

ISSUE PAPER

NATIONAL DEVELOPMENT BANKS AND GREEN INVESTMENT BANKS: MOBILIZING FINANCE IN LATIN AMERICA AND THE CARIBBEAN TOWARD THE IMPLEMENTATION OF NATIONALLY DETERMINED CONTRIBUTIONS



This background paper has been prepared by the Natural Resources Defense Council with the support of Climate Finance Advisors in preparation for the conference to be held on June 26th and 27th, 2017 in Mexico City: *National Development Banks and Green Banks: Key Institutions for Mobilizing Finance Towards the Implementation of Nationally Determined Contributions (NDCs) and Sustainable Development Goals (SDGs)*. This event is organized by the Connectivity, Markets and Finance Division (CMF) and the Climate Change & Sustainable Development Sector of the Inter-American Development Bank (IDB) in cooperation with the National Bank for Public Works and Services (BANOBRA), the Organization for Economic Co-operation and Development (OECD), the Green Bank Network (GBN), and the Latin American Association of Development Financing Institutions (ALIDE). The paper is intended to provide context for the more thorough examination of:

- potential opportunities for knowledge exchanges between existing green investment banks (GIBs) and national development banks (NDBs) in the Latin America and Caribbean (LAC) region; and
- ways in which the green investment bank model could be adapted to the LAC context to enhance the region's ability to invest in low-carbon and climate resilient infrastructure at the scale and pace required to meet NDCs and achieve SDGs.

The conference presents the first in-depth opportunity to share knowledge in a number of critical areas that both NDBs and GIBs target, such as risk management, monitoring and verification, warehousing and aggregation of small projects, consumer financing of distributed solar and energy efficiency, green bond issuance, and risk profiles of emerging technologies, such as offshore wind, electric vehicles, and energy storage. Adaptation investment is an area in which some NDBs, because of their broader infrastructure focus or sector-specific mandate, have more practical experience than GIBs. GIBs may have more experience with new technologies and business models being developed and deployed in advanced economies.

Primary authors

Douglass Sims, Sarah Dougherty, and Bettina Bergöö of the NRDC Center for Market Innovation.

Consulting authors

Lori Kerr and Stacy Swann, Climate Finance Advisors.

Peer reviewers

Inter-American Development Bank (IDB): Maria Netto, Enrique Nieto, Alexander Vasa, Margarita Cabrera Botaro, and Isabelle Braly-Cartiller; Organisation for Economic Co-operation and Development (OECD): Rob Youngman, Naeeda Crishna Morgado, and Rodney Boyd; Connecticut Green Bank (CGB): Bert Hunter; NRDC Latin America: Amanda Maxwell and Carolina Herrera; Climate Policy Initiative (CPI): Dario Abramskiehn, Jessica Brown, and Barbara Buchner; Rocky Mountain Institute (RMI): Paul Bodnar; Climate Finance Advisors (CFA): Stacy Swann.

About the Green Bank Network

The Green Bank Network (GBN) is a membership organization managed by NRDC and the Coalition for Green Capital that was founded in 2016 to foster collaboration and knowledge exchange among existing Green Banks, enabling them to share best practices and lessons learned. The GBN also aims to serve as a source of knowledge and a network for jurisdictions that seek to establish a Green Bank. The GBN founding members are the Clean Energy Finance Corporation (Australia), Connecticut Green Bank (U.S.), Green Finance Organisation (Japan), GreenTech Malaysia, NY Green Bank (U.S.), and UK Green Investment Bank. More information is available at Green Bank Network, greenbanknetwork.org/about-gbn.

About NRDC

The Natural Resources Defense Council is an international nonprofit environmental organization with more than 2.4 million members and online activists. Since 1970, our lawyers, scientists, and other environmental specialists have worked to protect the world's natural resources, public health, and the environment. NRDC has offices in New York City, Washington, D.C., Los Angeles, San Francisco, Chicago, Montana, and Beijing. Visit us at nrdc.org.

NRDC Chief Communications Officer: Michelle Egan

NRDC Deputy Directors of Communications: Lisa Goffredi and Jenny Powers

NRDC Senior Editor, Policy Publications: Mary Annais Heglar

Design and Production: www.suerossi.com

Cover: Lima, Peru.

© Natural Resources Defense Council 2017

Table of Contents

Executive Summary	1
Recommendations.....	3
Opportunities and Challenges Facing NDBs in LCR Infrastructure Investment	3
The Green Investment Bank Model	6
Governance of NDBs and GIBs	14
Areas for Collaboration Between NDBs and GIBs.....	15
Exploring Adaptation of the GIB Model to Challenges in the Region	15
Conclusion.....	18

Boxes

1. Risk Mitigants and Transaction Enablers: Tools of NDBs and GIBs.....	6
2. NY Green Bank’s Strategy to Scale up Investment in LCR Infrastructure	7
3. GIB Strategic Flexibility drives Additionality.....	10

Figures

A. Structural Options for a GIB in LAC	3
B. Green Investment Banks and their Relationship to other Public and Private Entities.....	9
C. Green Bank Network Members – Areas of Investment through First Quarter 2017	11

Tables

1. Comparison of Selected LAC National Development Banks.....	4
2. Comparison of Selected Green Investment Banks.....	7
3. Selected Key Indicators of Members of the Green Bank Network	12
4. Representative GIB Programs and Transactions.....	13

Executive Summary

- **Investment requirements in low carbon, climate-resilient (LCR) infrastructure to achieve nationally determined contributions under the Paris Agreement (NDCs) in LAC far exceed the capital public and private financial institutions are currently supplying.** For the purposes of this paper, LCR investments refer to those that mitigate the causes of climate change or help society adapt to its consequences. The International Finance Corporation (IFC) estimates that LAC NDC targets for infrastructure (broadly defined to include energy and urban infrastructure) and industrial energy efficiency alone will require US\$176 billion per year between 2016 and 2030. To provide a sense of the scale of the financing gap, data from the Climate Policy Initiative (CPI) indicates that in 2014 only US\$32 billion was invested in a broader array of subsectors, and two-thirds of the investment came from public sector institutions.¹
- **Key channels of domestic public climate finance include national development banks and other domestic development finance institutions in LAC (taken together, “NDBs”). NDBs are longstanding, critically important institutions in LAC, serving as conduits between on-the-ground investments and national, regional, and international capital. NDBs in LAC are playing a key role in catalyzing climate finance, particularly in the area of carbon emissions mitigation.** *The Role of National Development Banks in Catalyzing International Climate Finance*, a 2013 study by the Inter-American Development Bank (IDB) and CPI, concluded that NDBs could play a pivotal role in bringing in the additional private capital needed by using their local market knowledge and long-term capital to mitigate risk for commercial capital.² The follow-up study from the same organizations, *Supporting National Development Banks to Drive Investment in NDCs in Brazil, Mexico, and Chile*, confirms that some of the potential is already being realized. It attributes US\$11 billion in climate finance to 12 institutions in Chile, Mexico, and Brazil in 2015 alone, mainly in concessional and market-rate lending to large-scale renewable energy projects. However, the same study indicates that NDBs face financial, technical capacity, governance, regulatory, and policy constraints that prevent them from being more effective in achieving NDCs. NDBs are particularly challenged in assuming or transferring greater degrees of technical, credit, funding, high up-front cost, and demand-side risks.
- **The green investment bank model has been deployed in numerous jurisdictions around the world to fill financing gaps for clean energy projects, often at the local level. Green Investment Banks (GIBs) and GIB-like entities are not banks in a traditional sense.³ They are publicly capitalized, domestically focused, specialist financial institutions specifically established to crowd in private capital to investments in clean energy.** Existing GIBs are currently filling critical roles in the climate finance ecosystem where financing is lacking. These GIBs are much smaller than most LAC NDBs and do not accept deposits or channel savings. However, GIBs use the same tools and products that some NDBs use, including risk mitigation products, co-lending, co-investing, warehousing and securitization, and demonstration projects. They also provide various forms of technical and market development assistance (e.g., driving standardization of transaction formats). In their short history, GIBs have built a track record of success in mainstreaming a variety of new technologies, financial products and business models, and crowding in private capital using financial innovation and sector expertise. The GIB model may provide useful lessons and experience for countries in LAC to consider in the interest of achieving climate policy and investment goals, such as those detailed in their NDCs. Core characteristics of GIBs include:
 - Being capitalized with patient, usually public funds
 - Having a narrow mandate to focus on LCR infrastructure in the local environment
 - Being endowed with operating independence from government
 - Being evaluated on their ability to demonstrate additionality and “crowding in” of private capital
 - Being evaluated on their ability to demonstrate cost effectiveness
 - Being held accountable for achieving climate and other policy goals
- **Between NDBs and existing GIBs, there is a potential to have fruitful exchanges and knowledge sharing in a number of areas relevant to driving private capital to LCR infrastructure investments.** In addition to exchanges between NDBs and existing GIBs, the creation of the functional equivalent of a GIB in LAC—whether through existing institutions or through a new mechanism—could make a valuable contribution to the climate finance ecosystem in certain countries. It could be particularly valuable if there are gaps in financing for certain types of projects, for example because of small size. To varying degrees, the NDBs recently surveyed in Mexico, Chile, and Brazil reported having financial, technical capacity, governance, regulatory, and policy constraints that hinder greater progress in rapidly increasing LCR investment necessary to achieving NDCs. Adapting the GIB model to regional conditions may be an effective strategy to overcome some of the financial and technical barriers encountered and to more generally support green finance innovation.

FINANCIAL BARRIERS THAT COULD BE ADDRESSED BY LAC GIBs

A recent study and survey by the IDB and CPI on NDBs in Brazil, Chile, and Mexico, *Supporting National Development Banks to drive investment in NDCs in Brazil, Mexico, and Chile* highlights some discrete financial and technical problems that a LAC GIB could address. Among the financial barriers cited in the study are:

- lack of long-term, low-cost capital;
- insufficient risk-adjusted returns;
- conservative investment mandates; and
- risk perception of climate finance investments.

Based on the track record of existing GIBs and our analysis, LAC GIBs could address these financial barriers by:

- **Attracting long-term, low cost capital:** A long-term financing mechanism set up with the express mission of deploying techniques to crowd in private capital to LCR infrastructure investment could be attractive to international donors (multilateral, bilateral, and philanthropic) and private investors. Such capital providers may value a local specialist partner tasked with developing and maintaining the expertise and relationships necessary to achieve the mission and that is evaluated primarily on its ability to deliver on mission-related outcomes.
- **Improving NDB risk-adjusted returns:** When it is consistent with its mission, a LAC GIB (structured as a pool of capital distinct from an NDB) could take on transaction risk that an NDB might be reluctant to take on itself, thus enhancing the NDB's performance. Some of the institutions in the IDB study, in fact, called for just such an entity to enable them to advance more climate finance.
- **Providing options for NDBs to expand their mandate:** By having a GIB division within an NDB (particularly if permitted to be capitalized off-balance sheet), the NDB may be able to expand into new sectors, increasing its effectiveness.
- **Acting as risk mitigation agency and innovation incubator:** GIBs can help incubate innovative investments, and their funding can focus on derisking the aggregation of small-scale clean energy projects, introducing technologies new to the local market, and engaging in research and development of adaptation-focused financial products.⁴
- **Accelerating NDB learning curves, thereby reducing risk perception, and improving risk-adjusted returns:** Specialist GIBs can share knowledge with NDBs to help accelerate the NDBs' understanding of operating at different points in the financing ecosystem, more quickly reducing risk perceptions, and consequently, risk premiums.

