

Chapter 1.

Using green investment banks to scale up private investment

This chapter introduces green investment banks as a relatively new type of institution focused on increasing private investment in domestic low-carbon and climate-resilient infrastructure and other green sectors. Given the variety of existing public and private financial institutions that support green infrastructure investments, the chapter situates green investment banks within this wider context. The chapter closes with a discussion of factors governments may consider when evaluating the need to create a green investment bank. The chapter serves as a detailed introduction to green investment banks for policy makers and as an extended summary of the main messages of the report.

Introducing green investment banks

Given the urgent need to accelerate the transition to a low-carbon economy, governments are increasingly focused on finding ways to leverage greater amounts of private investment in domestic low-carbon and climate-resilient (LCR) infrastructure (Box 1.1). In recent years an increasing number of governments have created green investment banks (GIBs) and GIB-like entities to help meet this objective. A GIB is defined for the purposes of this report as a publicly capitalised entity established specifically to facilitate and attract private investment into domestic LCR infrastructure and other green sectors such as water and waste management through different activities and interventions.

Box 1.1. Defining low-carbon and climate-resilient infrastructure investments and green infrastructure

Choices of infrastructure or selected features of infrastructure will affect the greenhouse gas emissions intensity of service provision (e.g. water, electricity, mobility, shelter, sanitation services) as well as the exposure and vulnerability of businesses and people to climate change itself. Low-carbon and climate-resilient (LCR) infrastructure projects either mitigate greenhouse gas emissions or support adaptation to climate change or both.

In addition to renewable energy, the term green infrastructure can cover a broad range of investments, including sustainable agriculture, floodplain levees and coastal protection, waste management infrastructure and “green” water infrastructure. Green water infrastructure may include wastewater treatment and infrastructure that requires less concrete, e.g. through rainwater harvesting, source control of surface water (such as sustainable urban drainage systems), green roofs, and local processing of grey or black water.

This report focuses mainly on a subset of green infrastructure investments, namely LCR investments made in companies, projects and financial instruments that operate primarily in the renewable energy, renewable technology and environmental technology markets as well as those investments that are climate-change specific. These investments include energy efficiency projects, many types of renewable energy generation, carbon capture and storage, smart grids and electricity demand-side management technology, and new transport technologies (e.g. electric vehicles).

Sources: Corfee-Morlot, J. et al. (2012), “Towards a green investment policy framework: The case of low-carbon, climate-resilient infrastructure”, *OECD Environment Working Papers*, No. 48, OECD Publishing, Paris, <http://dx.doi.org/10.1787/5k8zth7s6s6d-en>; Kennedy, C. and J. Corfee-Morlot (2012), “Mobilising investment in low carbon, climate resilient infrastructure”, *OECD Environment Working Papers*, No. 46, OECD Publishing, Paris, <http://dx.doi.org/10.1787/5k8zm3gxxmnq-en>.

A key factor informing decisions to create green investment banks is the presence of barriers to investment in LCR infrastructure. Some of these barriers are broadly applicable to low-carbon investments, such as: a failure to sufficiently price fossil-fuel externalities or to reform inefficient fossil-fuel support measures; a lack of suitable financial instruments with attributes sought by private investors; and a shortage of objective information, data and skills to assess transactions and underlying risks, among others (Box 1.2). Other barriers are specific to energy efficiency investment, including: small average investment size, relatively high transaction costs and the corresponding need to aggregate projects; the need to structure investments for retail and commercial energy efficiency to allow energy savings to offset loan repayments; and the tendency for local lenders to focus only on a borrower’s credit rating during the underwriting process for an energy efficiency loan, rather than the project’s estimated energy savings.

Box 1.2. Barriers to scaling up low-carbon and climate-resilient infrastructure investment

A range of barriers can affect the risk-return profile of low-carbon and climate-resilient (LCR) infrastructure and can determine whether LCR infrastructure investments are attractive or accessible to investors.

Barriers to scaling up LCR infrastructure include, but are not limited to, the following:

1. Environmental, energy and climate policies and regulations that favour investment in unabated fossil-fuel intensive activities over green infrastructure

Inconsistent policy signals can limit the attractiveness of green infrastructure for investors. These include continuing support for fossil-fuel use and production, low or no prices on greenhouse gas (GHG) emissions and unpredictable changes to support policies for renewable energy generation.

2. Regulatory policies with unintended consequences

The global financial crisis has motivated changes to financial stability rules and prudential regulation (e.g. Basel III and Solvency II) that may inadvertently limit the ability of regulated institutions such as banks and insurance companies to finance long-term infrastructure investments. Financial stability is a prerequisite to any kind of investment, and to this end, strengthening the resilience of banks through higher capital and liquidity requirements as well as structural reforms, and more monitoring of system-level risks by financial supervisors are critical. At the same time, a review and evaluation of the impacts of regulations on long-term finance is important to spot and evaluate potential consequences for the supply of long-term finance that will be needed for low-carbon investment.

3. A lack of suitable financial instruments and funds with attributes sought by private investors

Few LCR infrastructure financial instruments and funds have the necessary attributes of familiarity, investment-grade credit rating, low transaction costs, liquidity, appropriate investment period and availability of related financial research that will make them attractive to private investors.

4. A shortage of objective information, data and skills to assess transactions and underlying risks

In the absence of transparent information, data and financial research about LCR infrastructure that can act as a signal to investors or means for performance comparison in any given sector, there are significant barriers to entry. Unlike such investments as stocks, bonds and real estate investment trusts, green infrastructure and infrastructure investment performance data are generally not collected systematically.

The OECD report *Mapping Channels to Mobilise Institutional Investment in Sustainable Energy* highlights the barriers that specifically limit institutional investor investment in sustainable energy projects (OECD, 2015a).

