that, given the marginal credit ratings of many countries, international institutional money⁷⁴ will not be available in significant amounts.

By definition, in this context, facilitating international institutional investment will require an “external” actor or actors. In the past, an external actor that operated in this space was the “monoline insurer.” Although of limited scale and scope (in terms of supported countries), the wrapping of investments in guarantees backed by their AAA status was useful. Since their effective demise in the 2008 Global Financial Crisis,⁷⁵ no successor class of institution has emerged. Individual guarantees have been extended to institutions on an ad hoc basis, but for the purposes of specific projects. ADB is experimenting with an ASEAN-level facility and this could be used to fill this systemic gap (Appendix 2).

⁷⁴ Even if the countries are international investment grade, the level of investment grade is low and excludes some institutions and, further, despite the sovereign rating, specific sub-sovereign projects—that is, projects sponsored by levels of government below national—are not investment-grade. The level of investment available from such institutions is consequently much lower—some investment is possible using the allocation for “speculative investments.”

⁷⁵ Interestingly enough, NOT caused by guarantee exposure but by investments in structured finance products such as collateralized debt obligation.

Such a facility could utilize its concessional funds finance a guarantee wrap of institutional investment. This facility could then provide significant added value to national facilities (e.g., the Indonesian GFF), channelling additional finance into climate investments.

At the national level, institutions could supply additional finance, but will often require changes in the enabling framework and a facilitating institutions such as the climate finance facility in South Africa (Appendix 2). In particular, there is potential for institutional and other participation in green bonds. Such bonds are already very popular with Chinese financial institutions, and, once established, a GFCF could be expected to strongly tap such a market. However, in many countries the cost of green bonds is comparable⁷⁶ to other types of PIC finance so where concessional funds are still required, green bonds are generally not a solution.⁷⁷ Green bonds could also be issued by the project entities themselves—particularly in relation to refinancing on the exit of the Facility. Other types of instruments can be envisaged. Given a pool of relatively mature investments and, tranching securities, providing a “waterfall” of proceeds to different levels of investors who have differing risk/return requirements can be constructed. Such securities can cater to a range of PIC investor types—from institutions requiring safe investments of moderate return to private debt funds requiring higher returns but also willing to accept higher risk.

VGF and revenue support mechanisms can also be included for any national or subnational facility. Where potential projects have high climate benefit and concessional finance is insufficient to bridge the viability gap, other financing modalities can be used either integrated into the Facility or in parallel. Justified and quantified by an independent financial assessment of high quality, an upfront grant for part of the capital cost is the simplest mechanism of VGF financing. Such financing could also be in the form of a very concessional loan or could guarantee a number of years of returns or of payments under an availability payment scheme. All of these mechanisms have been used effectively but require rigorous analysis and monitoring to avoid project sponsors “gaming” the system.

Such changes in the national enabling environment need to go beyond institutional investors. In particular, expanding the pipeline of climate investments requires significant change in institutions planning, designing, financing, structuring, and funding climate investments. In order to build such institutions and to address the demand-side bottlenecks to access climate finance, several parallel activities need to be undertaken in parallel with the establishment of the Facility, and/or through an expanded project development mechanism within it. These are:

- (i) Establishment of climate policy and planning processes that take a long-term perspective⁷⁸ and which produce clear pipelines of integrated programs of climate positive projects.
- (ii) Support to implementing agency project development and procurement, in particular related to the design and construction of energy-efficient and resilient buildings, public transport and other infrastructure, which ‘crowds in’ private sector finance through PPPs and other means.
- (iii) Development of sustainable funding mechanisms, for example, the use of land value-capture mechanisms and of appropriate capital market instruments, combined with performance-based transfer systems (such as challenge funds) to develop a sustainable system of financing the investments developed through the said processes.
- (iv) Support to capacity development, knowledge dissemination, and enforcement of established standards.

⁷⁶ Or even more given monitoring, reporting, and validation costs.

⁷⁷ If green bonds were tax advantaged, they could be a cheaper source of finance.

⁷⁸ In an environment which has incentives stacked high toward short term thinking and action.

Such activities can be embodied in various types of “development corporations” for which there are established precedents in most Asian countries.

ADB'S ADDED VALUE AND LESSONS LEARNED

ADB's Added Value

ADB has produced a knowledge product, *Catalyzing Green Finance*, focused on practical implementation translated it into operational reality. The use of TA funds to flexibly support the structuring of the facility and the development of operational frameworks and structures such as the green assessment mechanism and the M&E systems provide a model of inter-department cooperation.