TECHNICAL BARRIERS THAT COULD BE ADDRESSED BY LAC GIBs

Among the key technical barriers cited by respondents to the IDB survey are:

- lack of ability to identify and classify LCR (or, as in IDB survey's terminology, "climate-relevant") projects;
- challenges in assessing the financial, technological, and other risks of climate-relevant projects, particularly for energy efficiency, urban infrastructure, and adaptation projects; and
- need for greater understanding of financing structures for climate-relevant projects, specifically those involving innovative financial products.

A GIB could address these technical barriers, as well. Existing GIBs have demonstrated that a key to their success is having in-house dedicated technical expertise. This expertise has given them a fuller and deeper technical understanding of the attributes of new technologies, which, in turn, informs their approach to financing. This approach could be replicated for challenging areas in LCR investment in the LAC context. Existing GIBs have used this strategy to increase understanding of the risks and opportunities presented by new mitigation technologies, such as residential solar, offshore wind, energy storage, and electric vehicles. In LAC, some examples of areas that GIBs could develop technical capacity include distributed energy, energy storage, electric vehicles, and adaptation investments.

OPTIONS FOR CREATING A FUNCTIONAL GIB IN LAC

Should a country determine that a GIB could be a useful strategy, it would have various structural options from which to choose, ranging from an in-house "green division" within an NDB to a new, free standing GIB institution. Figure 1 sets out four options and grades them along the needs financial and technical assessment criteria identified in the IDB study and an additional critical one—the ability to leverage the network of NDB relationships. The pros and cons of each option are discussed in detail in Part 5.

FIGURE A: STRUCTURAL OPTIONS FOR A GIB IN LAC

STRUCTURAL OPTION	NDB NEEDS ASSESSMENT		
	ABILITY TO LEVERAGE NDB NETWORK	ABILITY TO ADDRESS FINANCIAL BARRIERS	ABILITY TO ADDRESS TECHNICAL BARRIERS
In-House Green Division	+++	+	+
Green Affiliate (NDB-controlled)	+++	++	++
Green Joint Venture (private investor-controlled)	++	++	+++
New Institution - stand-alone GIB	+	+++*	+++

Key: Number of “+” indicates the degree to which the structural option is able to address the barrier.

* Assuming increased ability to attract low-cost, long-term capital

Recommendations

- 1. We recommend that the Green Bank Network, the Latin American Association of Financial Institutions for Development (ALIDE), the IDB, and the Organisation for Economic Co-operation and Development (OECD) form a working group to develop a joint knowledge exchange and research agenda, building on the foundation set by this inaugural conference.**
- 2. To the extent that any jurisdiction is interested in exploring the GIB model more fully, we invite its representatives to contact the Green Bank Network for further information (info@greenbanknetwork.org).**

Part I: Opportunities and Challenges Facing NDBs in LCR Infrastructure Investment in LAC

The Latin America and Caribbean region (LAC) contains some of the countries most vulnerable worldwide to climate change (e.g., small island states in the Caribbean) as well as some of the world’s largest emitters (e.g., Mexico and Brazil). 32 out of 33 countries in LAC have signed the Paris Agreement, and 24 countries have put forth intended nationally determined contributions (INDCs)⁵. Reflecting this diversity as to where countries fall on the vulnerability-emitter continuum, the NDCs of individual LAC countries include a wide variety of climate actions. These range from water resources management to reforestation to renewable energy deployment. An inventory conducted by the United Nations Development Programme indicates that most emissions in the region are from the agriculture, energy, and land use and forestry sectors, so most LAC countries will pursue low-carbon action in these sectors.⁶

In a 2016 report, the International Finance Corporation (IFC) estimates that reaching LAC’s NDC targets for renewable energy, urban infrastructure, and industrial energy efficiency alone will require investment of more than US\$176 billion per year between 2016 and 2030.⁷ This does not include the need for investment in other sectors listed above. In its report *Global Landscape of Climate Finance 2015*, Climate Policy Initiative (CPI) estimated total climate finance invested in LAC at US\$32 billion in 2014, of which US\$24 billion was provided by public finance institutions.⁸

Clearly, there is a significant gap between the investment needed to achieve LAC’s NDC goals and current climate finance flows. It is increasingly recognized globally that public funding alone will be insufficient to achieve NDC commitments and it is imperative to catalyze private sector capital.⁹ Private financial institutions will have to evolve into more climate-conscious actors and it will especially behoove them to do so as governments adopt policies aimed at transforming the financial system to prioritize LCR investments. To accelerate this process, near term public funding must focus on removing private sector barriers to low-carbon, climate-resilient (LCR) investing. For the purposes of this paper, LCR investments generally refer to those that mitigate the causes of climate change or help society adapt to its consequences.

Key channels of domestic public climate finance include national development banks and other domestic development finance institutions in LAC (taken together, “NDBs”), as well as multilateral development banks (MDBs), regional development banks (RDBs), bilateral development banks, and multilateral climate funds, such as the Green Climate Fund and Climate Investment Funds. NDBs occupy a central position in the climate finance ecosystem of governments, international financiers, private sector actors, and others because they possess an in-depth understanding of the local context. NDBs benefit from having the support of governments and familiarity and contact with the full range of stakeholders and networks.

As a result, NDBs are well positioned to help develop and execute a coordinated effort to achieve NDC targets. As noted in *The Role of National Development Banks in Catalyzing International Climate Finance*, a 2013 study by the Inter-American Development Bank (IDB) and CPI on the role of NDBs to catalyze private investment in carbon emissions mitigation, “[NDB’s] special knowledge and long-standing relationships with the local private sector put them in a privileged position to access local financial markets and understand local barriers to investment. Compared to commercial banks and investment funds, they have a greater potential to take risks than the financial intermediaries, providing long-term financing in local currency in their local credit markets.”¹⁰

In the recent follow-up study, *Supporting National Development Banks to drive investment in NDCs in Brazil, Mexico, and Chile*, the IDB and CPI conclude that some of the potential is indeed being realized. LAC NDBs are already the single largest source of public climate finance in domestic markets.¹¹ The NDBs surveyed in the study are committing large volumes of capital to LCR investments—including US\$11 billion in Brazil, Mexico, and Chile in 2015 alone—aimed at achieving the region’s climate mitigation and adaptation goals. Still, the report indicates that much more climate finance is needed and that there are gaps and barriers to getting finance to mitigation subsectors, such as energy efficiency and small-scale renewables, and to the adaptation sector as a whole.

In surveys for the recent IDB report, 12 NDBs across Brazil, Chile, and Mexico noted barriers to increasing LCR infrastructure investments in their portfolios. The barriers include limited access to long-term and low-cost capital, insufficient risk-adjusted returns (mostly due to high transaction costs), the high cost of imported equipment, conservative investment mandates, and a general lack of institutional capacity to assess the risk of climate investments. While these constraints were noted by NDBs in these countries, they may be reflective of climate finance constraints facing financial institutions across the region.

Some NDBs operate as first-tier institutions that lend directly to end consumers (direct model) while other NDBs are second-tier institutions that lend to other financial institutions that subsequently on-lend to end consumers (wholesale model). Still others use both models.¹²

TABLE 1: COMPARISON OF SELECTED LAC NATIONAL DEVELOPMENT BANKS

NAME	CREATION YEAR AND MECHANISM	LEGAL STRUCTURE AND GOVERNANCE	MISSION	TOTAL ASSETS (2014)	DEBT FINANCING MODEL (TIER 1, 2)
Brazil - Banco Nacional de Desenvolvimento Econômico e Social (BNDES) (BNDES has various wholly owned subsidiaries and investment funds. Together, they form the BNDES Group.)	Established in 1952 by law 1628 as a government agency and converted to a state-owned company in 1971 by law 5662	Fully state-owned company associated with the Ministry of Planning, Development and Management. It is presided over by a 12-member board of directors that includes 10 members nominated by various ministries, one representative of BNDES’ employees, and the vice president of BNDES	To foster sustainable and competitive development in the Brazilian economy, generating employment while reducing social and regional inequalities	US\$332 billion	Tier 1, 2/ (Direct, Wholesale)
Brazil - Banco de Desenvolvimento de Minas Gerais S.A. (BDMG)	Established in 1962 by state law 2,607	Government-owned entity controlled by the government of the State of Minas Gerais and presided over by an 8-member board of directors and 5-member executive board	To promote the sustainable and competitive economic and social development of Minas Gerais, generating more and better jobs and reducing social disparities	US\$2.2 billion	Tier 1 (Direct)

TABLE 1: COMPARISON OF SELECTED LAC NATIONAL DEVELOPMENT BANKS

NAME	CREATION YEAR AND MECHANISM	LEGAL STRUCTURE AND GOVERNANCE	MISSION	TOTAL ASSETS (2014)	DEBT FINANCING MODEL (TIER 1, 2)
Mexico - Fideicomisos Instituidos en Relación con la Agricultura (FIRA) (comprises various trusts/funds)	Established in 1954 by decree of the Mexican government	Governed by a board of directors comprised of representatives from the federal government, regulatory bodies, commercial banks, agricultural industries, and agricultural organizations representing small and large farmers	Through local banks, to support the agricultural, livestock, fishing, forestry, and rural sectors of the country with credit, guarantees, technical assistance and training, and technology transfer	US\$5.3 billion	Tier 2 (Wholesale)
Mexico - Nacional Financiera (NAFIN)	Established in 1934 by decree of the Mexican government	Wholly-owned by the Mexican government and governed by a board of directors, which has various committees with external members	To promote the overall development and modernization of the industrial sector with a regional approach; stimulate the development of financial markets; and act as financial agent of the federal government in the negotiation, contracting, and management of credits from abroad	US\$20.6 billion	Tier 1, 2 (Direct, Wholesale)
Chile - Corporacion de Fomento de la Produccion (Corfo)	Established by the government of Chile in 1939 by law 6334 as a public institution and state development agency for the promotion of national competitiveness (not a bank)	Responsible to the Ministry of Economy, Development and Tourism with a 6-member board comprised of representatives from six ministries	To improve the competitiveness and the productive diversification of the country by encouraging investment, innovation, and entrepreneurship. In addition, to strengthen human capital and technological capabilities to achieve sustainable and territorially balanced development	US\$7.5 billion	Tier 2 (Wholesale)
Chile - BancoEstado	Established by decree 26 of 1953 as a commercial bank	Wholly state-owned financial institution for which the president of Chile appoints 6 of 7 members of the board of directors (one member from labor) and all 3 voting members of the executive committee	To provide financial services across all social sectors and remote territories in the country while encouraging savings to promote social and economic development nationwide	US\$48.8 billion	Tier 1 (Direct)

Source: Various¹³

Part 2: The Green Investment Bank Model

Prior to the Paris Agreement and the resulting NDCs, subnational governments like those of New York and Connecticut in the United States and the national governments of Malaysia, Japan, Australia, and the United Kingdom had already identified a need for specialized financing vehicles to address market barriers constraining clean energy deployment.