Sources: OECD (2013a), “Long-term investors and green infrastructure: Green infrastructure”, Policy Highlights Brochure, OECD, Paris; OECD (2015a), *Mapping Channels to Mobilise Institutional Investment in Sustainable Energy*, Green Finance and Investment, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264224582-en>.

To address some of these barriers, 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 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). The OECD report *Mapping Channels to Mobilise Institutional Investment in Sustainable Energy* explores risk mitigants and transaction enablers in detail (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.

Table 1.1 lists the GIBs and “GIB-like entities” discussed in this report.¹ “GIB-like entities” refers to organisations that have a mandate to leverage private finance for domestic LCR infrastructure investment, but which may not possess all core characteristics of GIBs, and may pursue other activities or use other approaches (e.g. grants).

Table 1.1. Green investment banks or green investment bank-like entities in operation

Operational green investment banks (GIBs) and GIB-like entities	Location	Year of formation
California CLEEN Center	California, United States	2014
Clean Energy Finance Corporation (CEFC)	Australia	2012
Connecticut Green Bank	Connecticut, United States	2011
Green Energy Market Securitization (GEMS) (Hawaii Green Infrastructure Authority)	Hawaii, United States	2014
Green Fund	Japan	2013
Malaysian Green Technology Corporation (GreenTech Malaysia)	Malaysia	2010
Masdar	United Arab Emirates	2006
New Jersey Energy Resilience Bank (ERB)	New Jersey, United States	2014
NY Green Bank	New York, United States	2014
Rhode Island Infrastructure Bank (RIIB)	Rhode Island, United States	2015
Technology Fund	Switzerland	2014
UK Green Investment Bank	United Kingdom	2012

Individual governments’ rationales and motivations for creating GIBs vary. In addition to reducing greenhouse gas (GHG) emissions, policy makers have cited factors such as local and regional development, global competitiveness, energy security and job creation as important reasons for establishing a GIB (Table 1.2). Despite these varying rationales, GIBs share an underlying goal – to address investment barriers and catalyse private investment in LCR infrastructure.

The UK government created the UK Green Investment Bank in 2012 as a tool to develop markets and cost effectively meet its legally binding GHG reduction targets established in 2008 (Green Investment Bank Commission, 2010). Australia’s Clean Energy Finance Corporation (CEFC) was created in 2012 under similar circumstances, as part of a national climate policy scheme that at the time included a carbon pricing plan. Malaysia’s Green Technology Financing Scheme was established to increase the development and use of green technology (OECD, 2013b) and was created as part of the broader GreenTech Malaysia organisation, which has a multi-pronged mission to promote environmental, economic and social well-being. The Japanese Green Fund was created to reduce carbon dioxide (CO₂) emissions.

Table 1.2. Summary of rationales for creating green investment banks (GIB) and GIB-like entities

Entity	Capital market efficiency	Reduce greenhouse gas emissions	Lower price of energy	Increase grid reliability	Create jobs/ industry growth	Part of national climate policy	Increase sustainability
California CLEEN Center (California, United States)		X			X	X	X
Clean Energy Finance Corporation (CEFC) (Australia)	X	X		X		X	
Connecticut Green Bank (Connecticut, United States)	X	X	X	X	X		
Green Energy Market Securitization (GEMS) (Hawaii Green Infrastructure Authority) (Hawaii, United States)	X		X				
Green Fund (Japan)		X			X	X	
Malaysian Green Technology Corporation (GreenTech Malaysia) (Malaysia)		X			X	X	X
Masdar (United Arab Emirates)	X				X		X
New Jersey Energy Resilience Bank (New Jersey, United States)				X			
NY Green Bank (New York, United States)	X	X		X			
Technology Fund (Switzerland)		X			X	X	
UK Green Investment Bank (United Kingdom)	X	X			X	X	X

In New York, the state government established NY Green Bank in 2013 because it wanted public funding that had previously been used almost exclusively for grant programmes to go further and attract greater private investment. The Connecticut Green Bank’s goal when it was created in 2011 was to make power “cheaper, cleaner and more reliable” for a state which then had the third highest electricity costs in the United States (US EIA, 2012). Responding to the need to make private rooftop solar photovoltaic (PV) more accessible, Hawaii’s Green Energy Market Securitization programme (GEMS) was designed in 2013 to increase the availability of financing, particularly for underserved markets, including renters, low-income individuals, non-profit organisations and people not otherwise able to acquire renewable energy systems. GEMS was also established to help the state reach its renewable energy portfolio standard goals. While GEMS funding

initially will be available for solar PV systems, it can also be used to finance energy storage, energy efficiency and other renewable energy technologies.

In New Jersey, energy security and the development of climate-resilient energy infrastructure were central to the decision in 2014 to create the New Jersey Energy Resilience Bank (ERB). This bank was established to facilitate investment in and provide technical support to power platforms and critical infrastructure that could withstand high-impact weather events such as Hurricane Sandy (New Jersey Board of Public Utilities, 2014).

While GIBs differ in name, scope and approach, they generally share the following core characteristics:

- **Narrow mandate:** GIBs generally have a narrow mandate focusing mainly on mobilising private LCR investment (but sometimes on broader green infrastructure investment) using interventions to mitigate risks and enable transactions.
- **Independence:** GIBs are typically established as special-purpose public or quasi-public entities which are granted independent authority to meet their mandates and a degree of latitude to design and implement interventions based on their deal-making and sectoral expertise.
- **Additionality:** GIBs seek to provide additional capital to facilitate transactions that would not occur without GIB involvement.
- **Cost-effectiveness:** GIBs mobilise private capital using least-cost solutions in order to reduce public expenses or as part of an organisational mandate for profitability.
- **Accountability:** GIBs are evaluated using metrics such as the amount of private capital mobilised, return on capital, number of jobs created and GHG reductions. GIBs' public reporting on their performance typically includes transparent calculation methodologies to build credibility.

