



LESSONS FROM ESTABLISHED AND EMERGING GREEN INVESTMENT BANK MODELS

*OECD Green Investment Financing Forum
Background Note*

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Abstract

This background note is a stocktaking analysis of “green investment banks” (GIBs), intended to inform discussions at the OECD Green Investment Financing Forum on 12-13 June 2014. In recent years, at least a dozen special-purpose GIBs have been established. They are domestically-focused public institutions that seek to use limited public capital to leverage or “crowd-in” private capital, including from institutional investors, for low-carbon and climate-resilient (LCR) infrastructure investment. GIBs are making their place within a broader ecosystem of domestic and international institutions engaged in catalysing private and institutional investment in LCR infrastructure. Such institutions include broader-scoped international financial institutions (including multilateral development banks and bilateral development banks), climate investment funds, national development banks and other public finance institutions, as well as investment and commercial banks which traditionally play a key role in providing asset finance for LCR infrastructure.

Each of the topics addressed in this note will be discussed at the Forum, which will take stock of GIBs, and examine what they do, why they are being established, what they have in common, and how they vary. The Forum will also examine how GIBs are working to mobilise capital specifically from institutional investors (a deep pool of global capital that is in theory available for long term investment but is in practice only flowing in small amounts to LCR infrastructure). GIBs can be a useful tool for governments to mobilise domestic private capital, including from institutional investors. As they are being used in different ways in different country settings, their varying operational models and focuses suggest a potential for their adaptation and replication at the national and sub-national level. The note concludes by raising questions for further consideration.

To structure the event and background note and benefit from the wisdom of previous research efforts, the OECD is partnering with a number of GIBs, two universities that have been actively researching GIBs (Oxford University & Yale University), the Coalition for Green Capital and the Climate Markets & Investors Association. The emergence of GIBs is a recent development in the green infrastructure investment ecosystem, and thus experience to date is fairly limited. As such, this note seeks to provide a stocktaking and some initial lessons and insights, with the understanding that individual GIBs and GIBs as a category of institution may change over time.

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What are Green Investment Banks (GIBs) and how can they facilitate a shift to a low-carbon economy?

1. Greening growth and achieving climate objectives requires a shift to a low-carbon economy. The financial resources required to meet this challenge are substantial and the private sector will need to play a central role in green infrastructure projects.¹ Global investments in infrastructure will have a major impact on whether a 2 degree climate target² can be achieved, as they can “lock-in” future emission levels. Some of the 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.

2. In recent years, a number of special purpose “green investment banks” (GIBs) have been established. For the purposes of this note, a GIB can be broadly defined as a public entity established specifically to facilitate and “crowd-in” domestic private low-carbon and climate-resilient (LCR) infrastructure investments (LCRII) through different activities and interventions.³

3. This note discusses the roles and activities of green investment banks in facilitating and financing LCRII (see Box 1). It is intended to provide background information for discussion on this topic at the OECD Green Investment Financing Forum on 12 and 13 June 2014. It situates GIBs in the spectrum of domestic and international institutions engaged in catalysing investment in LCR infrastructure, ranging from international financial institutions (including multilateral development banks and bilateral development banks), climate investment funds, national development banks and other public finance institutions.⁴

4. The note also highlights GIBs’ activities targeting institutional investors, which represent a very large pool of capital and an increasingly important alternative source of financing for LCRII, given the need to scale up LCRII and to compensate for declining financing from such traditional sources such as banks, governments, and utilities. It draws from recent OECD work on the domestic policy context needed to mobilise long-term LCR investment (Corfee-Morlot et al., 2012) and on how to overcome barriers to increased LCR infrastructure investment by institutional investors – notably pension funds, Public Pension Reserve Funds (PPRFs), insurance companies, sovereign wealth funds, mutual funds, etc. (Kaminker et al., 2013).

¹ This topic has been the focus of extensive OECD analysis available at: <http://www.oecd.org/env/cc/financing.htm>

² In the 2010 Cancun Agreements, Parties of the United Nations Framework Convention on Climate Change (UNFCCC) agreed to work together, with a view to reducing global greenhouse gas emissions so as to hold the increase in global average temperature below 2 °C above pre-industrial levels.

³ See Glossary for definitions of key terms throughout the note such as “crowding-in”.

⁴ A 2014 OECD working paper prepared with CDC Climat Recherche explores the mandates of five Public Finance Institutions (see Glossary) (the Group Caisse des Dépôts, KfW Bankengruppe, the UK Green Investment Bank, the European Investment Bank, and the European Bank for Reconstruction and Development) to address climate change issues; their different roles in low-carbon infrastructure investment and finance activities; and their ability to scale up private sector investments, focusing principally on OECD and transitioning economy countries (Cochran et al., 2014 (forthcoming)).

Box 1. Defining green investment banks and green infrastructure investments

For the purposes of this note, a **green investment bank (GIB)** is defined as a public entity established specifically to facilitate and “crowd-in” *domestic* private LCR infrastructure investments (LCRII) through different activities and interventions.

“Crowding in” occurs when public investment induces greater private investment than would have occurred otherwise, or reduces the costs that investing firms incur. “Crowding-out” occurs when public intervention directly displaces the efforts of the private sector by undertaking projects the private sector would have otherwise undertaken. Crowding out can also occur indirectly if governments use distortionary taxes to fund public investment.⁵

GIB institutional settings are often linked to the national policy framework and the structure of GIBs varies across institutions. The UK GIB and Connecticut’s green bank are described as quasi-public institutions. GreenTech Malaysia operates as a non-profit organisation supervised by the Ministry of Energy, Green Technology and Water Malaysia (KeTTHA). Other entities fit into existing government administrative structures. For example, NY Green Bank is operated as a division of the New York State Energy Research and Development Authority (NYSERDA). In South Africa the Department of Environmental Affairs appointed the country’s national development bank, the Development Bank of Southern Africa, as the Green Fund’s implementing agent.

Green infrastructure investments cover a broad range of investments, including sustainable agriculture, floodplain levees and coastal protection, waste management infrastructure, and “green” water infrastructure. The latter 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. Green infrastructure investments also include various types of low-carbon and climate-resilient (LCR) infrastructure investments (Corfee-Morlot et al. 2012; Kennedy and Corfee-Morlot 2012). This note focuses on a subset of green infrastructure investments, namely LCR investments made in companies, projects and financial instruments that operate primarily in the renewable energy, clean technology and environmental technology markets, as well as those investments that are climate-change specific or screened against Environmental, Social and Governance (ESG) criteria. These investments include energy-efficiency projects, many types of renewable energy, nuclear power and carbon capture and storage for countries that choose to use these technologies, smart grids and electricity demand side-management technology, and new transport technologies (e.g. electric vehicles).

Source: adapted from OECD (2012), Energy, OECD Green Growth Studies.

5. Green investment banks are not deposit-taking retail banks; they focus on investment activities to mobilise private capital, similar to traditional broker-dealer-advisor investment banks. Their activities can vary from equity investments that can mobilise co-investment in clean energy projects from institutional investors, to programs that encourage individuals to invest in residential energy efficiency.