These governments established green investment banks (GIBs) based on the observations that: (1) grant-based clean energy subsidies alone are sometimes ineffective and unsustainable in catalyzing clean energy investments over the medium- to long-term; (2) the amount of public funding available to reach local climate targets is dwarfed by the amount of investment necessary and therefore public money must be used judiciously as a private-sector catalyst; and (3) there are identifiable financing needs of clean energy projects and companies at the local level that are not being met by existing public or private institutions.^{14,15}

GIBs are not commercial, investment, or development banks in a traditional sense.¹⁶ They are publicly capitalized, domestically focused, specialist financial institutions specifically established to crowd in private capital to investments in LCR infrastructure. These entities are currently filling a critical role in the climate finance ecosystem where financing is lacking. They are much smaller than many LAC NDBs and do not accept deposits or channel savings. They use the same tools and products that some NDBs use, including risk mitigation products, co-lending, co-investing, warehousing and securitization, demonstration, and technical and market development assistance (e.g., driving standardization of transaction formats). In their short history, GIBs have established a track record of success in mainstreaming new technologies and business models and crowding in private capital using financial innovation and sector expertise. The GIB model can provide useful lessons and experience for countries in LAC, particularly in the context of achieving climate policy and investment goals, such as those identified in their NDCs.¹⁷ To date, GIBs have been established only in OECD countries (with Malaysia being the only exception). Where GIBs have emerged, NDBs either do not exist, or if they do, they generally do not play as dominant a role in financing infrastructure (or in the financial sector as a whole) as they often do in LAC.^{18,19}

BOX I: RISK MITIGANTS AND TRANSACTION ENABLERS: TOOLS OF NDBs AND GIBs

Risk mitigants, transaction enablers, and demonstration projects are key tools for crowding in private investment. As described by the Organisation for Economic Co-operation and Development (OECD) in a comprehensive 2016 report on GIBs:²⁰

“...GIBs employ a variety of techniques (“risk mitigants”) that aim to mitigate risk and enable a larger flow of deals than would otherwise occur. More specifically, they use a range of targeted interventions to reduce, reassign or reapportion different investment risks using mechanisms such as guarantees, insurance products, public stakes and other forms of credit enhancement. By providing coverage for risks which are new and are not currently covered by financial actors, or are simply too costly for investors, risk-mitigating tools increase the attractiveness and acceptability of investments (OECD, 2015a).

Other GIB techniques seek to reduce transaction costs. As many investors have limited experience with investment in [low carbon and climate resilient (LCR)] infrastructure, the cost associated with identifying, executing and managing such investments can be prohibitive. In addition, LCR infrastructure investments—and particularly energy efficiency investments—are typically too small to be attractive to many private investors due to high transaction costs. To reduce these costs, GIBs employ various approaches (“transaction enablers”), including warehousing (pooling small transactions), securitisation (transforming illiquid assets into tradable securities) in a prudent and judicious way and co-investment (OECD, 2015a).

... In addition to using these techniques, GIBs seek to prove through “demonstration” that LCR infrastructure investments can be profitable today on commercial terms, even without risk mitigation. Demonstration aims to: address incorrect perceptions among investors that clean technologies are less developed, risky and not commercially viable; fill data and information gaps; and build confidence in markets for new technologies and activities.”

GIBs have been developed to address local financing goals and gaps. They were created after extensive market analysis and engagement with market actors to identify local barriers to private LCR investment. This work not only establishes the rationale for creating GIBs but also informs the development of GIB goals and activities. For instance, in 2013, the New York State Energy Research and Development Authority (NYSERDA) commissioned a consulting firm to conduct an in-depth market analysis to assess the opportunity for a GIB. The firm’s report was based on market interviews, concept testing workshops, industry research, and financial modeling.²¹ This analysis was used to develop NY Green Bank’s first business plan, which identified key markets and barriers constraining clean energy financing in New York State (e.g., lack of transaction standardization) and outlined a plan to address the barriers.²² NY Green Bank continues to work closely with market participants and revise its business plan (which is submitted annually to its regulator) based on evolving market conditions.²³

BOX 2: NY GREEN BANK'S STRATEGY TO SCALE UP INVESTMENT IN LCR INFRASTRUCTURE

"NYGB works to increase the size, volume and breadth of clean energy investment activity throughout the State, expand the base of investors focused on NYS clean energy, and increase clean energy participants' access to capital. To do so, NYGB collaborates with the private sector to develop transaction structures and methodologies that overcome typical clean energy investment barriers, such as challenges evaluating risk and addressing the needs of distributed energy and efficiency projects where underwriting may be geared more towards larger and/or groups of somewhat homogeneous investment opportunities.

NYGB focuses on opportunities that create attractive precedents, standardized practices and roadmaps that capital providers can willingly replicate and scale. As funders "crowd in" to a particular area within the clean energy landscape, NYGB moves on to other areas that have attracted less investor interest.

To solve client problems in real-time, and address capital provider needs, NYGB operates comfortably within private sector time horizons and commercial norms."

Source: NY Green Bank 2016 Business Plan²⁴

New York followed the precedent established by the United Kingdom, which formed an expert Green Investment Bank Commission. The commission set out the case for government intervention in financing the UK's transition to a low-carbon economy and sketched out the parameters within which a GIB might operate.²⁵ The analysis identified specific LCR sectors with the greatest private capital shortages.

GIBs provide a variety of debt, equity and risk mitigation tools to achieve their missions. When operating as lenders, they may operate as first-tier institutions that lend directly to end consumers (direct model) or less frequently, as second-tier institutions that lend to other financial institutions that subsequently on-lend to end consumers (wholesale model).

TABLE 2: COMPARISON OF SELECTED GREEN INVESTMENT BANKS

NAME	CREATION YEAR AND MECHANISM	LEGAL STRUCTURE AND GOVERNANCE	CAPITALIZATION SOURCES	TOTAL ASSETS (2016)	MISSION	FINANCING MODEL (TIER 1, 2)
Clean Energy Finance Corporation (CEFC)	Established 2012 by the Australian government under the Clean Energy Finance Corporation Act 2012	Independent corporate commonwealth entity governed by an Independent board that reports to Parliament through its responsible ministers (treasurer and finance minister)	Government funding of AU\$10 billion (US\$7.47 billion) over 5 years, comprising annual appropriations of AU\$2 billion (US\$1.49 billion) ²⁶	US\$ 912 million	To accelerate Australia's transformation toward a more competitive economy in a carbon-constrained world by acting as a catalyst to increase investment in emissions reduction	Tier 1, 2 (Direct, Wholesale)
Connecticut Green Bank (CGB)	Created in 2011 from an existing entity through an act of the Connecticut legislature	Quasi-public independent entity governed by an 11-member board of directors comprised of all political appointees	Surcharge on ratepayer bills and carbon-trading proceeds leading to ~US\$32 million annually	US\$ 177 million	To achieve cleaner, cheaper, and more reliable sources of energy while creating jobs and supporting local economic development	Tier 1 (Direct)
GreenTech Malaysia (GTM)	The Green Technology Financing Scheme, which GTM manages, was introduced by the government in 2010	Nonprofit entity operating under the purview of the Ministry of Energy, Green Technology and Water, and a board of directors	Government funds of US\$800 million through 2017 and an additional US\$1.2 billion through 2022	US\$ 14 million	To develop sustainable and widespread green technology markets and strengthen local green technology industry	Tier 2 (Guarantees)

TABLE 2: COMPARISON OF SELECTED GREEN INVESTMENT BANKS

NAME	CREATION YEAR AND MECHANISM	LEGAL STRUCTURE AND GOVERNANCE	CAPITALIZATION SOURCES	TOTAL ASSETS (2016)	MISSION	FINANCING MODEL (TIER 1, 2)
Green Finance Organisation (Japan) (Green Fund)	Established in 2013 and selected by the Ministry of Environment to govern the Japanese Green Fund	Nonprofit entity comprised of an executive board and operations team that regularly receive counsel from external experts. No employees of the GFO are political appointees.	Capitalized by a portion of revenue from a carbon tax on fossil fuel consumption	US\$ 78 million	To solidify the business case for small- to large-scale clean energy projects by making equity and mezzanine investments that attract further capital from private sources	Tier I (Mezzanine)
New York Green Bank (NYGB)	Established in 2014 by executive action of the governor of New York	Public entity, subsidiary of the New York State Energy Research and Development Authority, overseen by the New York Public Service Commission	Ratepayer funds and carbon-trading proceeds leading to US\$1 billion over the next 10 years	US\$ 213 million	To accelerate clean energy deployment in New York State by working with the private sector to transform financing markets	Tier I (Direct)
UK Green Investment Bank (UK GIB)	Established in 2012 by the UK government	Upon creation, the GIB's sole shareholder was the Department of Business Innovation & Skills within the UK government. In April 2017, the UK GIB was sold to a consortium of private investors including Macquarie.	Upon creation, the GIB was given a UK government budgetary allocation of about US\$3.7 billion.	US\$ 2.1 billion	To accelerate the UK's transition to a greener, stronger economy	Tier I (Direct)

Source: Various²⁷

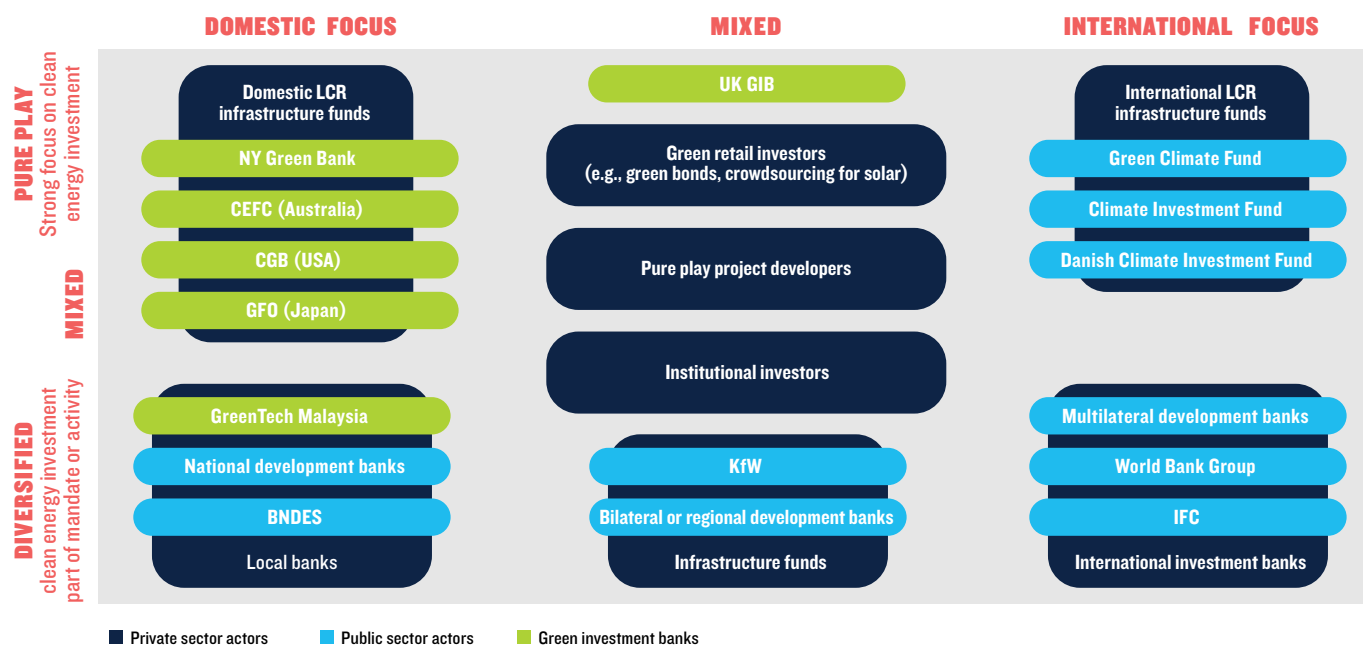
CORE CHARACTERISTICS OF GREEN INVESTMENT BANKS

According to the OECD and the Coalition for Green Capital, 13 GIBs have been established to date in national and subnational jurisdictions around the world.²⁸ This count does not include “city green funds” established by municipalities such as London, Toronto, Amsterdam, and New York.²⁹ The analysis in this paper covers a subset of the 13, namely, the six founding members of the Green Bank Network: Clean Energy Finance Corporation (Australia) (CEFC), Connecticut Green Bank (CGB), Green Finance Organisation (Japan) (GFO), GreenTech Malaysia (GTM), NY Green Bank (NYGB), and UK Green Investment Bank (UK GIB). Although existing GIBs have varying structures, missions, and product offerings, GIBs share a core set of defining characteristics: they are capitalized with public funds; they have narrow mandates; they operate independently; they provide additionality, attracting new capital and technologies; they are mandated to operate cost-effectively; and they aim to be accountable to their mandates and their stakeholders. Each of these characteristics is described in more detail below.