Some other characteristics of green investment banks are summarised in Box 1.3. Given that GIBs' track record is still relatively limited and this report is principally a stock-taking rather than an assessment, further research would be needed to evaluate the performance of GIBs. For example, future work could usefully focus on gathering and evaluating evidence of GIBs' performance with respect to cost-effectiveness, avoiding crowding out private investment, carefully gauging investment risks, effectively targeting and addressing key investment barriers, and successfully demonstrating the viability of LCR infrastructure investment.

In addition to GIBs that possess all of the core GIB characteristics, there are other domestic institutions that could be described as "GIB-like entities". These institutions incorporate some elements of GIBs but differ in other areas. For example, renewable energy funds or programmes, such as the Swiss Technology Fund, may use some of the same interventions to mobilise private investment that GIBs use, but do not have the independence of GIBs to select and structure different interventions. The Connecticut Green Bank was initiated as a renewable energy fund and was converted into a GIB in order to expand its activities and provide a more rigorous mandate and greater independence so as to take advantage of its experience and expertise. Another example of a GIB-like entity is Masdar (Abu Dhabi, United Arab Emirates), which has some subsidiaries which carry out GIB-like activities while others use a different model. For

instance, Masdar Clean Energy, similar to a GIB, focuses on investments in renewable energy projects using commercial technologies. Masdar Capital, on the other hand, operates more like a private equity fund.² Like many GIBs, it has an objective of profitability, but it has more capacity to take risks (e.g. those associated with earlier-stage technologies) than a GIB that must meet specific requirements for financial performance.

Box 1.3. How green investment banks view their added value

Overcoming investment barriers: Green investment banks (GIBs) typically have a specific mandate to overcome barriers to scaling up low-carbon and climate-resilient (LCR) infrastructure investment. They use targeted approaches and tailored financial structuring to address the lack of suitable LCR investments with attributes sought by private investors (e.g. through aggregation of small-scale investments such as residential rooftop solar photovoltaic [PV] investments or energy efficiency retrofits in commercial buildings). They also address a shortage of objective information, data and skills to assess transactions and underlying risks. GIBs work with market participants to increase the supply of and demand for profitable low-carbon investments by decreasing risks, increasing market transparency and improving investors' (including lenders') understanding of low-carbon investments.

Building confidence by reducing risk: Mainstream lenders and investors can be slow to gain confidence in new technologies. GIBs accelerate the process by reducing real and perceived risk and increasing the number of transactions in markets for new technologies.

Relying on local expertise: GIBs hire financial professionals with local and national expertise in low-carbon technologies, projects and investments, and an understanding of the specific risk-return appetites of local financial institutions and other investors such as institutional investors. This local expertise provides informational advantages that can be leveraged to overcome investment barriers, which are often location-specific.

Transforming markets: GIBs typically aim to demonstrate the profitability of low-carbon investments to accelerate market development and then move on to other investments where they can improve the risk-return profile and attract private investment. GIBs are better placed to play this role than traditional government programmes – which may be less flexible and less familiar with markets – and than private companies – which face competitive pressures.

Reducing local financing costs: By dispersing information, sharing expertise and demonstrating that investments are profitable, GIBs help accelerate reductions in financing costs.

Source: Personal communication with Douglass Sims, Natural Resource Defense Council, October 2015; OECD Green Investment Bank Workshop, 22 May 2015.

The People's Republic of China (hereafter "China") is a prominent example of a country with market and institutional settings that are distinct from those in most other countries with GIBs, and which is considering the establishment of a GIB or GIB-like entity (Box 1.4).

Investments and policies needed to meet a 2°C target

Climate objectives and LCR investment needs and challenges form the backdrop for governments' interest in creating GIBs and supporting other efforts to mobilise private investment in LCR infrastructure. In the Paris Agreement adopted in December 2015 by the 21st Conference of the Parties to the United Nations Framework Convention on Climate (COP21), parties agreed to transition to "aggregate emission pathways consistent

with holding the increase in the global average temperature to well below 2°C above preindustrial levels” (UNFCCC, 2015). An estimated USD 93 trillion in infrastructure investments across transport, energy, water systems and cities will be needed over the period 2015 to 2030 to meet global infrastructure needs while ensuring the transition to a low-carbon economy (Global Commission on the Economy and Climate, 2014). Given that traditional sources of green infrastructure finance and investment – governments, commercial banks and utilities – face significant constraints, alternative sources will be needed not only to compensate for these constraints, but also to ramp up green infrastructure investments.³ Due to the numerous barriers to scaling up LCR investment (Box 1.2), public interventions are needed to mobilise additional private investment in LCR infrastructure.

Box 1.4. A national green bank in China?

The China Council for International Cooperation on Environment and Development (CCICED) has recommended the creation of a National Green Development Fund. If implemented as proposed, the fund would have a capitalisation target of approximately RMB 300 billion (USD 47 billion) and could raise more private capital as required. The proposed fund would focus on providing equity investments to facilitate access to other financing, including bank loans. It would operate on a commercially sustainable basis and seek to pool capital from investors with differing risk and return requirements. Sources of capital for the fund could include “fiscal funds from the central government, development finance, and other interested financial institutions and private investors.” Its focus would be on investments in “resource efficiency, renewable energy, industrial pollution control and advanced vehicle technologies” (CCICED, 2015).

Renewable energy investment needs in China are significant (USD 1 trillion of cumulative investment in wind and solar PV from 2014-35) (IEA, 2014). Investments could be accelerated by a national green bank and broader policies for green finance reform and green transformation recommended by the CCICED, including policies to develop the domestic green bond market.

Source: CCICED (2015), “Green financial reform and green transformation”, report to the Annual Conference of CCICED, 9-11 November, China Council for International Cooperation on Environment and Development, www.cciced.net/encciced/policyresearch/report/201511/P020151117574533056430.pdf; IEA (2014), *World Energy Investment Outlook*, OECD/IEA, Paris, www.iea.org/publications/freepublications/publication/WEIO2014.pdf.