6. This note focuses on domestically-oriented institutions to (i) reflect the emergence of a number of institutions in recent years that are dedicated to mobilising *domestic* private LCRII; and (ii) highlight the potential role of GIBs as an instrument governments can use to facilitate a transition to an LCR economy, and as a type of institution that can be replicated in and adapted to different countries, at the national and sub-national levels, and with a range of objectives. Globally, domestic climate finance flows – both public and private – more than double that of cross-border flows (Haščič et. al, 2014 (forthcoming)), (CPI, 2013)⁶. This highlights the central role that domestic financing sources will play in meeting countries’

⁵ N.B. “crowd” is being used in certain countries in the clean energy sector in the different sense of “crowd sourcing”, meaning attracting small unaccredited investors to invest in clean energy. It is emerging as a key term for a certain type of investment which should not be confused with the term “crowding-in” as used here.

⁶ Based on data from Bloomberg New Energy Finance (BNEF)

green investment objectives, and the need for policy makers to create national green investment policy frameworks, incentives and institutions that support LCRII from domestic sources.

7. Concentrating on domestically-oriented institutions allows for a distinction to be made with institutions focusing on mobilising *international* private finance and investment flows into LCR infrastructure, including North-South, South-South and South-North directional flows⁷. In practice, lines between different types of institutions can become blurred, as individual entities have evolved and are being established with varying and overlapping mandates, scopes and objectives. Furthermore, there can be important similarities between different types of institutions with respect to their sectoral focus, vehicles and techniques for mobilising private investment, and operational philosophies. A wealth of experience exists in internationally-oriented institutions that will be relevant to emerging GIBs, as they share with those international institutions a focus on devising effective public interventions to overcome barriers to increased private investment and financing for LCR infrastructure.

8. Governments are increasingly focused on leveraging private capital with limited public resources and are exploring GIBs as an option to mobilise investment in domestic LCR infrastructure. The UK's Green Investment Bank (UK GIB), operational since 2012, has suggested it is the first of its kind in the world. Using a different model, Connecticut's Clean Energy Finance and Investment Authority (CEFIA) became operational in 2011 and made its first investment in 2012. Australia's Clean Energy Finance Corporation (CEFC) and the Japanese Green Fund began investing in 2013 and NY Green Bank expects its first investments to be made in 2014.⁸ These entities were established with a focus on scaling up private investment in domestic clean energy, low-carbon technology and green infrastructure. As noted below, other public sector actors have been active in financing, investing in and attracting private and institutional investor capital to LCR infrastructure for many years (see Box 2).

Box 2. Other relevant public finance institutions undertaking similar activities

While GIBs have recently emerged as important actors in leveraging private climate finance and investment, other public finance institutions have had climate change and green investment on their agendas for a number of years. For example, Germany's KfW expanded its focus to include environmental protection in the 1980s. The six priorities in the European Investment Bank's (EIB) Operational Plan include environmental sustainability, which encompasses climate action, and since 2007, the EIB has stepped up its lending for renewable energy and energy efficiency, and set itself specific targets for the share of low-carbon investments in its overall investment portfolio. One of the four historical priorities of the Caisse des Dépôts et Consignations is sustainable development and its 2013 Strategic Plan includes the "Energy Transition" as a mandate. Other PFIs also are addressing LCRII, as well as Multilateral Development Banks such as World Bank/IFC, EBRD, ADB, AfDB, and others (Cochran et al., 2014 (forthcoming)). Sovereign wealth funds constitute another category of public financing vehicle, and some are actively engaged in green infrastructure investment.

⁷ In this note "North" refers to high income OECD countries and all other countries are considered as "South". For a list of countries by income category, see <http://data.worldbank.org/about/country-classifications/country-and-lending-groups>.

⁸ The emergence of green investment banks is a recent phenomenon, and information on their activities is relatively limited to date. Due to varying availability of information for each GIB, the level of detail for each GIB provided in this note varies and may reflect current information gaps.

9. Table 1 lists the institutions described as GIBs, or “GIB-like entities” for the purposes of this note. Figure 1 illustrates a number of the diverse actors involved in LCR financing, their respective focus on domestic vs. international investment and on “pure play” (see Glossary) LCR investment vs. diversified green infrastructure investment (where green is part of the mandate), and the particular space inhabited by GIBs. Constructing a figure in this fashion reveals the emergence of a cluster of GIBs circled in red. For further analysis of the interactions among private actors active in LCR and GIBs, with a particular focus on the role of institutional investors, see Figure 2 found in the institutional investors section of this note.

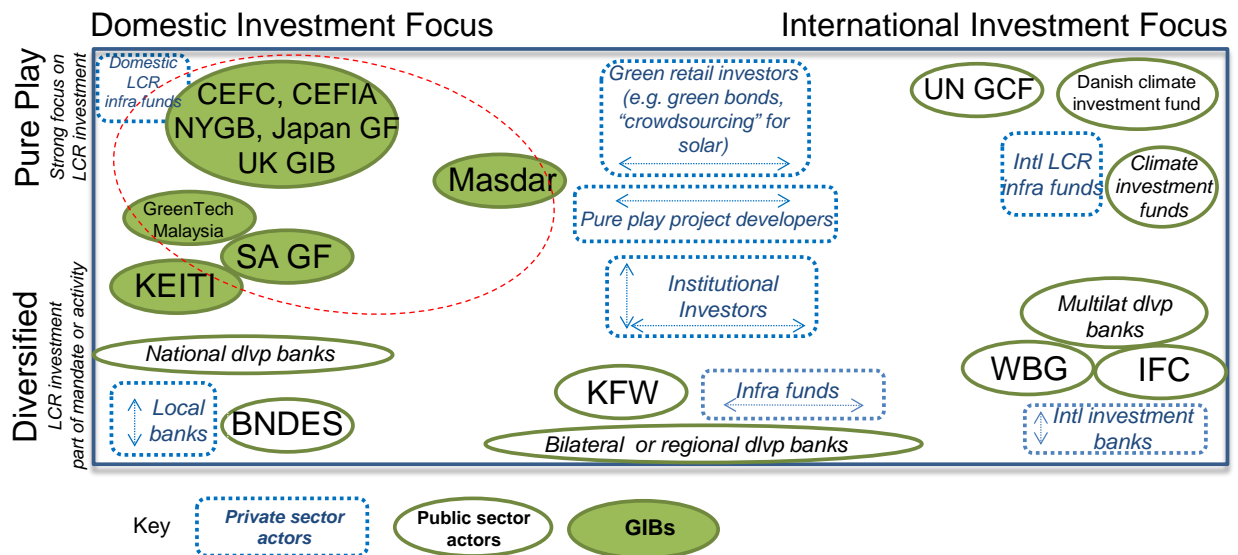
Table 1: Green investment banks in operation or under consideration

Operational GIBs and GIB-like entities	GIBs and GIB-like entities under consideration**
Clean Energy Finance and Investment Authority (CEFIA) (Connecticut, United States) [2011]	California Green Bank Initiative (United States)
Clean Energy Finance Corporation (Australia) [2012]	Green Energy Market Securitisation (GEMS) (Hawaii, United States)
Green Fund (Japan) [2013]	New Jersey Resilience Bank (United States)
Green Fund (South Africa) [2012]	US Federal Green Bank (United States)
Green Investment Bank (UK GIB) (United Kingdom) [2012]	
Korea Environmental Industry & Technology Institute (KEITI) South Korea [2009]	
Malaysian Green Technology Corporation (GreenTech Malaysia) (Malaysia) [2010]	
Masdar (United Arab Emirates) [2006]	
NY Green Bank (New York, United States) [2014]	
Vermont Sustainable Energy Loan Fund (United States) [2013]	

**“GIB-like entities” refers to organisations that may display some core characteristics of operational GIBs, particularly that of leveraging private finance for LCR, but may also pursue other activities that are outside the scope of a typical GIB.