Capitalized with patient, usually public funds: Existing GIBs have been initially set up as public or quasi-public specialized financing entities, capitalized with public funds from government budget appropriations, carbon pricing revenue, or utility bill surcharges. The public and generally permanent nature of the capital means it may be patient—i.e., long term—and allows flexibility in setting return expectations.

Narrow mandate to focus on LCR infrastructure in the local environment: Although the use of public funds to attract private investment in LCR infrastructure by mitigating perceived risk is common among GIBs and other public finance institutions, the core characteristic that distinguishes GIBs is a narrow mandate focusing specifically on LCR investment, generally in the local environment.³⁰ The relationship of GIBs to other LCR infrastructure financiers is depicted in Figure B.³¹

FIGURE B: GIBs AND THEIR RELATION TO OTHER EXISTING PUBLIC AND PRIVATE ENTITIES THAT FINANCE LOW-CARBON AND CLIMATE-RESILIENT INFRASTRUCTURE



Adapted from: *Green Investment Banks: Scaling up Private Investment in Low-carbon, Climate-resilient Infrastructure*, 2016, OECD. Note that GreenTech Malaysia (GTM) and UK GIB are separated from the other GIBs because GTM supports a greater diversity of technologies than most GIBs, and UK GIB makes international investments through its joint venture with the UK's Department of Energy and Climate Change.

As financing entities with narrow mandates to make NDC-aligned investments, GIBs have a different investment orientation than institutions with broader mandates. The World Bank, for instance, is mainstreaming climate mitigation and adaptation considerations into its activities under a broad mission to “achieve the twin goals of ending extreme poverty and building shared prosperity.” By comparison, Japan’s Green Fund was established directly in response to the challenges associated with building clean energy projects, including high up-front capital costs for development and construction as well as long operation and income phases that increase project risk for project owners and developers. The Green Fund’s objective is to solidify the business case for small- to large-scale clean energy projects by making equity and mezzanine investments that attract further capital from private sources.

The practical import of the narrow mandate is that within a GIB—whether in the form of a division within a larger institution or an independent institution—LCR investments need not compete for limited resources against investments in other industries, sectors, or locales. Professionals investing a dedicated pool of capital are evaluated solely on the successful execution of the entity’s LCR-focused activities and do not need to prioritize LCR investments over other, perhaps more traditional, investments. As specialized entities, GIBs may attract specialists in LCR infrastructure transactions more easily and with greater justification than less focused organizations. The narrow mandate makes it a priority to attract, cultivate, and expand the specialized capacity needed to address the more difficult segments of the LCR sector and encourages flexibility to be experimental and innovative.

Operating independence from government: GIBs are often situated within or controlled by a government agency and are subject to government policy changes. But, their charters usually grant them authority to be responsive to markets and operate largely free of direct political influence. For instance, the Australian CEFC is governed by an independent board that reports to the Australian Parliament but operates and makes its investment decisions independently, based on commercial assessments. In addition to this institutional independence, the CEFC, like other GIBs, is afforded certainty of capitalization; in accordance with the CEFC Act, it has access to AU\$2 billion (US\$1.49 billion) annually over five years. This funding certainty minimizes concern that politicians could interfere with the mission of the corporation using its funding as leverage.³²

Even with an official independent status, any public domestic financing entity is subject to political and economic shifts. In its most recent annual report, for example, UK GIB reported that operating asset revenues have been negatively affected by the removal of renewable energy incentives and falling power prices.³³ More fundamentally, in 2015, the UK government

made the decision to privatize the UK GIB in order to attract new investors and secure the institution’s long-term future. The UK GIB Board of Directors is supportive of this decision.³⁴

Requirement to demonstrate additionality and “crowding in” private capital: Like NDBs, GIBs seek to crowd in private capital where private capital is not currently sufficient but potentially could be. “Additionality” refers to facilitating transactions that wouldn’t otherwise happen.

For example, NY Green Bank must demonstrate that any financing arrangements it enters into can be replicated or scaled by the private sector and will help achieve widespread deployment of LCR infrastructure on a short-term basis.³⁵ CGB also aims to assess the additionality of its investments. Besides measuring the impact achieved by a program, it assesses the portion of projects that would most likely not have been undertaken in the absence of CGB involvement. It does so using net impact analysis, which is explained in its Evaluation Framework (see Box 4).³⁶

Existing GIBs have found that there are often market gaps for smaller-scale LCR investments, customer-sited projects (commercial, industrial, and residential), energy efficiency projects, and projects that include LCR technologies that are new to their local area. As a result, some GIBs have found particularly relevant niches in their broader financing ecosystems by operating at a retail level. This approach not only supports smaller-scale investments directly and demonstrates commercial viability, but also facilitates the aggregation of smaller-scale projects (or portfolios of projects) into asset bundles that meet size and investment-quality requirements of other types of financiers and investors.

BOX 3: GIB STRATEGIC FLEXIBILITY DRIVES ADDITIONALITY

The UK GIB has successfully adapted its offshore wind strategy to address multiple market barriers. In 2010, the UK government-appointed Green Investment Bank Commission added offshore wind to the UK GIB’s target sectors, which already included energy efficiency, waste and bioenergy, and onshore renewables.³⁷ In 2012, UK GIB made its first investment in an operating offshore wind farm by refinancing construction debt. Then, it moved on to equity investments in operating facilities and then to riskier construction stage and pre-construction stage projects. These early deals focused on providing exits for commercial banks and private developers to permit capital recycling into other projects. In 2015, UK GIB set up an affiliated offshore wind fund—the first of its kind in the world—layering on the strategy of attracting institutional investors to the sector as fund partners. In early 2017, the fund surpassed its GB£1 billion target with five UK pension funds, a Swedish life insurance and pension company, and a Middle Eastern sovereign wealth fund as co-investors.³⁸

Flexibility is also important because even well conceived programs may not perform as anticipated. For example, the Connecticut Green Bank (CGB) sought to administer a property-assessed clean energy (PACE) program. The program is designed to mitigate commercial lenders’ risk in extending energy efficiency loans by permitting the loans to be secured and repaid like real property taxes. However, no commercial bank was willing to be the first to invest under the untested structure. Having confidence in the effectiveness of the structure, CGB chose to originate and underwrite its own deals for aggregation into a portfolio until loan performance had been demonstrated at sufficient scale. Once this had been achieved, CGB bundled the loans and sold off the senior tranche of the bundled portfolio, retaining a subordinated tranche as a credit enhancement. In a subsequent transaction, CGB is building larger portfolios with external private capital with the goal of selling the loans through a public securitization. It has also qualified four additional private capital providers to originate and fund PACE loans.³⁹

The flexibility and market responsiveness of the GIB structure permits the same GIB to pursue multiple strategies sequentially or in parallel as the context requires and make midcourse adjustments as necessary. This should expedite catalyzing private capital for local LCR investments. GIBs combine this flexibility with the ability to go down market—to aggregate smaller transactions and assume a higher risk profile.

*While GIBs generally require technologies to be commercially proven, they, unlike commercial banks, can introduce to their own jurisdictions a new company or technology that has a track record elsewhere.*⁴⁰ This is an important source of their ability to provide additionality. CGB took advantage of this capability when it financed the first installation of a new hydropower technology—the Archimedes screw generator—in the United States. The generator turns slowly to allow fish to pass through, overcoming a serious drawback of other hydropower technologies, which block the passage of fish. While this technology has been deployed in Europe for the last several years, it had not yet been introduced in the United States.⁴¹ The project was financed by CGB along with three commercial bank co-investors. CGB provided debt for construction and financing costs, which was raised through green bonds, as well as working capital. Successful financing and installation of the technology in Connecticut can now lead the way to market acceptance of the Archimedes screw turbine technology elsewhere in the United States.⁴²

As noted in the United Nations report *Design of a Sustainable Financial System: The Financial System We Need*, “The key added value of green banks, for example, is their capacity to foster institutional innovations and partner with other financial and regulatory institutions to increase the diversity and depth of local financial markets in order to enhance the domestic supply of green finance.”⁴³

Requirement to demonstrate cost effectiveness: GIBs mobilize private capital using least-cost solutions to reduce public expenses as part of an organizational mandate for sustainability, or sometimes profitability. Regardless of their target rates and returns, existing GIBs, like NDBs, are expected to operate, at a minimum, so they break even. Some GIBs do have mandated benchmark return targets. The UK GIB, for example, must meet a minimum target return of 3.5 percent (annual nominal return on total investments after operating costs but before tax).⁴⁴ And the CEFC’s mandate from the government, “is to target an average return of the five-year Australian Government bond rate +3 to +4 percent per annum over the medium to long term as the benchmark return” of its portfolio. (This does not apply to its investments in the Clean Energy Innovation Fund, which has a separate benchmark return.)⁴⁵

Accountability for achieving climate and other policy goals: GIBs, along with MDBs, RDBs, NDBs, and other development finance institutions, share a focus on accountability to their mandates through the use of impact measurement and reporting. Existing GIBs report annually on a number of impact and investment metrics, for example, carbon dioxide and other greenhouse gas abatement, renewable capacity installed, public to private finance leveraged, and jobs created. GIBs’ public reporting on their performance usually includes explanations of their measurement methodologies to build credibility.

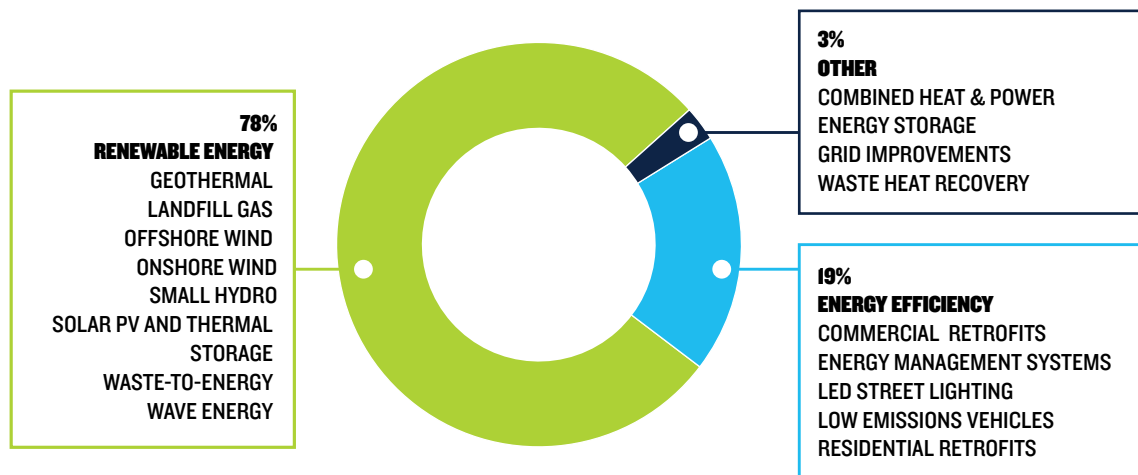
BOX 4: CONNECTICUT GREEN BANK’S EVALUATION FRAMEWORK

Now in its sixth year of operation, CGB has experience in assessing the effectiveness of multiple rounds of interventions and the opportunity to refine its approaches to measuring and publicly disclosing the societal impacts of its activities. CGB’s Evaluation Framework includes robust internal protocols for data collection and analysis that balance the goals of providing information to the public with honoring confidentiality commitments to financial partners. The framework also includes methodologies for evaluating the impact of its investments using metrics related to the avoidance of various greenhouse gases, job creation, health benefits, and other impact areas.⁴⁶ CGB believes that comprehensive reporting on its financial and nonfinancial performance in itself attracts private sector financiers to green projects, spurring competition in financing and lowering financing costs for low-carbon sectors. In addition to reporting on diverse metrics, CGB has developed a methodology to assess its contributions to market transformation through its Program Logic Model. CGB applies this model to its programs and reports on the results in its comprehensive annual financial reports.⁴⁷