ADB has fostered international best practice with respect to:

- shift from “business-as-usual” to “good practices,” “advanced benefits,” and transformational climate positive subprojects with international green climate standards;
- selection subprojects based on climate mitigation/adaptation benefits (to be maximized) and bankability (to be improved);
- leveraging catalytic funding with more than five times multiplier; and
- introducing effective gender mainstreaming into the fund—the first for ADB.

ADB's practical approach to project development has enabled it to put in place a path-breaking green finance mechanism that is innovative even in the PRC context where green finance is highly developed. It has achieved this by being both:

- flexible—in focusing on a more politically achievable provincial facility rather than attempting to craft a national entity—even though the latter is policy; and
- operationally experienced and robust—a project team of senior consultants led by a sector expert with long experience in the PRC and backed by a strong PRC Resident Mission team vigorously advocated best practice on such issues as the choice of general partner and inclusion of project development financing in the loan.

ADB has significant resources in terms of sovereign and private loans that can be brought to bear on establishing and capitalizing a Facility. Such facilities in Asia, in order to make any significant impact, need to be at least \$500 million. Within country lending limits, ADB can supply such levels of finance. There is the question of the cost of funds—especially where local currency is used, but ADB remains competitive, both in the cost of funds and tenor, in most Asian capital markets. In addition, ADB acts as the focus for attracting additional grant and concessional TA and cofinance. The resources required to manage and coordinate cofinancing, including liaison with such agencies as AFD, GCF, and KfW can be significant—in particular requiring staff- and consultant-intensive engagement over a significant time frame. ADB also has credit rating and mechanisms (guarantees, B loans, etc.) to enable leverage of PIC resources.

Lessons Learned

The structure of such a facility will vary considerably in different contexts. Even in the PRC, different circumstances apply in different provinces and, given a chosen investment scope, facility design will vary considerably. To effectively implement a climate finance strategy, on the demand-side the local

government has to (i) develop its overall strategy on low-carbon and/or resilient development, either mandated by the central government or voluntarily; and (ii) either have industries that can potentially make significant contributions to climate mitigation, such as energy, transportation, building, energy efficiency, and manufacturing, and/or have significant populations and economic activities at risk. This base is necessary to build a pipeline. Given the circumstances of the local capital market the mandated investment or financing institution can mobilize resources to design required policy incentives, build climate finance capacities, and structure facilities to crowd-in needed finance. It is important to note that the availability of a CICC-like general partner is not a constraining factor. Many types of financial institution can host a green facility. In addition, whether certain type of financial instruments in the selected developing countries according to its financial regulations should be considered, for example, an easy-to-use guarantee fund structure. There needs to be effective and continuing dialogue between project proponents and financiers to ensure a full understanding of the issues involved on both sides.

Key decision-making points in the process of establishing a green facility are:

- What scope of investment will the facility target? Critical are the scope of “green” investment defined and whether or not PIC financing is desirable at facility or project level or both?
- Will the facility use debt, equity or risk mitigation (guarantee) instruments or some combination of these? This will depend on the needs of potential project proponents within the defined investment scope and on the capacity of the local capital market.
- What institution is appropriate to host the facility? This will depend on the objectives and on the scope of cofinance that is deemed desirable (IFIs or not? International PIC funds or not?)
- What will be included within the operations of the facility? Project development or not? Refinancing or not? This will depend on the capacity of the chosen host, the capacity of demand-side institutions and of local capital markets, and on the scale and scope of TA resources available to build its capacity and to support implementation.

The GFCF concept constitutes a powerful mechanism for leveraging finance for climate investments. There is much room for flexibility and extension of the mechanism as illustrated above. It is replicable in many different forms—it may be based in a government entity, it may be based in a NDB, or it may be based in a private sector financial institution.

However, there are some key characteristics that need to be present for its effective operation. Among these are:

- the capacity to blend effectively and support a variety of financial instruments as appropriate to its clients’ needs;
- project development capacity is usually necessary to achieve required scale and quality especially in small, poorer countries;
- the facility must be able to effectively design access to concessionality (enough to compensate for external benefits) for a particular project in cognizance of:
 - » target market;
 - » local capital market;
 - » participating organizations (banks, development banks, pension funds, etc.); and
 - » clients (companies, local governments, development corporations, utilities, etc.)
- concessionality should be linked to project climate performance;

- the facility needs to be able to provide effective feedback to national and provincial/ state policy—knowledge and learning; and
- the facility must be open, and structured to able to utilize, the range of sources of finance, including the need to achieve an appropriate credit rating if international institutional money sought.