***The level of development of prospective GIBs varies widely. GIBs are considered to be “under consideration” when there are active legislative efforts to establish a green bank. Early stage developments, such a proposal to study the possibility of developing a GIB are not reflected in this table. For example, recent efforts in Maryland to develop the Maryland Clean Energy Financing and Risk Management Program which will then study the possibility of establishing a GIB are not included. Based on information from NY Green Bank, other countries that may be pursuing a “Green Bank-like” model include Bangladesh, Canada (Clean Energy Fund), Ecuador, Indonesia, Trinidad and Singapore. See Annex Table 1 for further details on the status of GIBs under consideration.

Figure 1. Green investment bank universe and relation with other existing public and private entities that finance LCRII



NB: The chart 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 cooperation but simply demonstrates the similar domains where public and private entities may pursue LCRII.

Rationales, Philosophies, Business Models and Roles of GIBs

10. Governments' rationales and motivations for creating GIBs vary, and include differing views on the obstacles to and need for scaled-up private finance and investment in LCR infrastructure (see Box 3). In some cases, policymakers have also cited factors such as local and regional development, global competitiveness, energy security, infrastructural resilience⁹, and job creation as important rationales for establishing a GIB.¹⁰

Box 3. Barriers to scaling up LCRII

A range of barriers can impact on the risk-return profile of green infrastructure and can determine whether the financial asset class is attractive or accessible to investors at all.

Barriers to scaling up LCRII include but are not limited to the following:

1. *Environmental, energy and climate policies and regulations that favour investment in "brown" infrastructure over green infrastructure*
Misaligned policy signals such as continuing support for fossil-fuel use and production, low or no prices on GHG emissions, and unpredictable changes to support policies for renewable energy generation can limit the attractiveness of green infrastructure for investors.
2. *Regulatory policies with unintended consequences*
Financial regulations agreed at international level to increase banks' levels of capital and reduce their exposure to long-term debts (Basel III for banks around the globe, and Solvency II for insurance companies in Europe) can discourage long-term investments, including green infrastructure investments. Investment restrictions established by pension regulatory and supervisory authorities may discourage institutional investors from investing in infrastructure and other "illiquid" asset classes, with the aim of ensuring their financial solvency. In addition, "unbundling" regulations aimed at gas and electricity markets prevent investors from owning a controlling stake in both transmission and generation, including renewable energy. Many investors that would consider direct investments in generation already have transmission assets in their portfolios, and therefore may not be able to invest in generation.
3. *A lack of suitable financial vehicles with attributes sought by institutional investors*
There is a lack of financial vehicles that 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 institutional 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 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 (REITs) in which institutional investors commonly invest, green infrastructure and infrastructure investment performance data are generally not collected systematically.

Source: OECD (2013)

11. A number of studies on GIBs have characterised these institutions as a bridge between clean energy markets that are fully supported by grants and those that are fully supported by private capital

⁹ For example, the New Jersey Energy Resilience Bank was created to improve responses to natural disasters and extreme weather events through improved energy infrastructure resilience (New Jersey Department of Community Affairs, 2013).

¹⁰ Annex Table 2 highlights the diversity of the missions and longer term objectives of these institutions.

sources (Coalition for Green Capital (CGC), Brookings Institution (2013), Kennan (2014)). In this role, GIBs help private capital markets get more comfortable with lending in clean energy markets, lower the cost of lending, and start to rein in public expenditure to support clean energy deployment. Furthermore, GIBs are depicted as temporary entities that, in theory, will no longer be necessary when private markets are fully functional and capital market failures are resolved. Kennan (2013) argues that GIBs can address gaps in the “finance supply chain” that the private sector cannot easily address on its own. They do not face some of the temporal and financial constraints that may limit private sector investment choices. For example, GIBs have greater flexibility to explore and test untried financing structures than do private investors. Similarly, they can arrange deals whose benefits accrue more to its partners than itself.

12. The stated goals of established GIBs include substantially increasing the amount of private capital leveraged by public investment, promoting greater market self-sufficiency for green investment, and lowering the costs of capital for green investment, although some GIBs have different philosophies with respect to the cost of capital. For example, NY Green Bank seeks to reduce overall capital costs by addressing informational gaps, improving standardisation and increasing market confidence (Booz & Co, 2013). Malaysia’s GIB’s financing scheme pays 2% of the interest for qualifying, privately approved loans. In contrast, the UK GIB focuses on demonstrating to investors that LCR investment opportunities can be profitable today, and that it is possible to provide market-rate financing for LCRII and for these projects to deliver commercially attractive returns. Rather than providing de-risking tools or concessional financing, it focuses on sectors where its added “capital, knowledge and reputation can make the difference that enables a project to be financed successfully” (UK GIB, 2013f). While this may not solve all market “gaps”, the UK GIB believes that its approach will help keep private capital in the market after public financing or other support is removed (UK GIB, 2013c).

13. Another objective of UK GIB’s investment strategy, particularly relevant in the case of wind power investments and other large-scale power projects, is facilitating “capital recycling” (Cochran et al., 2014 (forthcoming)). The UK GIB has noted that providers of long-term capital such as institutional investors could be providing financing at the operational stage of renewable energy projects, which deliver consistent, long-term returns.¹¹ Rather than “pushing” more financing into the construction phase, the UK GIB works to “pull” more capital through the pipeline by fostering the refinancing of projects during the operational stage by institutional investors, which can provide long-term debt (UK GIB, 2013d). During the operational stage, the majority of project-based risks have been resolved and projects typically produce consistent returns. As this point in the project cycle, different classes of institutional investors are better able to meet their risk-return and liquidity expectations. Connecticut’s green bank has used a similar approach by establishing a USD 40 million facility for construction phase lending and loan aggregation for commercial and industrial energy efficiency and renewable energy investments which are sold off to institutional investors (first portfolio sale to close on 6 May 2014). By providing refinancing at the operational stage, institutional investors provide project developers and other early-stage investors an “exit strategy”, allowing them to free up capital to invest in new projects – i.e. to “recycle” their capital.

14. For practical and strategic purposes some GIBs strongly focus on project replicability when making funding decisions. NY Green Bank notes that it will not pursue “one-off” opportunities and that the ability to replicate and scale up investments is a critical consideration (NY Green Bank, n.d.), as NY Green Bank is mandated to support projects that will help transform the clean energy financing market. As such, any financing arrangements entered into by NY Green Bank will have to demonstrate their ability to be

¹¹ Green investments that face financing challenges are shown in Figure 1 in the Annex. The UK GIB has targeted investments in industries such as offshore wind which are in the early stages of commercialisation and can face a “valley of death” that limits scale-up (see Glossary).

easily replicated and to achieve widespread deployment on a short term basis. South Africa's Green Fund similarly emphasises the replicability of projects as a necessary criterion for approval.