GREEN INVESTMENT BANK PERFORMANCE AND ACTIVITIES

In just a few years, the four national and two subnational institutions that are part of the Green Bank Network have helped their jurisdictions advance their climate-related policy mandates. They have done so by leveraging private capital, accelerating the mainstreaming of new technologies and business models, attracting new investors, and engendering transformative impacts in the markets. As one indicator, in a recent review of institutional investment in LCR infrastructure, the OECD noted that GIBs are disproportionately successful at crowding in institutional investors into those investments.⁴⁸

FIGURE C: GREEN BANK NETWORK MEMBERS – AREAS OF INVESTMENT THROUGH FIRST QUARTER 2017



Source: Various⁴⁹

Among the indicators that many GIBs (and indeed, many NDBs) highlight as a measure of success is leverage. Leverage refers here to the extent to which public sector investments attract additional investment from private sources. “Leveraging” is sometimes used interchangeably with “mobilizing,” “catalyzing,” “co-financing,” or “co-investment.” Thought of in this way, one may assume causality between the public intervention and the actions of private investors. But leverage does not necessarily indicate market transformation, which refers to increasing amounts of LCR investments being made with decreasing amounts of public investment. Market transformation may require, in addition to attracting private investors to individual projects, standardization of investment due diligence for new technologies and promulgation of information about successful transactions to build investor confidence. Ultimately, it requires private investment in LCR without any public subsidy.

Evaluating success based on leverage alone can be misleading, and focusing on it above other impact measures can create perverse incentives for institutions with the mission of market transformation. Different types of investments and instruments are likely to have different leverage effects. For example, risk-sharing mechanisms, such as guarantees, may provide high leverage for public dollars because of the way the instrument is structured and when public dollars are paid out. Conversely, infrastructure investments (particularly with new technologies) through debt or equity may achieve leverage in the single digits but still achieve the policy objectives. Success is therefore best measured through a number of metrics, not simply how much a GIB’s funds leverage other funding sources.

In some cases, the mandate of a GIB may affect its ability to pursue a high leverage strategy. For example, CEFC is restricted by its charter from issuing guarantees, which can achieve high leverage ratios, due to prudential concerns.⁵⁰ Many of CEFC’s investments are in senior debt, which tends to have a lower leverage ratio. But, to achieve its mission CEFC both works with other lenders to provide low cost financing to mature, yet under-served sectors, like commercial and industrial energy efficiency, and also makes some higher risk, venture-stage investments.⁵¹ The Clean Energy Innovation Fund has up to AU\$200 million (US\$149 million) is dedicated to projects that are, “not yet established or of sufficient maturity, size or otherwise commercially ready to attract sufficient private sector investment.”⁵² For the Fund, CEFC targets a benchmark rate of return of +1 percent above the average return for an Australian government bond—lower than the rest of its portfolio—to reflect the riskier nature of the investments.⁵³ On the other hand, Japan’s GFO has been specifically limited to equity investments at the project and fund levels, putting GFO at the high end of the leverage spectrum for GIBs due to the high amounts of additional capital that equity investments can unlock. This is driven by GFO’s mandate to build borrowing and technical capacity in the local Japanese developer community; the equity investments (up to 50 percent of total equity) allow both the transfer of managerial skills and easier access to debt markets because of more attractive debt to equity ratios. Table 3 provides additional information about existing GIB investment commitments, types of investments made, and associated leverage ratios.

TABLE 3: SELECTED KEY INDICATORS OF MEMBERS OF THE GREEN BANK NETWORK

NAME	TOTAL CAPITAL COMMITTED OR DISBURSED BY GIB (CUMULATIVE SINCE GIB INCEPTION, USD MILLIONS) ⁵⁴	TOTAL VALUE OF PLANNED PROJECTS WITH GIB SUPPORT (CUMULATIVE SINCE GIB INCEPTION, USD MILLIONS)	PRIVATE TO PUBLIC FUNDS LEVERAGE RATIO ⁵⁵	MAIN INSTRUMENTS
Clean Energy Finance Corporation (CEFC)	2,667 (through 3/31/17)	7,619 (through 3/31/17)	2.1:1	Debt, equity
Connecticut Green Bank (CGB)	173 (through 3/31/17)	1,000 (through 3/31/17)	5.8:1	Debt, aggregation, risk mitigation
Green Finance Organization (Japan) (GFO)	88 (through 12/31/16)	904 (through 12/31/16)	9:1	Equity
GreenTech Malaysia (GTM)	437 (through 4/30/17)	1,392 (through 4/30/17)	2.2:1	Guarantee
New York Green Bank (NYGB)	346 (through 3/31/17)	1,400 (through 3/31/17)	3:1	Debt, aggregation, risk mitigation
UK Green Investment Bank (UK GIB)	3,112 (through 3/24/17)	14,332 (through 3/24/17)	3.6:1	Debt, equity
	6,833	26,647	-	-

Source: Various⁵⁶

Through the beginning of 2017, the six founding members of the Green Bank Network have committed or disbursed US\$6.8 billion in LCR investments, which is expected to support projects with a total value of US\$26.6 billion.⁵⁷ Individual programs and investments have private to public investment leverage ratios that can be much higher or lower than the institutional average: one CGB residential solar program has a program-level leverage ratio of 10:1.⁵⁸

Table 4 sets out representative transactions for GIBs. For greater detail on GIB products, see Chapter 4 of *Green & Resilience Banks: How the Green Investment Bank Model Can Play a Role in Scaling Up Climate Finance in Emerging Markets*.⁵⁹

TABLE 4: REPRESENTATIVE GIB PROGRAMS AND TRANSACTIONS				
GIB INVOLVED	TARGETED MARKET BARRIER	INVESTMENT TYPE	RESULTS	FINANCING MODEL
Clean Energy Finance Corporation (CEFC)	Work with Australian commercial banks to develop programs that lower the cost of financing energy-efficient equipment for businesses and nonprofits	CEFC has committed AU\$500 million (US\$370 million) to specialized asset financing programs with Westpac, National Australia Bank (NAB), and Commonwealth Bank. The programs offer a 0.70 per cent discount on the standard asset finance rate for assets that meet the CEFC's investment guidelines	The program enables businesses to benefit from reduced energy and fuel costs while also lowering their carbon emissions. In April 2017, CEFC announced that small businesses had secured more than AU\$150 million (US\$111 million) to finance 1,000 specialist energy-efficiency projects ⁶¹⁰	Tier 2 (Wholesale) Debt
Connecticut Green Bank (CGB)	Activate the residential solar market in Connecticut by lowering the cost of financing for customer-owned solar systems	CGB's solar loan program enabled homeowners to access financing to own a solar home system and take advantage of the investment tax credit. A private company partnering with CGB acquired new customers and worked with local contractors to do the installations. CGB offered customers low-cost solar loans whose sizes were based on projected energy savings	During the two years when it was available, the CT Solar Loan provided financing for 279 projects costing over US\$8.5 million and totaling 2,186 kW installed capacity. Given the proof of concept of the CT Solar Loan, a private investor committed to replace the public fund with private capital without CGB involvement	Tier 1 (Direct) Debt
Green Finance Organisation (Japan) (Green Fund)	Facilitate loan financing for clean energy developers in Japan by decreasing debt to equity ratios, and support the implementation of new business models	The Green Fund makes equity investments. Investments are made directly in projects as well as indirectly through subfunds. Equity amount must be less than 50% of total equity, and Green Fund will stay in a project for a maximum of 10 years	Through 2016, GFO had committed to invest a total of US\$88 million in planned projects totaling US\$904 million, representing a leverage ratio of more than 9:1. Projects GFO invested in are expected to offset an estimated 682,000 tons of CO ₂ e every year	Equity and equity fund
GreenTech Malaysia (GTM)	Promote green investments by providing easier access to financing and at a lower financing costs	The Green Technology Financing Scheme that GTM administers provides a 60% government guarantee on financing provided by financial institutions as well as a 2% rebate on interest or profit rates charged by the financial institution	Through 2016, RM2.96 billion (~US\$700 million) in funding has been provided to 272 projects through the scheme, with 80% being in the renewable energy sector. The GTFS has attracted 28 risk-averse banks and financial institutions to invest in green infrastructure projects	Tier 2 (Wholesale) Debt
New York Green Bank (NYGB)	Accelerate the deployment of solar projects across New York State	NY Green Bank entered into two transactions with SolarCity Corporation, the largest residential and commercial solar energy provider in the U.S. One transaction provides a US\$30 million term loan facility to fund existing solar assets; the other provides a US\$20 million revolving credit facility to finance SolarCity's new solar projects in New York State	NYGB expects that projects financed as a result of these two transactions representing approximately 7,000 solar systems in New York State will produce approximately 54MW	Tier 1 (Direct) Debt
UK Green Investment Bank (UK GIB)	Attract capital into the UK's offshore wind sector from new, long-term investors seeking solid, risk-adjusted returns by investing in operational assets. Create liquidity or exit to permit reinvestment by sponsors	UK GIB started the world's first offshore wind equity fund in the form of unlisted equity. The fund is managed by a Financial Conduct Authority-registered subsidiary of UK Green Investment Bank Financial Services Limited	As of April 2017, the fund had six investments in UK offshore wind farms and had total committed capital of GB£1.12 billion (US\$1.4 billion) from UK-based pension funds such as Strathclyde Pension Fund, as well as one of the world's largest sovereign wealth funds and a leading European life and pension company	Equity fund

Source: Green Bank Network

Part 3: Governance of NDBs and GIBs

GOVERNANCE OF NDBs

NDBs in the region are governed like many financial institutions around the world, often with governing boards and committees that approve annual management plans and operational goals, including investment objectives, such as target sectors, target returns, and diversification and risk management objectives. In addition, many NDBs are subject to banking regulation and supervision. NDBs, whether or not they take deposits, are generally regulated like commercial banks and may be subject to international banking, Basel-based rules, particularly if the Basel rules are incorporated into domestic banking regulations and supervision.⁶¹ In some countries, Basel III-based rules create a more rigorous set of capital adequacy guidelines to prevent systemic issues during a financial crisis, and when implemented by national regulatory bodies, they have had an effect on how banks manage risk and on capital requirements related to the liquidity of a bank's holdings.

From a supervisory perspective, national bank regulators, central banks, and bank supervisory agencies exercise the same oversight functions for NDBs as for commercial banks pertaining to:

- conduct of business;
- disclosure of information;
- compliance with applicable banking regulations;
- monitoring the safety and soundness of individual NDBs; and
- monitoring exposure to systemic risk.

In addition, should an issue arise at an NDB, national bank regulators may take the same actions generally undertaken with respect to commercial banks.

GOVERNANCE OF GIBs

Existing GIBs are not banks. They are much smaller than most LAC NDBs and do not accept deposits or channel savings. As such, these GIBs are generally not subject to the same regulations as commercial banks.

However, existing GIBs have all been capitalized with public funding, and so are subject to transparency, fiduciary, and governance requirements similar to those applicable to NDBs.⁶² Existing GIBs are stewards of public funds and they operate under robust governance frameworks and stringent oversight. Such governance frameworks safeguard beneficial use of public funds and public trust by ensuring high levels of transparency and disclosure, effective monitoring and evaluation, and overall sustainability of operations. Many existing GIBs are actively managing risks while retaining the higher risk tolerance necessary to create new markets for LCR investments.