GIBs are a tool to mobilise private investment that can complement policies but cannot replace core climate policies. The OECD has developed policy frameworks and guidance which seek to integrate considerations of climate and investment policy in order to establish strong enabling conditions for investment (Box 1.5). To enable LCR investment, governments must send a robust and credible price signal to internalise the cost of greenhouse gas emissions, remove fossil fuel subsidies, provide incentives for renewable energy generation and set clear, long-term policy goals. When some or all of these conditions are in place, GIBs can play a supportive role in overcoming remaining barriers and catalysing investment. Policy makers considering a GIB should consider how the institution can be integrated with existing public policies and investment promotion initiatives.

Box 1.5. Green investment policy framework and policy guidance in renewable energy

The OECD has developed a five-point “green investment policy framework” that aims to integrate climate and investment policy to provide coherent incentives and establish strong enabling conditions for green investment in the domestic context:

1. Set clear, long-term strategic policy goals in infrastructure planning and climate policies.
2. Implement policies and incentives to support LCR investment, for instance by putting a price on carbon, and removing fossil fuel subsidies and providing well-designed, well-timed, well-targeted and time-limited incentives for renewable energy investment.
3. Provide the right financial instruments to reduce risk and increase returns of green infrastructure projects.
4. Harness resources (for instance in research and development) and build capacity.
5. Promote greener consumer and business behaviour.

Together, these elements of a green investment policy framework can help to mobilise private investment and bring transformational change.

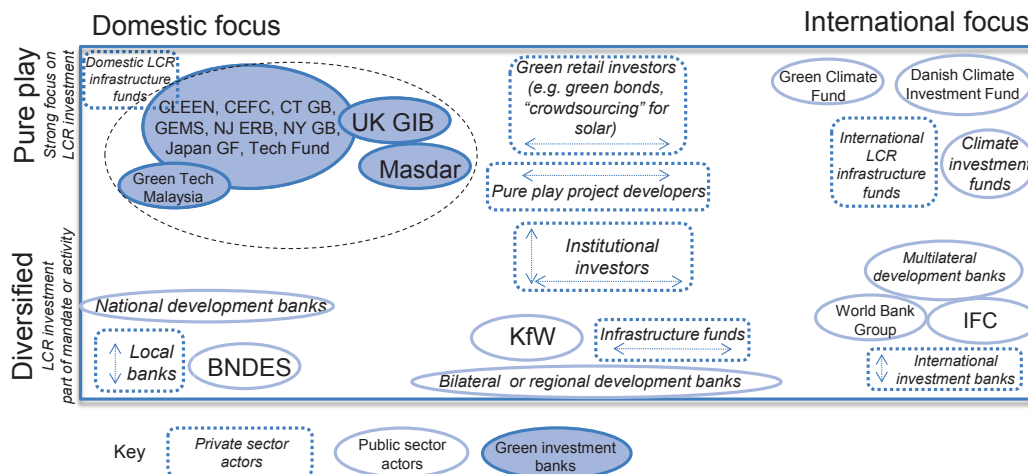
Although domestic policies to promote renewable energy infrastructure have greatly expanded throughout the world, policies in a number of related areas can create significant barriers to the effectiveness of these policies and potentially to the efforts of a green investment bank. To identify and address potential roadblocks to mobilising private investment in renewable energy infrastructure in emerging and developing economies, the *OECD’s Policy Guidance for Investment in Clean Energy Infrastructure* (OECD, 2015b) raises issues for policy makers’ consideration in the areas of investment policy, investment promotion and facilitation, competition, financial market and public governance policies. Similarly, investments in sustainable transport infrastructure also have their own particular set of challenges and channels that a new GIB may need to take into account (see Ang and Marchal, 2013). Other policy misalignments in the electricity sector and the broader economy which impede the transition to a low-carbon economy are examined in greater detail in *Aligning Policies for a Low-carbon Economy* (OECD, 2015c).

Sources: Ang, G. and V. Marchal (2013), “Mobilising private investment in sustainable transport: The case of land-based passenger transport infrastructure”, *OECD Environment Working Papers*, No. 56, OECD Publishing, Paris, <http://doi.org/10.1787/5k46hjm8jpmv-en>; Corfee-Morlot, J. et al. (2012), “Towards a green investment policy framework: The case of low-carbon, climate-resilient infrastructure”, *OECD Environment Working Papers*, No. 48, OECD Publishing, Paris, <http://dx.doi.org/10.1787/5k8zth7s6s6d-en>; OECD (2015b), *Policy Guidance for Investment in Clean Energy Infrastructure: Expanding Access to Clean Energy for Green Growth and Development*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264212664-en>; OECD (2015c), *Aligning Policies for a Low-carbon Economy*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264233294-en>.

Situating green investment banks among other institutions mobilising private climate finance and investment

GIBs and GIB-like entities are situated within a broad spectrum of public institutions and entities that provide financing or leverage private climate finance and investment. They are mobilising private investment within a broader ecosystem of multilateral development banks (MDBs), national development banks (NDBs), bilateral development finance institutions, international climate funds and various private sector investors and financiers and investors (Annex 1.A1). To provide more context, Figure 1.1 illustrates a number of the diverse actors involved in LCR infrastructure investment financing. It also considers their respective focus on domestic vs. international investment and on “pure play”⁴ LCR investment (i.e. an exclusive focus on LCR investment) vs. diversified infrastructure investment.

Figure 1.1. Green investment banks and their relation to other existing public and private entities that finance low-carbon and climate-resilient infrastructure



Note: BNDES: Brazilian Development Bank; CEFC: Clean Energy Finance Corporation; CLEEN: California CLEEN Center; CT GB: Connecticut Green Bank; GEMS: Green Energy Market Securitization; IFC: International Finance Corporation; Japan GF: Japan’s Green Fund; LCR: low-carbon and climate-resilient; NY GB: NY Green Bank; Tech Fund: Technology Fund; NJ ERB: New Jersey Energy Resilience Bank; UK GIB: UK Green Investment Bank.