15. Although some institutions provide concessional financing, GIBs often focus on maintaining financial sustainability and profitability as a key element of their business model. The UK GIB is declared to be “unashamedly and unambiguously a for-profit bank” (UK GIB, 2013a). The UK GIB is motivated by a “double bottom line” in which its green impact and financial results are considered equally important performance indicators. Australia's CEFC is strongly committed to investing on commercial terms and achieving financial self-sustainability. At the same time, it can offer concessional financing, subject to a cap of AUD 300 million per year (CEFC, 2013), and notes that profit maximisation is not a critical goal (CEFC, 2013: 13).¹² Investments by Connecticut's green bank are generally market-based but where it is required by statute to promote or support a particular technology, such as combined heat and power (CHP) or anaerobic digestion, it has provided concessional financing (which ultimately can be recycled) as an alternative to outright grants. These and other decisions by GIBs to emphasise market-based interventions rather than grants or concessional financing can be understood as coming in response to or anticipation of political pressure to make policy support more fiscally sustainable. Nevertheless, not all GIBs put an emphasis on financial returns. For example, Malaysia's GIB does not have a mechanism to generate returns as it provides only loan guarantees and subsidised loans. In addition to concessional loan financing, South Africa's Green Fund provides significant non-recoverable grant funding.

16. One other aspect of a green bank's business model that is frequently discussed in the US context is process standardisation, contract standardisation and data collection. The Coalition for Green Capital and NY Green Bank argue for a need for more standardised loan underwriting processes, contracts and data collection on loan and project performance, which would make it much easier and cheaper for securitisation to occur, for private banks to underwrite and for credit agencies to rate a securitisation.¹³ They share the view of many climate finance practitioners that securitisation is critical for transitioning to a clean energy market that is fully supported by private sector investment.

¹² By taking on projects that may be small yet complex (such as community wind farms), Australia's CEFC recognises that extra time and resources will likely be needed. Australia's green bank considers these transactions to create valuable public policy benefits which can lower the level of acceptable financial return (CEFC, 2013:13).

¹³ See Kaminker et al. (2013) for further discussion of the role of securitisation in financing LCRII and a case study on CRC Breeze Bonds, a securitised wind project offering.

Target Sectors

17. To date, GIBs have focused primarily on clean energy and energy efficiency. However, South Africa's Green Fund also has the mandate to support ecosystem adaptation to climate change, and Malaysia's GIB is allowed to support activities across the energy, water and waste treatment, building and transport sectors.¹⁴ Table 2 shows target sectors for operational GIBs.

Table 2: Target sectors for operational GIBs

Entity	Target Sectors [allocations if available]
Clean Energy Finance Corporation (CEFC) Australia	-Renew able energy (w ind, solar PV, thermal and CSP, biomass, geothermal, tidal and other renew able energy) [50%] -Low emissions* and energy efficiency [50%]
Clean Energy Finance and Investment Authority (CEFIA) Connecticut, United States	-Clean energy (i.e. renew able energy, energy efficiency, and alternative fuel vehicle infrastructure)
Green Fund Japan	-Low -carbon projects (e.g. w ind, solar, small-scale hydro, biomass)
Green Fund South Africa	-Green cities and tow ns (sustainable transport, w aste and w ater management, renew able energy, energy efficiency) -Low carbon economy (renew able energy, energy efficiency) -Environmental and natural resource management (ecosystem services, sustainable agriculture, rural adaptation models)
Green Investment Bank (UK GIB) United Kingdom	Priority sectors: [80%] -Offshore w ind -Waste recycling & bioenergy -Energy efficiency Other sectors:[20%] -Biofuels for transport, biomass pow er, carbon capture and storage, marine energy, renew able heat
Korea Environmental Industry & Technology Institute (KEITI) South Korea	-Environmental industry development -Recycling industry -Environmental improvement (pollution prevention)
Malaysian Green Technology Corporation (GreenTech Malaysia) Malaysia	-Energy (renew able energy) -Water and w aste management -Building (energy and w ater efficiency, indoor air quality) -Transport (electric vehicles, biofuels)
Masdar Capital UAE	-Clean energy -Energy efficiency -Carbon capture and storage
NY Green Bank New York, United States	-Energy efficiency -Renew able energy -Other clean technologies
Vermont Sustainable Energy Loan Fund Vermont, United States	-Renew able energy -Energy efficiency

*CEFC will consider on a case-by-case basis the funding of "low emissions technologies" which may include energy production and electricity generation using non-renewable fuels in cases where the investment will substantially lower current CO2 emissions levels (CEFC, 2014).

¹⁴ Proposed GIBs currently under consideration would also address new sectors. For example, a proposed GIB in New Jersey would focus on projects that address both climate resilience and clean energy (Friedrich, 2014).

18. Clean energy is a core focus for most GIBs. Although many GIBs have a mandate to support renewable energy broadly, most investment to date has occurred in onshore wind and solar PV.¹⁵ The UK GIB is unique in assigning the majority of its portfolio to designated renewable technologies (offshore wind and waste-to-energy).

19. Energy efficiency is a second major focus area. Australia's CEFC provides financing for a range of energy efficiency programs, including corporate finance for large energy efficiency projects and on-bill financing for consumers. On-bill finance is a commonly employed tool for energy efficiency financing (see Glossary). Connecticut's green bank is also very active in promoting energy efficiency. The UK GIB funds energy efficiency indirectly as it provides debt finance support for the UK's flagship energy efficiency program.¹⁶

20. Within their target sectors, GIBs vary in the way they approach technological risk and types of technologies they prefer to target. Most GIBs seek to invest exclusively in proven technologies. For example, NY Green Bank emphasises that it is "technology risk averse" and will only deploy "commercially proven technologies" (NY Green Bank, n.d.). Australia's CEFC highlights that other government agencies are better placed to support early development and explicitly avoids investment in "early stage or speculative technologies" as it considers such investment incompatible with its risk profile (CEFC, n.d.).¹⁷ Connecticut's CEFIA underscores that the mission of GIBs is not to support early stage technologies, venture capital investments, or R&D type investing. South Africa's Green Fund, in contrast, will fund new technologies and supports technological development including research.

¹⁵ For Australia's CEFC, the portfolio distribution by technology is dominated by wind (29%) and solar PV (19.4%) with other renewables such as solar thermal (7.5%) and bioenergy (2%) playing a smaller role (CEFC, 2013: 61). Solar PV programs have been a core focus for Connecticut's green bank.

¹⁶ The Green Deal is a UK government financing mechanism to provide homeowners and small business with long term finance for energy efficiency improvement projects. The UK GIB provides debt financing for the Green Deal Finance Company, which then provides financing to Green Deal Providers which offer loans to consumers and business owners.

¹⁷ Australia's CEFC works with the Australian Renewable Energy Agency (ARENA), which supports technologies from early-stage research through to commercialisation by supporting the research, development and demonstration stages (Gray, 2013).

Administrative configurations, leadership and reporting

21. Green investment banks are diverse and have distinct models and organisational histories, but a number of GIBs have emerged as part of a consolidation of existing clean energy or green investment programmes. For example, Connecticut's green bank was established as a new administrative entity by transferring the net assets and funding sources of the Connecticut Clean Energy Fund. Australia's CEFC incorporated an existing national energy efficiency fund into its structure. Proposed GIBs such as the California Green Infrastructure Bank and Vermont Clean Energy Loan Fund seek to consolidate existing clean energy programs into their mandate (Kennan, 2014).¹⁸ In contrast, South Africa's green bank was created as a new stand-alone entity.