In terms of prudential frameworks, GIBs are subject to liquidity and capital standards appropriate, given their missions, to enable them to meet their financing obligations, adequately withstand losses, and ensure overall sustainability of operations. As stated in Australia's Clean Energy Finance Corporation's investment policies, "An investment strategy that is too risk-averse would not allow the CEFC to fulfill its mandate, statutory objective and public policy purpose. On the other hand, an approach which is too tolerant of investment risk could lead to higher than acceptable capital losses."⁶³ Similarly, GIBs tailor prudential approaches to reflect their purpose, balanced with operational realities.

These governance structures and transparency requirements ensure that GIBs operate so as to achieve their institutional missions while also adequately managing risks and properly administering public funds.

Part 4: Areas for Collaboration Between NDBs and GIBs

Given their overlapping spheres of activity, existing NDBs and GIBs can learn from each other and collaborate on adaptation and mitigation investments. Specifically, they may work together on:

- financing strategies, deal structures, and underwriting methods;
- portfolio, risk management techniques (including for country and currency risk);
- metrics, monitoring and verification techniques, standards and reporting, particularly assessing the impact of NDB and GIB activities on market transformation;
- financial returns, tenor and position in the capital stack (e.g., senior, mezzanine, equity, guarantees, etc.), and loan and investment losses;
- approaches to marketing and demand creation;
- methods for deploying new technologies;
- policy environment for successful creation and operation;
- case studies and qualitative information on deals (e.g., lessons learned); and
- performance data.

We recommend that the Green Bank Network, the Latin American Association of Financial Institutions for Development (ALIDE), the IDB, and the OECD form a working group to develop a joint knowledge exchange and research agenda, building on the foundation set by this inaugural conference.

Part 5: Exploring Adaptation of the GIB Model to Challenges in the Region

What role, if any, might the GIB model productively play in LAC? While GIBs have not yet been established in emerging markets and developing economies, countries such as India, China, South Africa and multiple countries in LAC are exploring the creation of GIBs. The ways in which the GIB model can play a role in scaling up climate finance in emerging markets is outlined in the October 2016 paper, *Green & Resilience Banks: How the Green Investment Bank Model Can Play a Role in Scaling Up Climate Finance in Emerging Markets*.⁶⁴

In LAC, the first step will be to determine if the current institutional framework (including NDBs) can adequately address the market barriers impeding the growth of investment in LCR infrastructure to fulfill NDCs. The next step is to determine whether the framework actually does address them and, if not, what can be done to address the financing gaps.

If there is a need for additional solutions, the GIB approach is worth considering. GIBs are succeeding by concentrating resources in a specialized, flexible, mission-driven way in order to further LCR infrastructure investment. For LAC countries facing LCR investment financing barriers in their national and regional contexts, the task is to determine how best to ensure that essential functions of GIBs are effectively fulfilled in their local markets.

FINANCIAL BARRIERS THAT COULD BE ADDRESSED BY LAC GIBs

A recent study and survey by the IDB and CPI on NDBs in Brazil, Chile, and Mexico, *Supporting National Development Banks to Drive Investment in NDCs in Brazil, Mexico, and Chile* highlights some discrete financial and technical problems that a LAC GIB could address. Among the financial barriers cited in the study are:

- lack of long-term, low-cost capital;
- insufficient risk-adjusted returns;
- conservative investment mandates; and
- risk perception of climate finance investments.

Based on the track record of existing GIBs and our analysis, LAC GIBs could address these financial barriers by:

- **Attracting long-term, low cost capital:** A long-term financing mechanism set up with the express mission of deploying techniques to crowd in private capital to LCR infrastructure investment could be attractive to international donors (multilateral, bilateral, and philanthropic) and private investors. Such capital providers may value a local specialist partner tasked with developing and maintaining the expertise and relationships necessary to achieve the mission and that is evaluated primarily on its ability to deliver on mission-related outcomes.
- **Improving NDB risk-adjusted returns:** When it is consistent with its mission, a LAC GIB (structured as a pool of capital distinct from an NDB) could take on transaction risk that an NDB might be reluctant to take on itself, thus enhancing the NDB's performance. Some of the institutions in the IDB study, in fact, called for just such an entity to enable them to advance more climate finance.
- **Providing options for NDBs to expand their mandate:** By having a GIB division within an NDB (particularly if permitted to be capitalized off-balance sheet), NDBs may be able to expand into new sectors, increasing their effectiveness.
- **Acting as risk mitigation agency and innovation incubator:** GIBs can help incubate innovative investments, and their funding can focus on derisking the aggregation of small-scale clean energy projects, introducing technologies new to the local market, and engaging in research and development of adaptation-focused financial products.⁶⁵
- **Accelerating NDB learning curves, thereby reducing risk perception, and improving risk-adjusted returns:** Specialist GIBs can share knowledge with NDBs to help accelerate the NDBs' understanding of operating at different points in the financing ecosystem, more quickly reducing risk perceptions, and consequently, risk premiums.

TECHNICAL BARRIERS THAT COULD BE ADDRESSED BY LAC GIBs

Among the key technical barriers cited by respondents to the IDB survey are:

- lack of ability to identify and classify LCR (or, as in IDB survey's terminology, "climate-relevant") projects;
- challenges in assessing the financial, technological, and other risks of climate-relevant projects, particularly for energy efficiency, urban infrastructure, and adaptation projects; and
- need for greater understanding of financing structure for climate-relevant projects, specifically those involving innovative finance instruments.

A GIB could address these technical barriers, as well. Existing GIBs have demonstrated that a key to their success is having in-house dedicated technical expertise. This expertise has given them a fuller and deeper technical understanding of the attributes of new technologies, which, in turn, informs their approach to financing. This approach could be replicated for challenging areas in LCR investment in the LAC context. Existing GIBs have used this strategy to increase understanding of the risks and opportunities presented by new mitigation technologies, such as residential solar, offshore wind, energy storage, and electric vehicles. In LAC, some examples of areas that GIBs could develop technical capacity include distributed energy, energy storage, electric vehicles, and adaptation investments.

STRUCTURAL OPTIONS FOR LAC GIBs

Once the decision to establish a GIB has been made, there are many structural options. Below we suggest some general parameters that may be useful in the LAC context, given the central role of NDBs.

1. NDB Green Division: An NDB forms a GIB division within the existing institution.

PROS:

- Relative ease of execution and integration
- Ability to leverage NDB experience and client and industry networks
- Benefit from in-depth understanding of political and market architecture
- Direct access to end users and credibility with international climate funds and MDBs

CONS:

- Green division may have to compete with projects from other business lines
- Relatively expensive capital for many new types of investments due to liquidity and risk requirements
- Risk of excusing other branches from doing LCR investment or greenwashing NDB work without significantly expanding LCR investment

2. NDB Green Affiliate (controlled by NDB): NDB creates quasi-independent affiliate in the form of a special purpose vehicle (SPV), capitalized by a mix of national and international public and private funds managed by NDB personnel.

PROS:

- Same as Green NDB Division, but may have more flexibility in instruments, pricing, and ability to provide complementary technical assistance
- A ring-fenced, specialized vehicle focusing solely on LCR may be attractive to donors
- Potentially lower blended cost of capital if patient climate finance is obtained as capital contributions or equity

CONS:

- May fully not benefit from leverage of NDB resources and capacity, particularly with regard to appraisal, technical expertise, or pipeline development
- Use of private funds may create incremental profit pressure

3. NDB Green Affiliate (joint venture/fund): NDB creates a quasi-independent affiliate in the form of a joint venture special purpose vehicle (SPV), controlled by a private investor and capitalized by a mix of national and international public and private funds. It is co-managed with a private fund manager expert in LCR investment selected through a competitive process.

PROS:

- Able to leverage NDB experience and client networks, and most of the pros listed in options 1 and 2 above
- Potentially lower blended cost of capital if patient climate finance is obtained as capital contributions or equity
- Can have many benefits of both an NDB and a new institution, including the ability to build on NDB experiences and connections, while accumulating specific, LCR expertise and pursuing a narrow mandate

CONS:

- Loss of some public control
- Commercial return expectations
- May not be feasible for affiliate to make certain types of investments at scale
- Time to market may be greater than options 1 and 2 above but lesser than option 4 below
- May be less transparent as private manager may consider methodology proprietary

4. New Institution/GIB: A new, fully independent GIB, with a clear, focused mission and mandate, and funded with patient capital from public sources is created.

PROS:

- Custom-built based on where there are financing gaps and an understanding of why this type of financial institution is best suited to address those gaps
- Greater flexibility to create programs, build capacity and knowledge, engage in educational outreach, and design financial mechanisms to specifically target local needs

CONS:

- Lack of existing network of clients and industry partners
- Perceived institutional competition from NDBs
- Potentially slow and difficult legislative or other formation process
- Time to market may be significant while entity builds internal capacity and develops pipeline

RELATIVE ADVANTAGES OF STRUCTURAL OPTIONS FOR LAC GIBs

The following table summarizes the relative advantages of each structural option. The NDB Green Affiliate is most able to leverage NDB existing networks. It is likely to have some advantages over the status quo because of its ability to group specialists within the NDB and present a different face to donors and the market. But, such advantages may be limited. On the other end of the spectrum is the traditional stand-alone GIB, which is the hardest to execute and has the least support from deep NDB networks. At the same time, it may be the most effective in replicating existing GIB success and in dealing with the financial and technical difficulties cited by the surveyed NDBs. The in-between options blend the advantages and disadvantages of the green division and the traditional GIB.

FIGURE A: STRUCTURAL OPTIONS FOR A GIB IN LAC

STRUCTURAL OPTION	NDB NEEDS ASSESSMENT		
	ABILITY TO LEVERAGE NDB NETWORK	ABILITY TO ADDRESS FINANCIAL BARRIERS	ABILITY TO ADDRESS TECHNICAL BARRIERS
In-House Green Division	+++	+	+
Green Affiliate (NDB-controlled)	+++	++	++
Green Joint Venture (private investor-controlled)	++	++	+++
New Institution - stand-alone GIB	+	+++*	+++

Key: Number of “+” indicates the degree to which the structural option is able to address the barrier.

* Assuming increased ability to attract low-cost, long-term capital

To decide if one of the four suggested options would work for a given jurisdiction, stakeholders need to begin with research, discussion among community members, and gaining an understanding of local markets and goals.

This section is intended to suggest a framework for NDB exploration of GIB options, not to dictate a final answer for all LAC countries or NDBs. Following our *National Development Banks and Green Banks* conference, we recommend that interested countries contact the Green Bank Network, the IDB, the OCED, and ALIDE to collaborate in weighing these and other options more fully.

Part 6: Conclusion

Both NDBs and GIBs seek to mobilize private capital to achieve critical public policy goals and have the opportunity to share knowledge and collaborate on best practices. NDBs are at the center of climate finance in the LAC region. Existing GIBs have been developed to play this role in their home jurisdictions. The lessons of both institutions can be extrapolated to a number of different circumstances. The LAC region, with its wealth of successful public finance institutions, may be able to build on the experience of GIBs by adapting to its particular circumstances the model of purpose-built, specialist institutions or divisions to more effectively deliver on the LCR infrastructure investment imperative.