This figure is not intended to be exhaustive, but rather illustrative of certain institutions. The proximity of actors is not intended to reflect any particular interaction or co-operation but simply demonstrates the similar domains where public and private entities may pursue low-carbon and climate-resilient infrastructure investment. Arrows are used to illustrate that actors can be situated in different locations along each axis.

Source: Eklin, K. et al. (2016, forthcoming), “OECD Green Investment Financing Forum: Lessons from established and emerging green investment bank models”, Background Note, OECD, Paris, forthcoming.

As shown in Figure 1.1, GIBs and GIB-like entities occupy the upper-left quadrant, which reflects their orientation (with exceptions) toward increasing private investment in domestic, pure-play LCR infrastructure. All GIBs and GIB-like entities focus on domestic infrastructure, with the exception of the pilot joint venture announced in March 2015 by the UK Green Investment Bank and the UK Department of Energy and Climate Change (DECC) to invest in India and Africa⁵. Many but not all GIBs and GIB-like entities focus exclusively on LCR infrastructure. Other sectors covered by GIBs and GIB-like entities include waste management (Japan’s Green Fund), waste recycling and bioenergy (UK Green Investment Bank), and environmental mitigation and water treatment (California CLEEN Center).

In a short period of time (generally since 2011), GIBs and GIB-like entities have rapidly emerged as a new type of institution focusing on mobilising private investment. For policy makers, these entities merit consideration in light of their ability to be replicated in and adapted to different countries, at the national and sub-national level, and with a range of objectives.

The focus of green investment banks on domestic LCR infrastructure is another important feature. Although efforts to scale up private investment flows in LCR infrastructure need to focus on both domestic and international investment, flows of climate finance have been predominantly domestic to date. Total domestic climate finance flows – public and private flows combined – are more than double the size of cross-border flows (CPI, 2013; Hašćic et al., 2015). Private climate finance in particular

is strongly oriented toward domestic investment. Ninety percent of private climate finance investments remained in their country of origin (CPI, 2014). GIBs' focus on and understanding of local markets and investment barriers are particularly relevant in this context. Governments will increasingly need to make efficient use of public funding to mobilise much larger amounts of private investment in their domestic LCR infrastructure; this is an important part of their broader effort to provide enabling policies for domestic low-carbon investment. For these and other reasons, this study aims to provide a stock-taking on GIBs to inform governments' further consideration of these entities as a potential tool to help meet emission reduction, investment mobilisation and other objectives.

At the same time, GIBs should be understood as being a new player in a broader ecosystem of generally much larger institutions and funds that are active in mobilising private LCR infrastructure investment. Annex 1.A1 describes these entities, which include: government-sponsored loan programmes; green programmes or initiatives within existing national development banks, bilateral development finance institutions, export credit agencies, multilateral development banks or central banks; multilateral infrastructure development banks and other infrastructure-specific initiatives, including the New Development Bank, the Asian Infrastructure Investment Bank and the Global Infrastructure Hub; agencies and institutions supporting research and development (R&D) and early development of clean technology; public agencies that implement national energy plans; and purely international climate funds.

Greening existing institutions versus establishing new ones

To mobilise private investment in domestic green infrastructure, “greening” existing institutions may be preferable to creating new institutions when the necessary institutional and political support exists. For example, many countries have NDBs (or public investment, infrastructure or industrial development banks) which focus on domestic investment. These banks are typically much larger than even the largest GIB. While many NDBs are less focused on mobilising green investment than GIBs, some NDBs have been providing financing for low-carbon projects for many years. For example, Germany's KfW has been investing in environmental protection domestically and internationally since the 1980s, and invested approximately USD 56 billion in 2015 in “domestic promotion”, including but not limited to “special programmes to foster the use of renewable energy, to increase energy efficiency and to promote innovative technology companies” (KfW, 2016). Given the resources and longer track records of some NDBs in leveraging private climate finance and investment, they can provide important lessons for GIBs.

GIBs may also not be suitable for all countries. Establishing a GIB presumes a domestic context in which relatively limited interventions are sufficient to facilitate domestic private investment. Some domestic policy environments and local markets may be insufficiently developed to be appropriate for a GIB which uses commercial interventions. In these cases, market development and capacity building, and therefore grant models and significant subsidisation (e.g. from MDBs), are often required. However, the global spread of renewable energy markets may make GIBs (or GIB-like entities) potentially relevant for a large number of countries. One study estimates that “[a]s of early 2015, at least 164 countries had renewable energy targets, and an estimated 145 countries had renewable energy support policies in place” (REN21, 2015).

Some factors to consider when evaluating the relative benefits of creating a GIB or greening existing institutions include:

- **Costs:** Establishing a new institution likely involves more time and costs than greening an existing institution, and may be viewed as expanding bureaucracy or creating duplicative government services.
- **Independence and authority:** Creating a new GIB with an independent status can provide flexibility to experiment, innovate and adapt to market developments. It can also shield the institution from day-to-day political interference. In the case of the UK Green Investment Bank, this was deemed essential to attract long-term capital from institutional investors (UK House of Commons, 2011). Institutional barriers and political context could make it difficult for GIBs to address certain issues (CPI, 2015). Those barriers could apply equally to NDBs, however.
- **Mandate and culture:** Many NDBs lack a clear mandate to promote national climate change mitigation (Smallridge et al., 2013). NDBs may support renewable energy projects while also financing fossil fuel projects in parallel. In contrast, GIBs are exclusively focused on green investment and face fewer competing agendas.
- **Financing approaches:** The types of preferred financing approaches vary across GIBs, NDBs and MDBs. The International Development Finance Club (IDFC), which brings together over 20 NDBs and sub-regional development banks from around the world, estimates that members made new commitments representing USD 98 billion in green finance in 2014. Among the IDFC’s members, 51% of financing in 2013 was in the form of non-concessional loans, followed by concessional loans (44%) and grants (3%). Other financial instruments such as equity, guarantees and unspecified loans accounted for only 2% of investment (IDFC, 2015). GIBs tend to be more oriented toward accelerating risk-taking by investors, through demonstration, co-investment and sharing risks with investors using guarantees and other risk mitigants. However, there are exceptions to these characterisations of NDBs and GIBs. Some NDBs, such as KfW, as well as multilateral development banks like the European Investment Bank and others, also increasingly develop and use innovative tools to scale up private finance from multiple investor classes. Some GIB-like entities (e.g. GreenTech Malaysia) make extensive use of concessional loans while GIBs like Australia’s CEFC and Connecticut Green Bank use them only on a limited, targeted basis.
- **Scale:** The low-carbon investment portfolios of some NDBs are larger than those of even the largest GIB. If NDBs mainstream green investment throughout their portfolios, they may be able to mobilise LCR infrastructure at much greater scale than GIBs. However, if GIBs were able to significantly augment their current capitalisation by securing funds from other sources (e.g. the Green Climate Fund), the scale advantage held by NDBs could diminish.
- **Benefits of centralising green bank functions in one institution:** In addition to “greening” a single institution such as an NDB, another alternative to creating a GIB is to strengthen and expand green investment programmes that are already housed in different government agencies and institutions. Interventions undertaken by some programmes and institutions, such as transaction structuring and co-investing, require different skills than providing subsidies and concessional lending. In addition, such interventions may cover a number of

unrelated sectors. As a result, bringing these functions together in the same institution may not yield efficiency gains. However, efficiency gains could result from bringing together transactional expertise in similar technologies, projects and business models, particularly if staff have the financial and sector knowledge to undertake a range of interventions. Consolidation of programmes and related outreach would also facilitate information sharing with retail and commercial customers and other investors (CPI, 2015).

Publication overview

This report is divided into five chapters. The remaining chapters will address the following topics:

- Chapter 2 examines GIB strategic investment mandates including the importance of profitability, project replicability and demonstrating that profitable investments are possible. It also provides an overview of the range of GIB target sectors and sub-sectors.
- Chapter 3 discusses the specific instruments and funds GIBs use to make investments. It draws attention to the range of de-risking approaches used by GIBs and the innovative approaches they are using to reduce high transaction costs. The chapter also discusses the types of co-investors that GIBs collaborate with or seek to attract.
- Chapter 4 explores how GIBs are mobilising private investment in domestic energy efficiency.
- Chapter 5 provides practical information on capitalising and setting up a GIB. Administrative set up, leadership and staffing are discussed, as well as reporting, oversight and transparency.

Notes

1. The Montgomery County Green Bank (Maryland, United States) is not included in the table. As of 10 May 2016, the Green Bank was just beginning the process of recruiting its board of directors.
2. A private equity fund is a fund which invests its money in an asset class consisting of equity securities in operating companies that are not publicly traded on the stock exchange, to control the company.
3. This topic has been the focus of extensive OECD analysis www.oecd.org/env/cc/financing.htm www.oecd.org/env/cc/financing.htm.
4. In financial management, “pure play” entities are focused on only one industry or product.

5. In March 2015, the UK DECC and the UK Green Investment Bank announced a pilot joint venture to deploy capital from the United Kingdom’s International Climate Fund (ICF). The joint venture, named UK Climate Investments, focuses on renewable energy and energy efficiency in developing countries, including India, South Africa and countries in East Africa. The investment approach follows the UK Green Investment Bank business model and focuses on investing in green projects on commercial terms and mobilising private sector investment. A dedicated team manages the project and is supervised by a Board with members from the DECC and the UK Green Investment Bank (UK Green Investment Bank, 2015a; UK House of Commons, 2015, UK Green Investment Bank, 2015b).

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Annex 1.A1.

Other institutions, funds, agencies and programmes that mobilise private climate finance and investment

Overview of entities engaged in mobilising private investment in low-carbon and climate-resilient infrastructure

The following types of public financial institutions, funds, government programmes and agencies are active in mobilising private investment in low-carbon and climate-resilient (LCR) infrastructure, and are distinct from green investment banks (GIBs) or GIB-like entities for the purpose of this report. This list is intended to highlight many of the major entities without attempting to be comprehensive. These institutions and entities include the following:

- Green programmes or initiatives within existing national development banks, bilateral development finance institutions, export credit agencies, multilateral development banks or central banks. These actors may invest domestically, internationally or both. National development banks and other types of public financial institutions (PFIs) are discussed at length in the OECD working paper “Public financial institutions and the low-carbon transition: Five case studies on low-carbon infrastructure and project investment” (Cochran et al., 2014). For example, the Brazilian development bank BNDES funds renewable energy, energy efficiency and public transport projects in Brazil through its Green Economy programme (BNDES, 2013) and the German development bank KfW has invested in environmental protection domestically and internationally since the 1980s (Cochran et al., 2014). Central banks can also lead or participate in green finance initiatives, as illustrated by Bangladesh Bank’s establishment of a “Green Transformation Fund” to support green practices in the export-oriented textiles and leather sectors (Bangladesh Bank, 2016).

PFIs are typically active in sectors where market failures have substantially limited private sector investment, and often hold a mandate to provide long-term financing independent of market cycles and in line with policy-oriented objectives. PFIs are able to leverage capital at advantageous, below-market rates for targeted investments. In many instances these institutions serve as a catalyst for private sector investment and innovation. These characteristics and objectives of PFIs are well aligned with the challenge of overcoming barriers to private investment in low-carbon projects. Some PFIs already have an explicit mandate and authority to invest in green infrastructure – often with established guidelines on which technologies or markets to address (Cochran et al., 2014).