Given its potential for very high levels of leverage of concessional funds, this model of “cascade financing”—that is, original concessional funding leveraging additional PIC funds at each of several levels of participation in financing—responds to the stated priorities of the G20, which endorsed the recommendations of the Eminent Persons report on global financial governance. This report stressed the need to ensure IFIs are providing support to leveraging private sector (particularly institutional) finance for climate projects. The SGDF provides a practical and scalable model to achieve this.

APPENDIX 1: GREEN ASSESSMENT CRITERIA

Table A1.1 sets out how to score performance in the aforementioned criteria—from the level of a “good” project (score 1), to an “advanced” project (score 2), and to a “transformational” project (score 3).

It should be noted that, where additional activities or outputs are required to reach a higher level of performance, the requirements for the lower levels still apply—the indicators are “additive” in that achieving a higher level of performance means that the program or project also continues to meet indicators for lower levels of performance.

Table A1.1 Shandong Green Development Fund Investment Criteria

Investment Criterion/ Sub-criterion	Performance Level		
	Good Practice	Advanced Benefits	Transformational
Impact (E1)			
GHG mitigation (tons)	GHG indicators and performance		
Beneficiaries of increased resilience to climate impacts – direct	Adaptation indicators and performance		
Beneficiaries of increased resilience to climate impacts – indirect			
Other relevant indicators			
Paradigm Shift (E2)			
Scaling up and replication (about institutional structures)	Providing well-designed on-the-job training for implementing the green project to involved stakeholders (project level)	Providing the basis for replication in terms of a sustainable business model that can continue to implement green projects (corporate level)	Providing organizational and financial bases for expansion of activities beyond the province (industry level).
Knowledge and learning	Program or project has a clear, funded set of activities to document and disseminate outcomes/ results	Support to sectoral partnerships and dialogue to enhance green investment	Support to national and international partnerships, knowledge exchange, and dialogue on integrated approaches to enhancing green investment
Enabling environment and regulatory framework (about policies adopted/ implemented by institutions)	Catalyzing well-designed regulatory and other policies implementing the green project (project/ corporate level).	Fostering and participating in structured, well-resourced provincial national policy dialogue with the objective of upscale and maximize the impact of green investments in the sector (industry level).	Supporting a regulatory framework that provides incentives and funding to undertake efficient and sustained green investments (i.e., helping develop regulations at national level).
Innovation (about operational or financial technology – includes ICT overlays for current technology)	Program or project demonstrates that it has canvassed appropriate, available technical and financing options available and has selected appropriate options given client needs and capacities (innovative at project level).	Program or project demonstrates that it is utilizing new planning, financing, and/ or operational technology, processes, or systems that will enable greater impact per unit input (replicable, innovative technology, and/or process at industry level).	Program or project demonstrates that it is utilizing integrated systems for planning, new technology, financing, and/or operations capable of driving synergies across investment sectors (innovation that will impact many sectors/ industries).

Table A1.1 continued

Sustainable Development Potential (E3)			
Economic	Project or program demonstrates it has considered ways to maximize the local economic benefits of the proposed investment (project level).	Program or project is designed to provide opportunities for enhancing employment either directly or indirectly through enhanced productivity, skills and/or competitiveness; or through enhanced resilience e.g., energy and/or water security (community level).	Program or project is structured to promote more efficient markets for green technologies (national level).
Social	ADB equivalent social safeguards addressed adequately (project level).	Program or project leads to active adoption of climate positive action by stakeholders involved in the program or project or builds their community resilience to climate impacts. Program or project is designed to provide opportunities for social inclusion as an integral part of its design; protect cultural heritage; and/or health safety co-benefits (community-level benefits).	Program or project leads to active adoption of climate positive action across a broad range of stakeholders both directly impacted by the program or project and external to it. Program or project is proactive in relation to ensuring that the benefits of the investment are shared by lower income/ disadvantaged groups in terms of employment and/or supplying inputs (community level systems).
Gender	Relevant gender policy (ADB equivalent) addressed adequately	Supports proactive involvement of women in program or project planning and implementation.	Supports gender mainstreaming (ADB definition)
Environmental	ADB equivalent/Equator Principles environmental safeguards addressed adequately ¹ (project level).	Program or project is designed to provide significant co-benefits such a better air/ water quality as an integral part of its design (community level).	Program or project to act as catalyst for broader adoption of policies and process which will provide significant co-benefits such a better air/ water quality in a broader region or in other regions (provincial or national level).
	Pollution indicators and performance by sector. <i>Note: performance on this criterion should be assessed on actual designed pollution abatement performance, but if information about pollution co-benefits is not available at early stages in the project preparation process, the above narrative ranking should be used.</i>		
Needs of Recipient (E4)			
Justification of additional financing	Project or program demonstrates that there is a need for finance to address inability of local capital market to finance the project and/or there is a binding government budget constraint.	Project or program acts as a catalyst for local climate finance in capital markets, new instruments, and/or new funding sources/ mechanisms.	Project or program acts as a catalyst for adding value international climate finance through capital markets, and/ or new instruments therefor.
Level of vulnerability	Number of people/ percent of economic activity at risk—both gross and as proportion of city/ region/ national totals. Disaggregate by social group and gender where appropriate (as in IAF).		
Ownership (E5)			
Ownership level	Program or project is included/ implied in climate strategy/ INDCs.		