ENDNOTES

- 1 D. Abramskieln et al., *Supporting National Development Banks to drive investment in NDCs in Brazil, Mexico, and Chile*. (Climate Policy Initiative and the Inter-American Development Bank, 2017).
- 2 Diana Smallridge, Barbara Buchner, Chiara Trabacchi, Maria Netto, Jose Juan Gomes Lorenzo, and Lucila Serra. “*The Role of National Development Banks in Catalyzing International Climate Finance*”; Inter-American Development Bank. March 2013. <https://publications.iadb.org/bitstream/handle/11319/3478/Role%20of%20NDB%203-12-13final%20web.pdf?sequence=2>
- 3 The OECD defines “GIB-like entities” as organizations that have a mandate to leverage private finance for domestic LCR infrastructure investment but which may not possess all of the core characteristics of GIBs and may pursue other activities or use other approaches. For the purposes of this paper, existing GIBs are the members of the Green Bank Network as of the date of publication.
- 4 Diana Smallridge et al., *The Role of National Development Banks in Catalyzing International Climate Finance* (Washington, D.C.: Inter-American Development Bank, 2013). <https://publications.iadb.org/bitstream/handle/11319/3478/Role%20of%20NDB%203-12-13final%20web.pdf?sequence=2>. This incubator role of NDBs is outlined in this report, which states, “Finally, [NDBs] can develop strategies, such as project incubators and innovative and catalytic financial instruments, which could induce the private sector to finance sectoral projects that otherwise would not be financed due to real or perceived barriers and risks. As private financial institutions become engaged in financing these types of projects, their potential profitability will become apparent, making them more prone to participate in the future.”
- 5 World Bank: “Intended Nationally Determined Contributions (INDCs) identify the post-2020 voluntary national climate targets, including mitigation and adaptation, which countries committed to and which will become a binding Nationally Determined Contributions (NDC) when a country ratifies the Paris Agreement.” <http://spappssect.worldbank.org/sites/indc/Pages/INDCHome.aspx>
- 6 Matilde Mordt, *Latin America and the Caribbean at the forefront of climate action* (United Nations Development Programme, 2016). <http://www.undp.org/content/undp/en/home/blog/2016/10/28/Latin-America-and-the-Caribbean-at-the-forefront-of-climate-action.html>.
- 7 International Finance Corporation, *Climate Investment Opportunities in Emerging Markets: An IFC Analysis* (2016), http://www.ifc.org/wps/wcm/connect/51183b2d-c82e-443e-bb9b-68d9572dd48d/3503-IFC-Climate_Investment_Opportunity-Report-FINAL-11_6_16.pdf?MOD=AJPERES. Annualized estimate is based on needs of US\$2.64 trillion over the 15 years from 2016-2030 for renewable energy, urban infrastructure (building energy efficiency, waste management, and transport), and industrial energy efficiency. IFC does not provide estimates of industrial energy efficiency financing needs for Mexico and Chile so investment needs are underestimated.
- 8 B. Buchner et al., *Global Climate Finance: An Updated View on 2013 & 2014 Flows*. (Climate Policy Initiative, 2016). <http://climatepolicyinitiative.org/wp-content/uploads/2016/10/Global-Climate-Finance-An-Updated-View-on-2013-and-2014-Flows.pdf>. Note that with the exception of the Brazilian Development Bank, Banco Nacional de Desenvolvimento Econômico e Social (BNDES), the climate finance contributions of NDBs and other domestic DFIs are not captured in CPI’s climate finance landscape reports. Includes totals for Mexico and Chile.
- 9 G20 Green Finance Study Group, *G20 Green Finance Synthesis Report* (2016). http://unepinquiry.org/wp-content/uploads/2016/09/Synthesis_Report_Full_EN.pdf.
- 10 Diana Smallridge, Barbara Buchner, Chiara Trabacchi, Maria Netto, Jose Juan Gomes Lorenzo, and Lucila Serra. “*The Role of National Development Banks in Catalyzing International Climate Finance*”; Inter-American Development Bank. March 2013. <https://publications.iadb.org/bitstream/handle/11319/3478/Role%20of%20NDB%203-12-13final%20web.pdf?sequence=2>
- 11 D. Abramskieln et al., *Supporting National Development Banks to drive investment in NDCs in Brazil, Mexico, and Chile*. (Climate Policy Initiative and the Inter-American Development Bank, 2017).
- 12 Diana Smallridge et al., *The Role of National Development Banks in Catalyzing International Climate Finance* (Washington, D.C.: Inter-American Development Bank, 2013). <https://publications.iadb.org/bitstream/handle/11319/3478/Role%20of%20NDB%203-12-13final%20web.pdf?sequence=2>.
- 13 Respective NDB websites and 2015 annual reports, including: Banco Nacional de Desenvolvimento Econômico e Social (BNDES), http://www.bndes.gov.br/SiteBNDES/bndes/bndes_en; http://www.bndes.gov.br/SiteBNDES/export/sites/default/bndes_en/Galerias/Download/management_report1215.pdf; Banco de Desenvolvimento de Minas Gerais S.A. (BDMG), <http://www.bdmg.mg.gov.br>; <http://www.bdmg.mg.gov.br/RelacoesInvestidores/ApresentacaoResultado/Apresenta%C3%A7%C3%A3o%20de%20Resultados%202015.pdf>; FIRA, <http://www.fira.gob.mx>; <https://www.fira.gob.mx/Nd/VisionMisionValores.jsp>; Nacional Financiera, <http://www.nafin.com.mx>; Corfo, <http://www.corfo.cl>; BancoEstado, <http://www.bancoestado.cl>; Moody’s Investors Service, <https://www.moody.com/credit-ratings/Banco-del-Estado-de-Chile-credit-rating-600012694>.
- 14 See Section 4: Market Transformation in: Connecticut Green Bank, *CT Green Bank Comprehensive Annual Financial Report 2016* (2016). <http://www.ctgreenbank.com/wp-content/uploads/2016/11/CTGreenBank-CAFR-2016-Published-JJM-Revision.pdf>.
- 15 Policymakers that created the first GIBs recognized that such entities play an important complementary role to climate-smart policies such as removing inefficient fossil fuel subsidies, establishing ambitious targets for low-carbon, climate-resilient technology deployment, and adequately pricing carbon emissions. As local enabling environments become stronger, GIBs can work with private sector actors to overcome remaining barriers to investment.
- 16 There are more than two dozen GIB or GIB-like entities. The OECD defines “GIB-like entities” as organizations that have a mandate to leverage private finance for domestic LCR infrastructure investment but which may not possess all of the core characteristics of GIBs and may pursue other activities or use other approaches. For the purposes of this paper, existing GIBs are the members of the Green Bank Network as of the date of publication.
- 17 GIBs and GIB-like entities have been established at the national level (Australia, Japan, Malaysia, Switzerland, and United Kingdom), state level (California, Connecticut, Hawaii, New Jersey, New York, and Rhode Island in the United States), county level (Montgomery County, Maryland, United States) and city level (Masdar, United Arab Emirates). For a discussion of city-level GIBs such as the New York City Energy Efficiency Corporation, see *C40 Cities Good Practice Guide – City Climate Funds* (C40 Cities, 2016). http://c40-production-images.s3.amazonaws.com/other_uploads/images/887_C40_Good_Practice_Guide_-_City_Climate_Funds.original.pdf?1479934289.
- 18 We note that, while not a development bank, the United States Loan Guarantee Program administered by the Department of Energy provided financing to the first five utility-scale solar PV projects larger than 100 MW in the United States to demonstrate the technology’s success to the market and led to the private financing of an additional 45 utility-scale solar PV projects, a ten-fold increase. U.S. Department of Energy, <https://energy.gov/articles/energy-department-analysis-loan-guarantee-program-launched-utility-scale-photovoltaic-solar>.
- 19 We also note that Germany provides a model closer to that of LAC than the GIB jurisdictions. German development bank KfW has been a major driver of clean energy financing in Germany and is estimated to have covered at least one-third of total funding of the green transformation in Germany. However, in some years the proportion has been even higher. In 2012, KfW funded US\$11.4 billion of renewable investment, which represented more than 50% of renewable investment in Germany, and as much as 90% of investment in onshore wind and more than 50% of solar PV. See Stephany Griffith-Jones, *National Development Banks and Sustainable Infrastructure; the case of KfW* (Boston: Boston University, 2016). https://www.bu.edu/pardeeschool/files/2016/08/GriffithJones.Final_.pdf.
- 20 OECD, *Green Investment Banks: Scaling up Private Investment in Low-carbon, Climate-resilient Infrastructure* (2016), <http://www.oecd.org/env/cc/green-investment-banks-9789264245129-en.htm>.
- 21 Petition of the New York State Energy Research and Development Authority to Provide Initial Capitalization for the New York Green Bank (2013), <http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7BC3FE36DC-5044-4021-8818-6538AAB549B8%7D>.
- 22 *New York Green Bank Business Plan* (2014). NY Green Bank, <http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7B3BCF6C87-33FB-49FA-B264-8669055DD6E5%7D>.
- 23 Two new open solicitations that streamline the funding process for specific types of projects exemplify this market responsiveness. NY Green Bank, *New York Green Bank Closed Record \$40.6 Million in New Transactions* (2017), <http://greenbank.ny.gov/News/In-The-News/2017-04-27-NY-Green-Bank-Closed-Record-New-Transactions>.
- 24 NY Green Bank, *New York Green Bank 2016 Business Plan 2016*. <https://greenbank.ny.gov/-/media/greenbanknew/files/2016-NYGB-Business-Plan.pdf>.
- 25 Green Investment Bank Commission, *Unlocking investment to deliver Britain’s low-carbon future: Report by the Green Investment Bank Commission* (2010). https://www.e3g.org/docs/Unlocking_investment_to_deliver_Britains_low_carbon_future_-_Green_Investment_Bank_Commission_Report_June_2010.pdf.
- 26 Unless otherwise indicated, all currency exchange rates used are from 30 May 2017.
- 27 Total Assets figure for GreenTech Malaysia is for FY2015. Annual reports accessed May 2017 at the following links: Clean Energy Finance Corporation, <http://annualreport2016.cleanenergyfinancecorp.com.au/>; Connecticut Green Bank, <http://www.ctgreenbank.com/wp-content/uploads/2016/11/CTGreenBank-CAFR-2016-Published-JJM-Revision.pdf>; GreenTech Malaysia, 2015 Annual Report provided to GBN through personal communication; NY Green Bank, <https://greenbank.ny.gov/-/media/greenbanknew/files/2016-NYGB-Annual-Financial-Metrics.pdf>; UK Green Investment Bank, <http://www.greeninvestmentbank.com/media/118884/gib-annual-report-2016-web-single-pages.pdf>.
- 28 The OECD identified 12 GIB and GIB-like institutions as of May 2016. See OECD, *Green Investment Banks Scaling up Private Investment in Low-carbon, Climate-resilient Infrastructure* (2016). The Montgomery County Green Bank (Maryland, U.S.) was established by law in June 2015. <http://coalitionforgreencapital.com/>
- 29 See Sustainable Infrastructure Finance Network, *C40 Cities Good Practice Guide – City Climate Funds* (C40 Cities Climate Leadership Group, 2016). http://c40-production-images.s3.amazonaws.com/other_uploads/images/887_C40_Good_Practice_Guide_-_City_Climate_Funds.original.pdf.

30 While most GIBs focus their activities in their local jurisdictions, some – notably the recently privatized UK GIB – have considered LCR partnering and investments in other countries.

31 Green Finance and Investment, *Mapping Channels to Mobilise Institutional Investment in Sustainable Energy* (Paris: OECD, 2015). <http://dx.doi.org/10.1787/9789264224582-en>.

32 *Clean Energy Finance Corporation Act 2012*, <https://www.legislation.gov.au/Details/C2012A00104/ab1f4835-8ccf-4568-bed4-61b459be68bb>.

33 Green Investment Bank, *UK Green Investment Bank plc Annual Report and Accounts 2015-16*. <http://www.greeninvestmentbank.com/media/118884/gib-annual-report-2016-web-single-pages.pdf>.