22. Most GIBs are led by a CEO or president who typically has significant financial market experience. Traditional elements of corporate governance such as a governing board of directors and board sub-committees are common among GIBs. Although many GIBs grew out of existing funds or programmes, new boards have been created to reflect the mission of these new institutions. Operational GIBs such as the UK GIB and Australia's CEFC publish annual reports and reviews that are publically available online. Some institutions, such as Connecticut's CEFA, also commission independent outside reviews and audits of their operations.

Capitalisation and Funding

23. Green investment banks can be capitalised directly by governments. For example, Australia's CEFC receives transfers from the Treasury, and Masdar Capital was capitalised directly by the Abu Dhabi Government through Mubadala Development Company, a sovereign wealth fund. However, many other alternative sources of government funding have been used, or have been proposed as sources of GIB funding.

24. The diverse sources of initial capitalisation and additional funding for GIBs include the following:

Sources used to date

- *Asset sales:* Two-thirds of the UK GIB's initial capitalisation came from the sale of assets by the government. For example, the sale of a concession to run High Speed 1, a high-speed railway, contributed GBP 775 million to the UK GIB (UK House of Commons, 2011).
- *Emissions trading schemes:* New York's Green Bank sourced USD 52.9 million from emissions allowance auction proceeds under the Regional Greenhouse Gas Initiative (RGGI) (State of New York, 2013). RGGI also provides USD 5-10 million annually for Connecticut's green bank. Similarly, auction proceeds from California's Cap-and-Trade Program are a proposed source of capital for the California Green Infrastructure Bank.
- *Utility bill surcharges:* The State of New York imposes a System Benefits Charge on all utility customers. A portion of these funds was used to provide initial capitalisation for NY Green Bank. Connecticut levies a USD 0.001 per kWh surcharge on electric ratepayer bills that provides about USD 30 million annually for the Connecticut's CEFA.

- *Loans:* Most GIBs do not have the ability to borrow. However, for the UK GIB, a loan of up to GBP 500 million is available from the UK Government's National Loan Fund. Connecticut's green bank makes frequent use of majority or wholly-owned special purpose entities (SPEs) to leverage its own capital and to date has raised USD 55 million in non-recourse financing using this technique, pledging the cash flows from residential and commercial-scale loans, leases and power purchase agreements for solar PV in support of these financings.
- *Renewable Portfolio Standards or Energy Efficiency Resource Standards:* Renewable Portfolio Standards (RPS) or Renewable Electricity Standards (RES) are policies that require electricity supply companies to produce a designated percentage of electricity from renewable sources. Energy Efficiency Resource Standards (EERS) often accompany RPS or are designed to complement renewable energy policies. EERS set targets for energy efficiency savings that utilities must meet. Non-compliance with these standards can trigger penalties, or "alternative compliance payments," which generate government revenues. NY Green Bank used revenue from RPS and EERS to fund their initial capitalisation (State of New York, 2013).

Potential sources

- *Bond issuance:* The funding source with perhaps the greatest potential is bond issuance. For example, the UK GIB is interested in issuing bonds as a source for continued fundraising. However, under the terms of its establishment, it is not permitted to borrow (including by issuing bonds) until 2015-16 and only when the percentage of government debt to GDP begins to fall (UK House of Commons, 2011). As there are doubts that the UK GIB will be able to borrow as originally planned (starting in 2015), the UK GIB has started to push for these requirements to be adjusted to allow for borrowing (UK Government, 2014). Connecticut's CEFIA has authority to issue USD 50 million in bonds backed by a "special capital reserve fund" which effectively guarantees that the state of Connecticut will pay out bond returns and repay bond principle if the Connecticut green bank cannot do so.¹⁹ Proponents of a national GIB in the United States have suggested using a US Treasury green bond issuance as the capitalisation mechanism (Coalition for Green Capital, 2013b). In addition, the proposed Hawaiian GIB (Green Energy Market Securitisation Program) has legislative approval to issue up to USD 100 million in bonds to fully fund their initial capitalisation. Hawaii's bond will be repaid using funds from an existing consumer surcharge on electrical bills (Hawaii Clean Energy Initiative, 2013).
- *Central banks:* Central banks have the potential to provide GIB funding through their purchase of GIB-issued green bonds. Some central banks have already shown interest in international green bond issuances. For example, the Brazilian and German central banks invested in the International Finance Corporation's USD 1 billion green bond issuance in 2013 (World Bank, 2014). Although the IFC is not a green investment bank as such, these investments illustrate the potential for GIB bonds to be purchased by central banks. The governor of the Bank of England (BoE) has proposed "green quantitative easing" in which the BoE would purchase bonds from entities that support LCRII such as the UK GIB (Clark and Giles, 2014).
- *Federal grants or programmes:* Sub-national GIBs may seek to obtain funding from federal sources. For example, New Jersey's proposed energy resilience bank seeks to draw upon initial

¹⁹ No bonds have been issued to date.

funding from the United States Department of Housing and Urban Development (Friedrich, 2014).²⁰

- *Sale of equity stake:* Although no GIB has sold equity in its own institution to date, a sale of an equity stake potentially can serve as a source of funding. The UK GIB has already been approached by sovereign wealth funds interested in buying equity in the institution (Jeff, 2014).

25. In a GIB's initial years, the level of funding depends significantly on the size of the initial capitalisation and the timing of future re-capitalisations. Some entities receive a large initial capitalisation. For example, the UK GIB was initially capitalised with GBP 3 billion and given a multi-year mandate for investment, providing a significant budget to start pursuing large transactions immediately.²¹ Other GIBs have ambitious goals for their future budgets, but start off with more conservative initial capitalisations which require future funding rounds to grow to desired levels.²² If a GIB depends on annual budget negotiations through national or sub-national political structures, it could be vulnerable to budget cuts. Connecticut's CEFIA recently faced a potential budget challenge as the state legislature proposed a significant reallocation of GIB funds (USD 25 million) to the state's general fund (State of Connecticut, 2013). While CEFIA was able to avoid this fund diversion by offsetting funds transferred with USD 25 million of additional allowance revenues from RGGI auction proceeds, this example shows the potential risks of funding GIBs through yearly budgets instead of a longer-term funding period.

Instruments, Vehicles, Techniques, Tools and Interventions

26. Depending on the type of private investment that they seek to mobilise and their operational philosophy, GIBs use diverse combinations of instruments, vehicles, techniques, tools and interventions to enhance LCRII.

27. *Instruments & Vehicles*

Investment instruments and vehicles used by GIBs include the following:

- *Loans:* Loan finance may be provided for projects or companies and can include both senior and junior debt. With the exception of Masdar and the Japanese Green Fund, loan finance is provided by every operational GIB.
- *Equity:* Similar to loan financing, equity investment can be provided by GIBs to both projects and companies. In order to mobilise investment by private investors, GIBs generally do not take majority investment stakes. The UK GIB, Japanese Green Fund and Masdar have undertaken equity investments.

²⁰ The state of New Jersey will receive USD 1.46 billion in federal funds as part of a superstorm Sandy recovery package. The proposal to allocate USD 210 million for a New Jersey Energy Resilience Bank has been proposed as an amendment to the second funding allocation but has not yet been formally approved (State of New Jersey, 2014).

²¹ The UK GIB has since received an additional GBP 800 million in funding, bringing total capitalisation to GBP 3.8 billion (UK Department for Business Innovation, 2013). While this is a significant level of funding, it is still below initial proposals which sought a capitalisation of GBP 4 – 6 billion (Ernst & Young, 2010).