¹ Equator Principles. <https://equator-principles.com/>.

Table A1.1 *continued*

Capacity to implement	Previous track record satisfactory. <i>Note: BOTH Ownership and Capacity must be deemed adequate to obtain a “good” rating</i>		Green procurement. <i>Note: EITHER use of green procurement OR extensive engagement with stakeholders will be deemed adequate to obtain a “transformational” rating</i>
Engagement with relevant institutions and civil society			Local institutions fully engaged in program or project design. Civil society informed as per guidelines.
Efficiency and effectiveness (E6)^{2,3}			
Economic effectiveness	Economic rate of return analysis above climate-relevant hurdle rate, i.e., Economic BCR > 1 (<i>Note: ADB Guidelines at https://www.adb.org/documents/guidelines-economic-analysis-projects</i>) Justification for level of concessionality		
Financial effectiveness	Using the relevant Weighted Average Cost of capital, Financial BCR > 1 (with/ without GCF support) Justification of effectiveness of funds flow, financial management, funding mechanisms, financial instruments—and the sustainability of these structures beyond GCF support.		
Cost effectiveness	For mitigation: \$/ ton carbon equivalent For adaptation cost per beneficiary. <i>Note: Minimum of 10% of capital cost required for adaptation if it is to be considered as a combined mitigation/ adaptation project.</i>	See text 1/3 to 2/3 of way to zero limit or best practice	See text Above 2/3 of way to zero limit or best practice
Cofinancing leverage	1 = Good; 1-3 = Advanced; >3 = Best		

ADB = Asian Development Bank, BCR = Benefit Cost Ratio, GCF = Green Climate Fund, GHG = greenhouse gases, ICT = information and communications technology, INDC = Intended Nationally Determined Contributions.

Source: ADB. 2019. *Shandong Green Development Fund Project: Project Administration Manual*. Manila.

Quantitative Project Design Indicators and Performance: Indicator Overview

The challenge for assessing Investment Criterion 1 Impact, Criterion 3 (Environmental) Sustainability, and Criterion 6 Effectiveness is to establish not just standards, but some kind of ranking of performance against best practice. Given the aforementioned narrative criteria that can be applied to non-quantitative investment criteria, it was considered that a “three-tiered” approach to quantitative indicators would be appropriate. Based on some measure of good practice as a baseline for business-as-usual (BAU), the numerical difference between this and “best practice” can be divided in three segments corresponding to “good practice,” “advanced practice,” and “transformational or best” practice. Standards selected as the baseline of good practice were, in general, PRC standards—where these are not applicable EU standards were used. These were chosen because they were reasonably aspirational standards that had been agreed by a range of EU countries across a spectrum of economic development. Where EU regulations required detail standards to be enacted in national laws, UK standards were generally used as they are accessible in English.

² At present, with the exception of cost abatement figures, benchmark figures for these indicators are tentative or do not exist. Narrative description of indicators should reflect (i) increasing targeting of concessionality, and (ii) relative timelines for removal of GCF-funded and other subsidies, in the economic and financial assessments, respectively.

³ Some sub-criteria have been rearranged and downgraded to indicators for analytical coherence.

The concept used in respect of GHG emissions rating established, in each sector, current good technical practice BAU GHG performance⁴—for example, GHG emissions of Euro 5 for buses in the public transport sector—constitutes the baseline for “Good” performance under the project. Then this is translated into an indicator that is useable in relation to urban development and is technically “agnostic”—for example, GHG emissions per passenger km. The “zero limit” is then set—for example, electric busses running on wind power generation (Scope 2). The spectrum from current good practice BAU to zero limit is then divided into three segments—corresponding to the Good Practice, Advanced Benefits, and Transformational/Best categories as set out in Figure A1.1. These standards will be established, by sector, in the Mitigation subsection that follows. Comparable data are only available for Scope 2 emissions. It would be desirable to use Scope 3 emissions⁵ but this appears not to be technically feasible at this stage given data availability.