In the context of developing strategies to mobilise private investment in domestic green infrastructure, countries with an existing national development bank (or a public investment, infrastructure or industrial development bank which focuses on domestic investment) should consider and assess how its current operations are approaching green infrastructure investment, and the institution’s relative success in scaling up and attracting private investment. “Greening” existing PFIs, when

the necessary institutional and political support exists, might be preferable to creating new institutions.

- The multitude of **government-sponsored loan programmes** that provide financing for LCR projects are considered not to be GIBs or GIB-like entities. These programmes typically have less independence and flexibility than GIBs, although they may to different extents share with GIBs a focus on preservation and recycling of public capital. Government-sponsored loan programmes may provide significant amounts of grants, finance the majority of a project or provide non-commercial (i.e. subsidised) lending terms. One such programme is the Environmental Investment Fund of Namibia, which is funded by national conservation fees and environmental taxes and which provides subsidised loans and grants for sustainable resource management and environmental protection, including renewable energy, water efficiency and land-use planning (EIF Namibia, n.d.). South Africa’s Green Fund, which focuses on green cities and towns, the low-carbon economy, and environmental and natural resource management, has similarities to a GIB-like entity but is focused on grants and has not mobilised significant private investment to date (Green Fund, 2014; personal communication with Ruan Kruger, Development Bank of South Africa, 25 November 2015).
- **Agencies and institutions supporting research and development (R&D) and early development of clean technology** (i.e. “clean tech” – a broad category which includes technologies that use less energy, generate less waste and cause less environmental damage). Publicly and privately supported research and industrial agencies encourage fundamental research in pre-commercial technologies, while GIBs generally operate at the other end of the spectrum, mobilising private investment for commercially established or market-ready technologies. Some organisations support business and product development for pre-commercial technologies. For example, Sustainable Development Technology Canada (SDTC), an independent non-profit funded by the government of Canada, supports the early-stage development of clean tech projects through funding and coaching in areas such as climate change, air quality and biofuels (SDTC, 2015).
- **Public agencies that implement national energy plans** are often designed to encourage private investment yet often lack the flexibility and independence of a GIB. Examples include the Moroccan Agency for Solar Energy (MASEN) and the Indian Renewable Energy Development Agency (IREDA).
- **Multilateral infrastructure development banks and other infrastructure-specific initiatives** are primarily concerned with scaling up and prioritising infrastructure investment without specifically focusing on LCR infrastructure. Box 1.A1.1 discusses some of these emerging infrastructure banks and initiatives.
- **Purely international funds** are also outside the scope of this report, as a key characteristic of GIBs is their focus on mobilising investment in *domestic* infrastructure. For example, the Danish Climate Investment Fund uses an innovative structure and risk mitigants to mobilise private investment (including Danish institutional investment) for projects in LCR infrastructure in developing countries.

The following sub-section provides additional details on selected international climate funds.

Box 1.A1.1. Emergence of new development banks and initiatives focused on infrastructure investment

Green investment banks (GIBs) are not the only institutions with significant new activity in financing infrastructure investment in recent years. Developing countries and emerging economies are undertaking efforts to establish new development banks. The Group of Twenty (G20) is also promoting increased infrastructure investment through a Global Infrastructure Initiative launched in 2014. While these institutions will not be exclusively dedicated to financing low-carbon and climate-resilient (LCR) infrastructure, they are particularly focused on filling the infrastructure gap.

In July 2014, Brazil, the Russian Federation, India, the People’s Republic of China and South Africa (known as the BRICS countries) collectively agreed at their annual BRICS Summit to establish a development bank, to be known as the New Development Bank. The bank’s purpose is to increase economic co-operation between BRICS countries and finance investment in sustainable development and infrastructure in BRICS and other emerging economies and developing countries (BRICS Summit, 2014). The New Development Bank “shall support public and private projects through loans, guarantees, equity participation and other financial instruments” and will also co-operate with other international organisations (BRICS Summit, 2014). The New Development Bank is based in Shanghai and is capitalised with the payment of USD 10 billion for each founding member for a total initial capitalisation of USD 50 billion (Hou, 2014). In April 2016, the bank approved its first set of loans for a total of USD 811 million supporting 2,370 MW of renewable energy capacity (New Development Bank, 2016). In addition, China has proposed an Asian Infrastructure Investment Bank (AIIB), which will provide project loans to developing countries. The agreement to establish the AIIB was signed by representatives from 50 countries in June 2015. The bank declared itself open for business on 16 January 2016 (AIIB, 2016).

Leaders of the G20 are increasing support to infrastructure investment through the creation of a Global Infrastructure Hub, which will provide resources to help implement the agenda of the Global Infrastructure Initiative. The Global Infrastructure Hub will have a four-year mandate to increase knowledge-sharing, address data gaps relevant for investors, increase the capacity of government officials and enhance investment opportunities by developing a database of infrastructure projects (G20, 2014). The Business 20 (B20), a forum of private sector leaders that produces policy recommendations for the G20, estimates that the Global Infrastructure Initiative can help to unlock an additional USD 2 trillion in global infrastructure capacity, 10 million jobs per annum and USD 600 billion in GDP benefits to 2030 (B20, 2014).