34 Green Investment Bank, *GIB chairman responds to government statement on sale*, 2017, <http://www.greeninvestmentbank.com/news-and-insights/2017/gib-chairman-responds-to-government-statement-on-sale/>.

35 See Section 2.3 Other Investment Considerations in: NY Green Bank, *New York Green Bank 2016 Business Plan 2016*. <https://greenbank.ny.gov/-/media/greenbanknew/files/2016-NYGB-Business-Plan.pdf>.

36 Connecticut Green Bank, *CT Green Bank Evaluation Framework: Assessing, Monitoring and Reporting of Program Impacts and Processes, 2016*. (Section 6 has details on various methods for conducting attribution analysis.) <http://www.ctgreenbank.com/wp-content/uploads/2017/02/CTGreenBank-Evaluation-Framework-July-2016.pdf>.

37 Green Investment Bank Commission, *Unlocking investment to deliver Britain's low-carbon future: Report by the Green Investment Bank Commission* (2010). https://www.e3g.org/docs/Unlocking_investment_to_deliver_Britains_low_carbon_future_-_Green_Investment_Bank_Commission_Report_June_2010.pdf.

38 Descriptions of UK GIB's offshore wind investments can be found at Green Investment Bank, <http://www.greeninvestmentbank.com/our-investments/all-investments/?sector=offshore-wind#main>.

39 Green Finance and Investment, *Green Investment Banks: Scaling up Private Investment in Low-carbon, Climate-resilient Infrastructure* (Paris: OECD, 2016). <http://dx.doi.org/10.1787/9789264245129-en>.

40 CEFC does not always require technologies to be commercially proven, as it has a mandate to make venture and commercial investments. Federal Register of Legislation, Australian Government, *Clean Energy Finance Corporation Investment Mandate Direction 2016 (No.2)*, <https://www.legislation.gov.au/Details/F2017L00035>.

41 The Guardian, *Hydroelectric energy creation arrives in London* (2012), <https://www.theguardian.com/environment/2012/jul/19/hydroelectric-turbine-energy-london>.

42 Connecticut Green Bank, *New England Hydropower Energizes First Archimedes Screw Turbine site in U. S.* (2017), <http://www.ctgreenbank.com/first-archimedes-screw/>.

43 United Nations Environment Programme, *The Financial System We Need: Aligning the Financial System with Sustainable Development*, (2015). http://unepinquiry.org/wp-content/uploads/2015/11/The_Financial_System_We_Need_EN.pdf.

44 As required by UK GIB's Shareholder Framework Document. Green Investment Bank, *Green Investment Bank, Annual Report and Accounts 2014-15*. <http://www.greeninvestmentbank.com/media/44802/gib-annual-report-2015-aw-web.pdf>.

45 Federal Register of Legislation, Australian Government, *Clean Energy Finance Corporation Investment Mandate Direction 2016 (No.2)*, <https://www.legislation.gov.au/Details/F2017L00035>.

46 Connecticut Green Bank, *CT Green Bank Evaluation Framework: Assessing, Monitoring and Reporting of Program Impacts and Processes, 2016*. (Section 6 has details on various methods for conducting attribution analysis.) <http://www.ctgreenbank.com/wp-content/uploads/2017/02/CTGreenBank-Evaluation-Framework-July-2016.pdf>.

47 Connecticut Green Bank, *CT Green Bank Comprehensive Annual Financial Report 2016* (2016). <http://www.ctgreenbank.com/wp-content/uploads/2016/11/CTGreenBank-CAFR-2016-Published-JJM-Revision.pdf>.

48 OECD, *Progress Report on Approaches to Mobilising Institutional Investment for Green Infrastructure*, (2016). https://www.oecd.org/cgfi/resources/Progress_Report_on_Approaches_to_Mobilising_Institutional_Investment_for_Green_Infrastructure.pdf.

49 Annual reports accessed May 2017 at the following links: Clean Energy Finance Corporation, <http://annualreport2016.cleanenergyfinancecorp.com.au/>; Connecticut Green Bank: <http://www.ctgreenbank.com/wp-content/uploads/2016/11/CTGreenBank-CAFR-2016-Published-JJM-Revision.pdf>; GreenTech Malaysia, 2015 Annual Report provided to GBN through personal communication; New York Green Bank, <https://greenbank.ny.gov/-/media/greenbanknew/files/2016-NYGB-Annual-Financial-Metrics.pdf>; UK Green Investment Bank, <http://www.greeninvestmentbank.com/media/118884/gib-annual-report-2016-web-single-pages.pdf>.

50 “Guarantees pose a particular risk to the Commonwealth’s balance sheet and have unexpected consequences when called.” From the Explanatory Statement Issued by authority of the Minister for the Environment and Energy and the Minister for Finance on the *Clean Energy Finance Corporation Investment Mandate Direction 2016 (No.2)*, (2016). Federal Register of Legislation of the Australian Government, <https://www.legislation.gov.au/Details/F2017L00035/Explanatory%20Statement/Text>.

51 Currency conversion: 1.31 AUD:USD, 100 JPY:USD (GFO consistently uses this conversion), 4.3 MYR:USD, 0.78 GBP:USD.

52 Federal Register of Legislation, Australian Government, *Clean Energy Finance Corp Investment Mandate Direction 2016 (no. 2)* (2016), <https://www.legislation.gov.au/Details/F2017L00035>.

53 Clean Energy Finance Corporation, *CEFC Investment Policies 2016*. http://www.cleanenergyfinancecorp.com.au/media/222517/CEFC-Investment-Policies_161101.pdf.

54 Currency conversion: 1.33 AUD:USD (25 Jan 2017), 100 JPY:USD (GFO consistently uses this conversion), 4.44 MYR:USD (20 Feb 2017), 0.794 GBP:USD (25 Jan 2017).

55 Figures in this table reflect green investment banks’ public reporting. Reporting on investments is not harmonized across GIBs, and accounting practices (i.e., what is accounted as committed and disbursed) as well as how leverage ratio is calculated may differ.

56 Annual reports accessed May 2017 at the following links: Clean Energy Finance Corporation, <http://annualreport2016.cleanenergyfinancecorp.com.au/>; Connecticut Green Bank: <http://www.ctgreenbank.com/wp-content/uploads/2016/11/CTGreenBank-CAFR-2016-Published-JJM-Revision.pdf>; GreenTech Malaysia, 2015 Annual Report provided to GBN through personal communication; New York Green Bank, <https://greenbank.ny.gov/-/media/greenbanknew/files/2016-NYGB-Annual-Financial-Metrics.pdf>; UK Green Investment Bank, <http://www.greeninvestmentbank.com/media/118884/gib-annual-report-2016-web-single-pages.pdf>.

57 The Green Bank Network (GBN) is a membership organization founded in 2016 to foster collaboration and knowledge exchange among existing Green Banks, enabling them to share best practices and lessons learned. The GBN also aims to serve as a source of knowledge and a network for jurisdictions that seek to establish a Green Bank. The GBN founding members are the Clean Energy Finance Corporation (Australia), Connecticut Green Bank (U.S.), Green Finance Organisation (Japan), GreenTech Malaysia, NY Green Bank (U.S.), and UK Green Investment Bank. More information is available at Green Bank Network, <http://greenbanknetwork.org/about-gbn/>.

58 Connecticut Green Bank residential energy program leverage ratio presented in CGB Board meeting materials. Connecticut Green Bank, http://www.ctgreenbank.com/wp-content/uploads/2016/02/board-of-directors-of-the-connecticut-green-bank_010517-strategic-retreat-copy.pdf materials.

59 NRDC, Climate Finance Advisors, and Coalition for Green Capital, *Green & Resilience Banks: How the Green Investment Bank Model Can Play a Role in Scaling Up Climate Finance in Emerging Markets*, (2016). <https://www.nrdc.org/sites/default/files/green-investment-bank-model-emerging-markets-report.pdf>.

60 Clean Energy Finance Corporation, *CEFC achieves \$150m milestone in energy efficiency finance for 1000 small business projects* (2017), [http://www.cleanenergyfinancecorp.com.au/media/files/cefc-achieves-\\$150m-milestone-in-energy-efficiency-finance-for-1000-small-business-projects.aspx](http://www.cleanenergyfinancecorp.com.au/media/files/cefc-achieves-$150m-milestone-in-energy-efficiency-finance-for-1000-small-business-projects.aspx).

61 Basel accords (there have been three) create a framework that bank regulators worldwide use to help enhance global financial stability by improving banking supervision. Each country’s banking supervisory authority or authorities use the Basel framework to help create regulations to ensure adequate supervision and banking oversight. This information and more details can be found at Bank for International Settlements, <http://www.bis.org/bcbs/history.htm>.

62 For detailed information on GIB governance, see individual GIB sources: Clean Energy Finance Corporation, *CEFC Investment Policies* (2016), <http://www.cefc.com.au/media/178167/20160419-investment-policies.pdf>; Connecticut Green Bank, *Connecticut Green Bank Operating Procedures* (2016), <http://www.ctgreenbank.com/wp-content/uploads/2017/02/CTGreenBank-Operating-Procedures-sec16-245n-CTGS-r12162016.pdf>; UK Green Investment Bank, *UK Green Investment Bank Risk Management Framework* (2016), <http://www.greeninvestmentbank.com/media/157338/gib-risk-management-framework.pdf>; New York Green Bank, *NY Green Bank 2016 Business Plan* (2016), <https://greenbank.ny.gov/-/media/greenbanknew/files/2016-NYGB-Business-Plan.pdf> (See Schedule I: Risk Management & Oversight Framework).

63 Clean Energy Finance Corporation, *CEFC Investment Policies 2016*. http://www.cleanenergyfinancecorp.com.au/media/222517/CEFC-Investment-Policies_161101.pdf.

65 NRDC, Climate Finance Advisors, and Coalition for Green Capital, *Green & Resilience Banks: How the Green Investment Bank Model Can Play a Role in Scaling Up Climate Finance in Emerging Markets*, (2016). <https://www.nrdc.org/sites/default/files/green-investment-bank-model-emerging-markets-report.pdf>.

64 Diana Smallridge et al., *The Role of National Development Banks in Catalyzing International Climate Finance* (Washington, D.C.: Inter-American Development Bank, 2013). <https://publications.iadb.org/bitstream/handle/11319/3478/Role%20of%20NDB%203-12-13final%20web.pdf?sequence=2>. This incubator role of NDBs is outlined in this report, which states, “Finally, [NDBs] can develop strategies, such as project incubators and innovative and catalytic financial instruments, which could induce the private sector to finance sectoral projects that otherwise would not be financed due to real or perceived barriers and risks. As private financial institutions become engaged in financing these types of projects, their potential profitability will become apparent, making them more prone to participate in the future.”



NEW YORK (HQ)
40 West 20th Street
11th Floor
New York, NY 10011
212.727.2700

WASHINGTON, DC
1152 15th Street NW
Suite 300
Washington, DC
20005 202.289.6868

MIDWEST
20 North Wacker Drive
Suite 1600
Chicago, IL 60606
312.663.9900

NORTHERN ROCKIES
317 East Mendenhall
Street, Suites D & E
Bozeman, MT 59715
406.556.9300

SAN FRANCISCO
111 Sutter Street
20th Floor
San Francisco, CA
94104 415.875.6100

SANTA MONICA
1314 Second Street
Santa Monica, CA
90401 310.434.2300

BEIJING
Taikang Financial
Tower 17th Floor, Suite
1706 No. 38 Dong San
Huan Bei Road
Chaoyang District
Beijing, China 100026
86.10.5927.0688

**LEARN MORE
AT NRDC.ORG**