Figure A1.1: Performance Measurement for Green Indicators

Mitigation (GHG) Indicators

Adaptation Indicators

Cost Abatement Indicators

Pollution Indicators

BAU = business as usual, CO₂e = carbon oxide equivalent, EUR = euro, GHG = greenhouse gases, kg = kilogram,
Source: ADB. 2019. *Shandong Green Development Fund Project: Project Administration Manual*. Manila.

⁴ GHG emissions should be calculated using Intergovernmental Panel on Climate Change (IPCC) methodologies where available (IPCC 2006 Guidelines. <https://www.ipcc-nggip.iges.or.jp/public/2006gl/>), otherwise consultants have to define the methodology in line with either an analog IPCC methodology, an established sector methodology, or one they develop subject to scrutiny by GCF independent review panel or equivalent.

⁵ Scope 3 emissions would include full life cycle assessment and encourage use of carbon offsets against manufacture/construction and disposal.

The base concept used in respect of adaptation rating establishes, in each sector, current levels of impact in terms of people affected in a significant way—either directly or indirectly. A BAU project of good current practice then establishes the BAU baseline (i.e., a 5% improvement). The definition of “significant” is, to some extent, based on professional judgement as to what is achievable in a sector, and thus will vary by sector. For example, the number of people being impacted by flooding—either directly through having possessions damaged or indirectly through, for example, being delayed on a commute. The “zero limit” is then set—for example, reducing the people impacted by flooding by 30%. These percentages were set based on the expected impact of a medium to large size ADB sector loan investment in a medium to large size (1 million to 5 million) city and are in line with expected levels of impact set by EBRD. The spectrum from current good practice BAU to zero limit is then divided into three segments—corresponding to the Good Practice, Advanced Benefits and Transformational/Best categories are set out in Figure A1.1. These standards will also be established, by sector, in the Adaptation subsection that follows. Where project benefit calculations are based on projections of worsening impacts due to climate change, it is important that the assessment of these benefits, i.e., those benefiting significantly from the investment (both directly and indirectly), be related to impacts demonstrated by down-scaled climate models.

The concept used in respect of pollution rating established, in each sector, related to the standards set for performance. The baseline levels (BAU) are established by PRC standards. Higher levels of performance are established by reference to additional standards which increase resilience or have other climate benefits. EU standards are often used (where appropriate) to establish “best practice” in these additional outcomes. Intermediate performance is determined according to the extent to which these outcomes are achieved. As aforementioned, the spectrum from current good practice BAU to zero limit is then divided into three segments—corresponding to the Good Practice, Advanced Benefits, and Transformational/Best categories set out above. These standards will also be established, by sector, in the Pollution subsection. Where project benefit calculations are based on projections of worsening impacts, it is important that the assessment of these benefits, i.e., those benefiting significantly from the investment (both directly and indirectly), be related to impacts demonstrated by sound technical assessments, and supported by down-scaled climate models to define the impact of climate change on the pollutant.

The concept used in respect of cost effectiveness rating uses mitigation the estimated cost per tCO₂e (total investment cost/expected lifetime emission reductions)—using \$60/tCO₂e median rate of the World Bank Expert Panel⁶ as the basis of the rating—cost between \$30–\$60/tCO₂e gets a medium green rating i.e., “2”; below \$30 gets dark green (3); and from \$60–\$100 gets light green. The benchmarks for adaptation will have to be established by each project using the methodology set out in the assessment guidelines.

⁶ See <https://www.carbonpricingleadership.org/report-of-the-highlevel-commission-on-carbon-prices/>.

APPENDIX 2: USE OF GREEN FINANCE CATALYZING FACILITY MODEL IN OTHER CONTEXTS (ASEAN, INDONESIA, AND SOUTH AFRICA)

Two major initiatives to extend the green finance catalyzing facility (GFCF) concept are currently in the pipeline. One initiative is regional (ASEAN) and another is in a country (Indonesia).

GREEN FINANCE FACILITY, INDONESIA

Background and Rationale

The SDG (Sustainable Development Goals) Indonesia One platform (SIO or the Platform)¹ launched by the Government of Indonesia (GOI) in October 2018 is being developed by PT Sarana Multi Infrastruktur (PT SMI), the state-owned national infrastructure financing company.² One of the first such initiatives globally, this aims at providing integrated financing solutions in multiple financing windows to achieve Indonesia's SDG targets.³ ADB's GFCF concept,⁴ aligning climate change actions with SDG targets, provides the road map for ADB support to develop a green finance facility under SIO (SIO-GFF). A critical goal is to use public resources strategically to (i) incentivize the commitment of infrastructure projects to address climate change targets; and (ii) improve their bankability so that private investment could be mobilized for project financing—thus, catalyzing significant volumes of green finance from a broad range of private capital sources to meet the GOI's estimated \$1.229 billion climate-adjusted infrastructure needs, 2016–2030.