²² NY Green Bank expects to have USD 1 billion available for financing; the initial capitalisation accounts for around a fifth of this amount (Klopott, 2013).

- *Mezzanine capital:* Mezzanine capital is a type of hybrid financing that begins as debt and gives the lender the right to convert to an ownership or equity interest in the company if the loan is not paid back in time or in full. Some GIBs such as those in Australia, the UK and New York specifically mention mezzanine capital as a potential and permitted investment instrument. The Japanese Green Fund has also undertaken mezzanine capital investments.
- *Investment funds:* GIBs can set up their own debt or equity investment funds or invest in existing funds. Masdar Capital, a division of Masdar, has created their own investment funds that have attracted private investors as limited partners.²³ UK GIB has invested in existing green or clean energy funds.
- *Bonds:* In addition to using bond issuances as a tool for initial capitalisation, the UK GIB has expressed interest in issuing bonds to refinance its investments in green infrastructure and other green investments. As noted in paragraph 14, Connecticut’s green bank securitised its commercial and industrial energy efficiency and renewable energy loans (secured by a lien on the benefitted property as explained later in this note, also see Glossary), resulting in a sale of senior bonds to an institutional investor with the GIB retaining the junior bonds.
- *Grants:* Some GIBs such as the South Africa Green Fund provide grant funding. The Green Fund divides grants into recoverable and non-recoverable categories. A recoverable grant may require partial or complete repayment if the funded project is ultimately successful (Green Fund, 2013b).

28. *Techniques*

Structuring and product design techniques used by GIBs include the following:

- *Warehousing:* Aggregation techniques such as loan warehousing or bundling can be useful to reduce transaction costs and facilitate investment in bundled small-scale projects, thereby helping to get them to a commercial scale. For example, in addition to bundling and securitising commercial and industrial loans as noted previously, Connecticut’s green bank has bundled solar leases from a large number of small projects to attract private companies and new investors.²⁴ Aggregation techniques to bundle small-scale projects could be instrumental to increase the size of invested projects to a commercially attractive scale.
- *Securitisation:* By warehousing or aggregating smaller transactions, GIBs can take a pool of loans or leases (such as energy efficiency loans or solar leases) and securitise it by issuing bonds to be repaid from the proceeds of the loan pool, or by providing bond-like returns or dividends on capital investments in the securitised pool of loans. For example, NY Green Bank is interested in purchasing loans that conform to specific green standards. Once its pool of purchased loans

²³ Masdar Clean Tech Fund was launched in 2006 and is co-managed by Masdar Capital, Consensus Business Group and Credit Suisse (Masdar, 2012b). This USD 250 million venture capital fund invests in early-stage clean technologies. Masdar’s second fund (USD 290 million), DB Masdar Clean Technology Fund, was developed in conjunction with Deutsche Bank and invests in clean energy, environmental resources, and energy and material efficiency (Masdar, 2012a).

²⁴ Through the Solar Lease II program, Connecticut’s green bank aggregated solar leases. A private insurance company was attracted by the scale provided by the program and has created a new product to provide insurance and warranties for solar leases. In addition, new sources of non-bank investment have been attracted by the aggregated pool of residential solar loans. Mosaic, a solar finance “crowdsourcing” company will provide USD 5 million in “crowdsourced” loans (Business Wire, 2014).

reaches a threshold of USD 25-100 million depending on the assets, NY Green Bank proposes securitisation (Booz & Co, 2013).

- *On-bill financing:* Australia's CEFC partnered with an Australian energy retailer to provide on-bill financing for businesses that undertake energy efficiency upgrades or install solar PV panels. Financing is available for up to seven years for projects between AUD 50,000 and 1 million. On-bill financing is the core focus of Hawaii's proposed GIB (Strand and Seligman, 2013). Connecticut's CEFIA is developing an "open source" on-bill *repayment* program whereby a diverse group of lenders and capital providers (such as banks, credit unions and solar leasing companies) can provide financing for solar PV loans and leases, and will be able to collect loan and lease payments through a charge on the utility bill.
- *Financing through tax payments:* The Commercial Property Assessed Clean Energy (C-PACE) programme supported by Connecticut's green bank provides upfront financing for energy efficiency and clean energy upgrades that are repaid through property taxes over time.²⁵ Australia's CEFC uses a similar technique in their Environmental Upgrade Agreements by funding building energy efficiency improvements that are repaid through a local council charge on the land.
- *Leasing:* Leasing can provide an attractive alternative to purchasing certain renewable technologies for residential and commercial use. By promoting leasing as an alternative to purchasing for residential solar PV and solar hot water installations, Connecticut has lowered the upfront costs and made it easier for residents to experiment with renewable energy. Australia's CEFC has a leasing program that encourages small business owners to lease energy efficient technologies such as LED lighting.

29. *Tools and interventions*

Credit enhancements are a tool to reduce the risk to an investor that a project or another investment will not deliver its expected level of return, and can take the form of loan loss reserve funds or loan guarantees. Examples of the credit enhancement tools and interventions provided by GIBs include the following:

- *Loan loss reserve funds:* Loan loss reserves set aside capital to cover potential losses and help to reduce repayment risk. If a borrower (such as a purchaser of a solar PV installation) defaults, the lender (such as an institutional investor) is repaid using the reserve fund. Green investment banks may provide a percentage of loan loss coverage for lenders. As part of their Smart-E Loan program, Connecticut's GIB offers distinct residential energy efficiency and renewable energy financing products with corresponding loan loss reserve levels. Every time a lender underwrites a loan, Connecticut's green bank reserves a percentage of the loan principal (between 7.5-15%) for the lender in the event of a default (Energize CT, 2013). In the Connecticut model, to promote sound lending practices and share risks, the lender assumes the "first loss" (1.5%) on its portfolio before access is permitted to the reserve.

²⁵ By using a tax lien, C-PACE provides a long term and secure product for private investors as these loans are repaid in a steady stream alongside tax payments. Repayment obligations are also transferred to the next owner if the property is sold. As referenced in the note, Connecticut's green bank is currently in the process of selling these loans to private capital providers, providing them with stable returns and freeing up capital for Connecticut's GIB to make additional loans.

- *Guarantees:* By providing a loan guarantee, a guarantor (such as a GIB), agrees to pay a lender a portion of the loan if a borrower cannot repay. For example, GreenTech Malaysia provides guarantees to tap private banks to finance green projects. Its Green Technology Financing Scheme (GTFS) assesses applications for “green project certificates” and provides certificates to eligible companies. These certified companies can then seek loans from participating private lenders. In order to improve lending approval rates and reduce risk, GTFS guarantees repayment of 60% of the financing provided by private lenders to certified companies in the event of loan default.

Green Investment Banks and Institutional Investors

30. Institutional investors are an important potential source of alternative capital for domestic LCR investment. In OECD countries alone, these investors manage USD 83 trillion of assets (Kaminker et al., 2013).²⁶ They often seek long-term and low-risk investments, and also allocate significant amounts of capital domestically. Creating attractive opportunities for institutional investors to collaborate with the public sector to finance LCR infrastructure is therefore essential to scaling up LCR II.