Sources: AIIB (2016), “AIIB open for business. Jin Liqun elected as first President”, press release, 16 January, Asian Infrastructure Investment Bank, www.aiib.org/html/2016/NEWS_0116/84.html; AIIB (2015), “Fifty countries sign the articles of agreement for the Asian Infrastructure Investment Bank”, press release, Asian Infrastructure Investment Bank, http://219.237.194.234/html/2015/NEWS_0629/11.html; B20 (2014), “B20 Infrastructure and Investment Task Force policy summary”, B20 Infrastructure and Investment Task Force, July, www.b20australia.info/Documents/B20%20Infrastructure%20and%20Investment%20Taskforce%20Report.pdf; BRICS Summit (2014), “Agreement on the New Development Bank”, VI BRICS Summit, Fortaleza, Brazil, 15 July, <http://brics6.itamaraty.gov.br/media2/press-releases/219-agreement-on-the-new-development-bank-fortaleza-july-15>; Hou, Z. (2014), “BRICS Development Bank, too good to be true?”, Overseas Development Institute, 6 August, www.odi.org/comment/8703-brics-development-bank-too-good-be-true; G20 (2014), “The G20 Global Infrastructure Initiative”, *G20 Communiqué*.

International climate funds and initiatives

A wide range of international climate funds and initiatives support greater financial mobilisation for mitigation and adaptation in developing countries.¹ Similarities between

these funds and initiatives and GIBs vary depending upon their particular mandate and approach. The following non-exhaustive list highlights some of the more prominent international climate funds. Notably, this list does not include public finance from bilateral finance institutions and providers, which exceeded multilateral public finance in 2013 and 2014 (OECD, 2015).²

Green Climate Fund

The Green Climate Fund (GCF) is a fund created within the framework of the UNFCCC and is an operating entity of the financial mechanism of the Convention (UNFCCC, 2010). Operational since 2014, the GCF is designed to be used as a mechanism to disburse international climate finance provided mainly (but not exclusively) by developed countries to fund projects in developing countries. In November 2015, it approved its first investments for a total of USD 168 million in 8 projects and programmes valued at USD 624 million (GCF, 2015a). As of April 2016, the GCF was capitalised with USD 9.9 billion signed out of a total amount announced of USD 10.3 billion, with pledges from 42 countries, including 9 developing countries (GCF, 2016).

The GCF also seeks to increase complementarities between its activities and those of other relevant institutions. GIBs appear to be one type of institution whose activities are consistent with and supportive of the GCF's objectives. In terms of sectoral coverage, GIB investment activity is well aligned with the GCF; GIBs finance projects in three mitigation sectors identified as priorities by the GCF: renewable energy, energy efficiency and transport. Perhaps most importantly for the purposes of this report, the GCF includes a Private Sector Facility which will operate as a component of the fund.

To mobilise private capital and expertise at scale in accordance with national plans and priorities, the Private Sector Facility will address barriers to private sector investment in adaptation and mitigation activities, such as market failures, insufficient capacity and lack of awareness. These activities are expected to facilitate and enhance the participation of national, regional and international investors. GIBs, by their very nature, are designed to interact with private investors, which may be local or international, and to maximise their investment in green investment bank-supported projects and programmes. Lessons learnt by GIBs in engaging with institutional investors such as pension funds and investment funds may also be particularly useful for the Private Sector Facility. The GCF Private Sector Facility will seek to mobilise institutional capital from local actors and in the immediate term will focus on mobilising funds at scale from local commercial banks, local pension funds, local insurance companies, sovereign wealth funds and high net worth individuals (GCF, 2015b). Given that GIBs often partner with local banks (see the discussion on co-investors in Chapter 3), they are particularly well placed to share lessons learnt regarding collaboration with local banks and other investors.

Climate Investment Funds

The Climate Investment Funds (CIF) were developed in 2008 and designed as a way to mobilise resources to support climate change in developing countries in the areas of clean technology, renewable energy, sustainable forestry management and climate resilience. With a total capitalisation of USD 5.5 billion, the Clean Technology Fund (CTF) is one of the largest multilateral mitigation funds and one of the key funding areas of the CIF (UNFCCC, 2014a). The CTF provides concessional resources to scale up demonstration, deployment and technology transfer of low-carbon technologies (CIF,

2015). GIBs that support the development of clean technology, such as the Swiss Technology Fund and Masdar, have relevant expertise that could be shared.

Global Environment Facility

Originally established as a USD 1 billion World Bank pilot programme in 1991, the Global Environment Facility (GEF) has become a permanent and separate institution which serves as a financial mechanism for several international conventions, including the UNFCCC, the Convention on Biological Diversity and the UN Convention to Combat Desertification (GEF, 2013). In the context of the UNFCCC, the GEF supports projects in climate change mitigation and adaptation and administers the GEF Trust Fund, Least Developed Countries Fund and Special Climate Change Fund (SCCF). These funds provide grant support and lending for mitigation and adaptation projects. The SCCF, in particular, focuses on adaptation and technology transfer with a strong demand for projects related to water resource management resilience. GIB-like entities such as the New Jersey Energy Resilience Bank, Swiss Technology Fund or Masdar share some characteristics with the SCCF, and these institutions could potentially benefit from sharing relevant expertise and experience.

Adaptation Fund

The Adaptation Fund (AF), which was established to finance adaptation projects in developing countries that are particularly vulnerable to the impacts of climate change, has been operational since 2009. The AF is funded by a 2% levy on certified emission reductions issued to clean development mechanism projects as well as voluntary contributions (UNFCCC, 2014b). The AF is administered by the Adaptation Fund Board. As of December 2015 the AF has allocated USD 331 million and disbursed USD 140.6 million (UNFCCC, 2015). GIBs that support adaptation and resiliency may have relevant expertise to share with the AF, and vice versa.

Notes

1. The OECD's *Climate Fund Inventory Database* (<http://qdd.oecd.org/subject.aspx?subject=climatefundinventory>) is an available source that compiles funds for both adaptation and mitigation.
2. The OECD report "Climate finance in 2013-14 and the USD 100 billion goal" (OECD, 2015), prepared in collaboration with Climate Policy Initiative, provides an aggregate estimate of mobilised climate finance and an indication of the progress towards the UNFCCC climate finance goal, covering international climate funds and other sources of climate finance.

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