Strategic Challenge: Catalyzing Green Finance

Several challenges remain for the SDGs in Indonesia as evidenced by two key figures: an annual infrastructure financing gap of \$51 billion and adverse climate change impacts leading to 13.5% of lost gross domestic product (GDP).⁵ Sustainable or green development is a critical cross-cutting theme underpinning most SDGs, but requires a substantial amount of private capital, which at present is not flowing at the scale required. As the world's fifth-largest emitter of GHG and the world's largest contributor of forest-based emissions, green finance is thus critical to Indonesia's success in achieving its national climate pledges under the Paris Agreement; its SDGs; and its Medium-Term Development Plan⁶ 2015–2019, which identifies \$400 billion of infrastructure needs, 248 strategic projects, and at least 30% of private financing. The main constraint to the needed green finance flows is the lack of a bankable pipeline of green infrastructure projects, resulting from (i) lack of capacities to incorporate innovative finance solutions in project structures, (ii) lack of de-risking and incentivizing government mechanisms to improve projects' bankability, and (iii) clear green criterion.⁷ If addressed together, they could provide the much-needed impetus to green finance flows.

¹ This section is sourced from an ADB presentation to PT SMI on the structure of the proposed Green Finance Facility October 2019.

² PT SMI is in transition to incorporate SDGs as their corporate mandates and KPI framework through this Platform.

³ The SDGs are a collection of 17 global goals set by the United Nations General Assembly in 2015. SIO explicitly targets 15 of the 17 SDGs, of which 7 could be delivered through green infrastructure.

⁴ ADB. 2017. *Catalyzing Green Finance: A Concept for Leveraging Blended Finance for Green Development*. Manila.

⁵ ADB report on Indonesia Infrastructure Financing Gap.

⁶ This provides aspirational targets by sector, to roll out 1,000 kilometers of roads, 24 seaports, 33 dams, 35 gigawatts power, etc. Strategic value projects are under Presidential Regulation No. 58/2017; 30 of these are Priority Projects.

⁷ Project de-risking tools to improve bankability using financial structures generally use concessional public funds (e.g., lower costs) to address private sector's perceived financial risks in early stages of project cycles, i.e., junior or convertible debt.

Proposed Solution

Given the challenges noted, the proposed ADB assistance will develop several green finance de-risking mechanisms with the objective of accelerating public and private green finance, the most significant, cross-cutting, and urgent aspect across the SDGs. This will be done by gradual adoption of financial tools from relatively simple to more complex to derisk green infrastructure projects, in line with development of project green pipelines.

Aiming at this strategic green finance focus under SIO, ADB proposes to support Indonesia through a financial intermediation loan to PT SMI as an MFF modality, covering: (i) development of a specific green finance facility under SIO, the SIO-GFF, aimed at transitioning green projects to bankability; and (ii) strengthened capacity in PT SMI strategically in project origination, greening, monitoring, and reporting on green targets, in line with the SIO's overall SDG framework. The SIO-GFF establishment will include: (i) green finance framework/s for project selection, (ii) financial mechanism formulation including increasingly complex de-risking finance tools, (iii) financial structuring unit establishment (with project origination and structuring capacity), and (iv) a blending of funds from climate donors and cofinanciers for usage by the financial mechanism. The capacity strengthening will enhance PT SMI's systems tools for SIO and SIO-GFF implementation, as well as possible future SDG windows to be developed (e.g., sustainable healthcare facility).

Key Conclusions

The Indonesian GFCF will adapt the concept to the less-developed state of the Indonesian capital market, simplifying the range of projects and detail of the assessment criteria to the level of capacity of the local development financial institution (DFI), simplifying the process.

ASEAN INFRASTRUCTURE FACILITY

Context

The Association of Southeast Asian Nations (ASEAN) Infrastructure Fund (AIF)⁸ is a dedicated fund established by the ASEAN member nations and ADB to address the ASEAN region's infrastructure development needs by mobilizing regional savings, including foreign exchange reserves. All AIF-financed infrastructure projects are also cofinanced by ADB funds. The AIF is an integral part of ASEAN's efforts to strengthen regional connectivity. ADB is the AIF's administrator, and ADB also provides technical support. ADB's Regional Cooperation and Operations Coordination Division, Southeast Asia Department, is the focal point for the administration of the AIF. ADB also acts as a cofinancier and the lender of record for the AIF loans.⁹

It is recognized that the AIF needs to broaden its remit to green investment.