31. Green investment banks are looking to engage institutional investors as the deepest and most accessible pool of global capital for capital-intensive projects in varying degrees. Their interest in engaging institutional investors is sometimes explicitly referenced²⁷ and other times implied²⁸. GIBs have engaged with institutional investors through taking cornerstone stakes in funds or vehicles that attract pension and insurance capital (e.g. the UK GIB in the Greencoat UK Wind deal in Box 4), providing debt (e.g. the UK GIB participated in a loan consortium to refinance a stake in the Walney Offshore wind farm owned by Ampere Equity Fund and Dutch pension fund PGGM), and issuing green bonds or designing products that have stable long-term cash flows that will be attractive to long-term institutional investors (e.g. Connecticut and New York GIBs have designed loan bundling programs to facilitate securitisation or sell-offs to larger investors).

²⁶ Despite their significant size, institutional investors’ asset allocation to direct infrastructure investments in general remains small, less than 1% for OECD pension funds, and the ‘green’ investment component remains even more limited. This investment is constrained for a variety of reasons including regulatory and policy uncertainty, a lack of suitable financing vehicles, investor inexperience with direct investing and with new technologies and asset classes, as well as market and government failures. (See Kaminker et al., 2013.)

²⁷ See for instance the UK Green Investment Bank’s Chairman of the Board Lord Smith of Kelvin’s address to the National Association of Pension Funds (06 Mar 2014) available at: <http://www.greeninvestmentbank.com/media-centre/gib-news/lord-smith-of-kelvin-address-to-the-national-association-of-pension-funds.html>

²⁸ See for instance the Petition of the New York State Energy Research and Development Authority to Provide Initial Capitalization for the New York Green Bank where it is proposed (page 8) that “*the Bank could execute a debt securitization, through which investors interested in holding long term debt, such as pension funds, could invest in longer term securities, while those banks preferring shorter loan terms would be able to exit their investments earlier.*” Available at: <http://documents.dps.ny.gov/>

Box 4. Recent example of a GIB mobilising capital from institutional investors - UK Greencoat IPO

The UK Green Investment Bank (UK GIB) and UK Department for Business, Innovation and Skills (BIS) played two vital but different roles in bringing the recent GBP 260 million Greencoat Wind Fund Initial Public Offering (IPO) to fruition on the London Stock Exchange. BIS invested GBP 50 million as a cornerstone investor which enabled the IPO to occur and provided the necessary confidence to utility SSE and major institutional investors to join the offering.

Greencoat's plan is to invest in proven operating UK wind farms greater than 10 MW in size on an unlevered basis. It expects to provide investors with an initial dividend yield of 6% on investment, which is evidently a sufficient incentive to attract institutional public investors. The fund closed its first acquisitions alongside the IPO, purchasing stakes in four wind farms from SSE in a deal worth about GBP 140 million. The UK GIB matched Greencoat's investment in the Rhys Flats wind farm, buying a 24.95% stake in the project for GBP 57.5 million in the first time it has contributed direct equity to an offshore wind farm.

Given that banks did not want to launch the Greencoat IPO without the UK GIB and BIS signed up as cornerstone investors, the IPO provides an excellent example of a transaction that would not have worked without the involvement of government as an investor. A combination of government (for profit) capital, and the name and reputation of these government entities helped transactions get done.

The IPO was oversubscribed to the extent that it hit the offering's maximum target, up from the anticipated mid-range point of GBP 205 million announced in February. The government backing no doubt helped de-risk the IPO for institutional investors, but the deal also reflects the extent to which there is appetite for the kind of low-risk infrastructure-style investment in operational wind projects that Greencoat aims to execute.

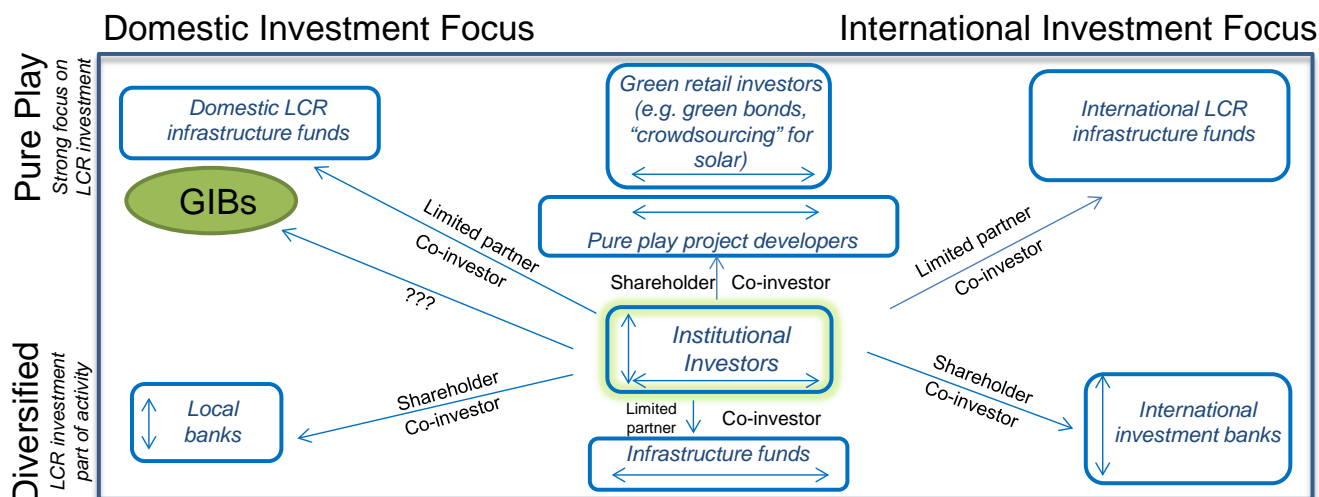
32. In an initial study on the prospect of creating a UK GIB, Ernst & Young (2010) emphasised the importance of creating investment opportunities attractive to institutional investors as well as actively interacting with these investors during the design phase of the institution. It was recommended that the UK GIB “act as a bridge between institutional capital and ultimate investments” and “should be strategically structured to appeal to the widest and deepest sources of capital as possible” (Ernst & Young, 2010)

33. Australia's CEFC has a project in their pipeline to develop a listed vehicle to enable pension funds and retail investors to invest in renewable energy projects (CEFC, 2013). Similarly, the UK GIB is considering the creation of a fund that would invest in multiple projects. The fund is designed to appeal to institutional investors that may seek exposure to assets such as offshore wind but would be unlikely to risk investing in a single project (Shankleman, 2014).

34. Figure 2 highlights the role of institutional investors and their current and potential interactions with private and public financing entities that pursue LCRII. In addition to investing alongside public sector actors such as GIBs, institutional investors interact with a variety of private finance providers. For example, institutional investors can engage with infrastructure funds by providing capital as limited partners (LPs) which the fund then invests, or as co-investors for debt or equity transactions in which they can benefit from the fund's or project developer's clean energy expertise. They may also participate in clean infrastructure deals by acquiring a financial stake in a project after a developer or infrastructure fund builds and continues to operate and maintain the project. Interaction with project developers can take the form of company shareholding or as a project-level co-investment with a developer. In addition to being

large shareholders in domestic and international banks, institutional investors may pursue debt or equity co-investment in LCR deals with local and international financial institutions.