ASEAN Catalytic Green Finance Facility

The aim of the ASEAN Catalytic Green Finance Facility (ACGF) Facility is twofold: to help bridge the investment gap for infrastructure in the region by helping to mobilize public and private capital, and to support governments in meeting commitments to the Paris Agreement and the SDGs by financing infrastructure investments linked to clear, measurable green targets.

⁸ A. Perdiguerro and A. Mehta. 2018. *The ASEAN Infrastructure Fund's ASEAN Catalytic Green Finance Facility: Innovative Finance for Green Infrastructure Development in ASEAN*. Manila: ADB.

⁹ ADB ASEAN Infrastructure Fund. <https://www.adb.org/what-we-do/funds/asean-infrastructure-fund>.

This will be achieved by designing infrastructure projects with green/climate mitigation or adaptation features (through a separate, linked, project structuring unit) and by providing financing for these under the ACGF Facility over a specific period of time to offset upfront risks. As a leveraging facility, the ACGF Facility will help governments in the region use public and concessional funds better, so that each dollar can mobilize funds from the private sector—whether institutional investors, capital markets, or through public–private partnerships (PPPs). In the long term, the facility will serve as a model to help spur the green finance mobilization in ASEAN member countries.

It is intended that every project will need to fulfill two key eligibility criteria: (i) financial bankability criterion (which will be based upon typical project finance targets such as debt service coverage ratios, etc.), and (ii) a set of green projects eligibility criteria. To assist projects in achieving these, the project structuring unit referred to above will provide support.

For greater impact, it is intended that concessional funds from other climate donors be raised to support the impact of the ACGF Facility, under a framework umbrella Green Finance Leveraging Facility to be established. This is both (i) to create a larger pool of funds to deploy (aiming at between \$200 million to \$500 million), as well as (ii) for the blended cost with ACGF Facility funds (i.e., AIF pricing as noted above plus other concessional climate fund rates) to be even more competitively priced.

The funding from the ACGF Facility, together with other funds that may be raised, would ideally provide up to 35% of capital expenditure as concessional loan to a project, to be disbursed at the construction phase. A transaction finance approach is intended to assist the project over its first 7 years, and allow commercial finance to step in. At the end of year 7 of the project's life cycle, the blended funding with ACGF Facility funding would be potentially refinanced by commercial debt or equity from sponsor or institutional or commercial investors. In the event of external refinancing not materializing, the ACGF funds would be transitioned to commercial terms after the 7 years.

Consistent with its overall objectives, the ACGF Facility is centered on the concept of leveraging public and private, concessional and non-concessional finance. The central idea is that concessional resources (grant, low-cost debt) be used strategically to leverage non-concessional funds, and mobilize private, institutional, and commercial (PIC) funds so as to increase the pool of green finance available for ASEAN infrastructure projects.

Enhanced implementation arrangements are required for the ACGF Facility. Origination, structuring, and monitoring of projects to be financed by AIF resources in the ACGF Facility require dedicated resources, especially to screen projects and help meeting green targets and indicators. To support this, ADB will explore the provision of additional resources through existing or new technical assistance funds to support a project structuring unit, which may be placed in ADB headquarters in Manila or possibly another ADB-ASEAN office location. This unit will help originate and prepare transactions, structure projects, and develop green frameworks, and help with monitoring green targets and indicators. For knowledge sharing and visibility raising of green finance thematic topics, the unit will also undertake annual or semiannual green finance roundtables. Partnerships for knowledge sharing and cooperation in the development of the ACGF Facility are also being explored.

Key Conclusions

The regional GFCF will adapt the concept to become a support and leverage facility for local financing activities in range of ASEAN economies and their diverse capital markets, supporting the development

of projects that will leverage private sector finance and simplifying the detail of the assessment criteria to accommodate the diverse regulatory frameworks, project circumstances, and levels of capacity of the local DFIs.

CLIMATE FINANCE FACILITY, SOUTH AFRICA

The Coalition for Green Capital and the Development Bank of Southern Africa (DBSA) are developing a Climate Finance Facility Program (CFF),¹⁰ which is a lending window of the DBSA that aims to address market constraints and play a catalytic role with a blended finance approach to increase climate-related investments in the southern African region. The lending facility will consist of credit enhancements focused on first-loss or subordinated debt and tenor extensions to catalyze private sector climate investments. The CFF will be a first-of-its-kind application based on the "green bank" model, adapted for emerging market conditions. It offers globally significant proof-of-concept value to middle- and lower-income nations seeking to address market barriers and quickly scale up the high levels of private investment required by Paris climate commitments.¹¹

The CFF will fill market gaps and crowd-in private investment, targeting commercially viable technologies that cannot currently attract market-rate capital at scale. It will focus on infrastructure projects that mitigate or adapt to climate change and utilize two main instruments: subordinated debt/first-loss and credit enhancements such as tenor extension to projects that are commercially viable but not currently being financed by the private sector banks. It should be noted that CFF will not fund projects that could be funded solely by commercial banks. Projects will be required to demonstrate that they are focused on technically and economically feasible transactions where there is market interest, but limited capital availability due to specific financing gaps and barriers. Developers will also be required to show that the project cannot be fully financed by the private sector. Projects will be required to show that they involve financial participation by one or more private sector financial parties, and that it will have some transformative effect on markets in terms of scale, improved private sector participation, confidence in clean energy investments, or other aspects.¹²

The activities of the CFF are expected to result in reduction or avoidance of 29.73 million tons of carbon dioxide equivalent (tCO₂e) through support of climate mitigation measures alone during the lifetime of the program. In terms of the potential adaptation impact through water efficiency, treatment, and clean water outputs in the private sector, the CFF has the potential to create at least 132 jobs through installation and save 22,600 jobs through the installation of water systems (avoiding dismissal due to water shortages). The expected number of indirect beneficiaries is 410,963 (Appendix 2, footnote 11).

The DBSA's CFF will deliver outcomes related to each of the GCFs Investment Criteria including: (i) mitigation of climate change via expanding private investment in climate-friendly infrastructure; (ii) providing a replicable model for building nation-specific capacity to scale up climate finance in support of Paris climate goals; (iii) supporting at least eight of the UN SDGs: access to clean water, renewable energy generation, economic growth, development of sustainable infrastructure, reduced inequality in terms of energy access and access to clean water, sustainable cities and communities, and taking climate action; (iv) providing necessary financial capacity to meet socioeconomic needs related to climate friendly and clean water infrastructure; (v) expanding national capacity to achieve

¹⁰ See GCF Funding Proposal FP098: DBSA Climate Finance Facility South Africa & Southern Africa Development Community (SADC) Region | Development Bank of Southern Africa (DBSA) | Decision B.21/34 28 November 2018.

¹¹ Green Climate Fund. 2018. *FP098: DBSA Climate Finance Facility. Incheon*. <https://www.greenclimate.fund/sites/default/files/document/funding-proposal-fp098-dbsa-south-africa-southern-africa-development-community-sadc-region.pdf>.

¹² DBSA. 2018. *Climate Finance Facility: Environmental and Social Management Framework*. Johannesburg.

established climate goals working through local stakeholders, and (vi) increasing market efficiency through a leverage approach to scaling up private investment (Appendix 2, footnote 11).

The CFF will conduct targeted marketing and outreach to support market and project pipeline development in South Africa and other Rand-based economies. Market outreach will focus on relevant sectors including: off-grid projects, micro-grid/urban solar farm projects, industrial and commercial solar for self-generation and wheeling on the grid to small and medium-sized enterprises, industrial and commercial water projects, local community water projects, and residential and commercial energy efficiency investments. Market outreach strategies will include:

- outreach to developers and project sponsors to explain the role and capacity of the CFF and how it addresses significant financing barriers;
- outreach to commercial banks and DFIs to encourage referral of projects that meet CFF criteria and are not currently bankable at sustainable terms;
- outreach to municipalities to explain the role of the CFF around micro-grid/urban solar farm projects and local community water projects;
- support for the CFF request for proposals solicitation process as noted above; and
- creation and maintenance of CFF website to support visibility and understanding of the CFF.

Key Conclusions

As with the abovementioned ACGF Facility, this regional facility adopts a similar concept to become a support and leverage facility for local financing activities in range of southern African economies and their diverse capital markets; support the development of projects that will leverage private sector finance; and simplify the detail of the assessment criteria to accommodate the diverse regulatory frameworks, project circumstances, and levels of capacity of the local DFIs.

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Catalyzing Climate Finance

Lessons Learned from the Shandong Green Development Fund

In 2019, the Asian Development Bank (ADB) approved a \$100 million loan contributing to climate finance for the \$1.5 billion Shandong Green Development Fund Project. The fund introduces an innovative leveraging mechanism to catalyze private, institutional, and commercial capital for the development of climate-friendly infrastructure and business in Shandong Province, the People's Republic of China. This paper sets out ADB's experience in establishing scalable institutional structures for climate finance and presents current and prospective ADB roles in support of such structures and resultant value addition. The paper also discusses key considerations in designing the operational systems of such institutions and provides policy rationale for government action.

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ASIAN DEVELOPMENT BANK

6 ADB Avenue, Mandaluyong City

1550 Metro Manila, Philippines

www.adb.org