Figure 2: Institutional investor interactions with private LCR/II finance providers



Domestic Policy Context and Green Investment Banks

35. As suggested by the range of activities, structures, philosophies and sectoral focuses of green investment banks, governments are using GIBs in a number of different ways. This reflects the different domestic policy contexts of the various OECD and developing and emerging economies and sub-national jurisdictions in which GIBs have been established or are being planned. As GIBs have only been operational for two years at most, experience is relatively limited. Given the diversity of GIBs and their short track record, the stocktaking of GIBs and GIB activities described in this note is intended to provide a starting point for discussions at the OECD Green Investment Financing Forum on June 12-13, 2014, rather than an attempt to identify elements of good practice, which at this stage might be premature.

36. Based on OECD’s work on domestic policy frameworks to support green investment (Corfee-Morlot, the elements of good practice are likely to be similar across institutions and countries, but there is no one-size-fits-all approach. Country contexts do matter.

37. Green investment banks are each situated within a domestic ecosystem of institutions, financial and climate regulations and capacities that is specific to their country. Governments that seek to establish a GIB will tailor their choices regarding institutional design, governance structure, mandates and dedicated instruments for green banks based on the institutional setting, strategic priorities and needs of different sectors and actors within unique national contexts. Indeed, the creation of a GIB may not be appropriate in all contexts, as other public finance institutions or GIB-like institutions may already be serving the same functions as a GIB, as discussed below.

38. Prior to deciding to create a GIB, it will be important for governments to assess existing and missing interactions of environment and investment policies – including enabling policies and direct financial tools and instruments. Aligned policies will be critical for incentivising and driving LCR/II. The decision to establish a GIB, and the tools and instruments to be used by a GIB will depend upon a complex set of factors including:

- **The climate and investment domestic policy framework.** Without effective domestic policies providing coherent and consistent signals to investors to incentivise domestic investments in green infrastructure and provide predictability, institutions like GIBs will not maximise their potential for mobilising private climate finance and investment. The OECD has developed a five-point policy framework that aims to integrate climate and investment policy to align incentives and establish strong enabling conditions for green investment in domestic context: 1. Set clear, long-term strategic policy goals, in infrastructure planning and climate policies; 2. Implement policies and incentives to support low-carbon, climate-resilient investment, for instance by putting a price on carbon, and removing fossil fuel subsidies; 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 and 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 (see Corfee-Morlot et al., 2012).²⁹
- **The existence of domestic public finance institutions (PFIs).** These institutions 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. They 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 (e.g. KfW) already have an explicit mandate and authority to invest in green infrastructure – often with established guidelines on which technologies or markets to address (see Cochran et al., 2014 (forthcoming)). “Greening” existing PFIs, where there is the necessary institutional and political support, might be preferable to creating new institutions.
- **Sectoral specificities.** Institutional designs and instruments will also need to be assessed against the targeted sector. For example, although domestic policies to promote clean energy infrastructure have greatly expanded throughout the world³⁰, policies in a number of related areas can create significant barriers to the effectiveness of these policies and potentially to the efforts of a GIB. To identify and address potential roadblocks to mobilising private investment in clean energy infrastructure in emerging and developing economies, the OECD’s *Policy Guidance for Investment in Clean Energy Infrastructure* 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).

²⁹ The OECD first discussed recommendations on green investment banks in this report and stated that “*as investment and environmental policies become more stable and well integrated, and as markets for new green technologies mature, the targets for such transitional support [through public finance mechanisms] will need to continue to shift over time to ensure it is well targeted to technologies that are not yet fully competitive and to avoid ongoing, inefficient subsidies. Thus sunset clauses and careful monitoring and evaluation practices are essential to guide decisions on how to allocate and prioritise limited public support that might be available through green banking channels (de Serres et al., 2011; Kalamova et al., 2010)*”.

³⁰ IRENA estimates that tax reductions (84 countries), feed-in tariffs/premiums (71 countries), and auctions/tenders (45 countries) are the most prevalent renewable energy deployment policies (IRENA, 2013).

- **Targeted investors.** As demonstrated by the UK GIB's role in the successful Greencoat Wind Fund Initial Public Offering, GIBs can play an important role in facilitating and mobilising LCRII by institutional investors.

39. At the Green Investment Financing Forum (GIFF), participants and panellists will consider these and other issues related to domestic policy frameworks and GIBs in the final panel discussion. This discussion may suggest promising areas for further work as GIBs evolve, and as governments in OECD, developing and emerging economies consider their potential role in facilitating a transition to a low-carbon economy. In particular, insights from discussions at the GIFF will inform the OECD's upcoming work on policy alignment across the whole of government to enable a successful economic transition of all countries to sustainable low-carbon and climate-resilient economies.

40. In the Climate Change Statement³¹ signed by OECD ministers of economy and finance in May 2014, ministers called for the OECD to, inter alia, reinforce existing efforts using research and evidence-based analysis to better align investment and climate policies to support an effective partnership among governments, development partners, and the private sector in order to incentivise private investment in LCR infrastructure; and to examine how to better align policies across different areas including, but not limited to, economic, fiscal, financial, competition, employment, environmental, energy and finally investment, where institutions such as GIBs will play an important role.

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Glossary³²

“Crowding-in”

Occurs when public investment increases the marginal productivity of private capital or labour, or reduces the costs that investing firms incur and induces greater private investment than would have occurred otherwise. “

“Crowding-out”

Occurs when a public intervention directly displaces the efforts of the private sector by undertaking projects the private sector would have otherwise done. Crowding out can also occur indirectly if governments use distortionary taxes to fund public investment.

Crowdsourcing

The process of obtaining ideas, content or funding, usually online, from a large group of people. In the context of this paper crowdsourcing refers to attracting small unaccredited investors to provide funding for clean energy projects.

Green investment bank

Broadly defined as a public entity established specifically to facilitate and “crowd-in” domestic private LCR infrastructure investments (LCRII) through different activities and interventions.

Institutional investor

Institutional investors are usually synonymous with “intermediary investors”, that is to say, an institution that manages and invests other people’s money. The term institutional investor can be used to describe insurance companies, investment funds, pension funds, public pension reserve funds (social security systems), foundations and endowments among others.

Investment bank

An investment bank traditionally facilitates transactions of all types in the wholesale financial markets (transactions conducted by corporations, businesses, institutional investors, and high net worth individuals) including mergers and acquisitions (the purchase and sale of businesses and their assets), capital raising or “underwriting” (of equity, debt, etc.) on behalf of corporations or their shareholders. They may provide ancillary services such as market making, trading of derivatives securities, and other financial instruments, investing and lending, asset management, and FICC services (fixed income instruments, currencies, and commodities). This excludes retail brokerage, retail lending, or any other practice that centres on “unaccredited investors”.

Mezzanine financing

Mezzanine financing is senior to common shares (equity) (i.e. mezzanine investors receive returns from the investment before equity holders) but junior to secured debt or senior debt. Mezzanine financing normally includes subordinated (i.e. junior) debt or preferred equity (i.e. equity shares that provide dividends before common stock dividends are paid out) and is usually more expensive than senior debt. It can be used as the stage of financing that follows venture capital.

On-bill finance (OBF)

OBF allows utility consumers to invest in energy efficiency improvements and repay the funds through additional charges on their utility bill. Under this approach, a third party (such as an energy

³² Disclaimer: Explanations on the terms are very condensed and may not be complete. They are not considered to necessarily reflect official position of the OECD.

provider) provides upfront funding for energy efficiency improvements to an investor (e.g. a tenant in a residential or commercial building). The investor pays back the loan via its energy bill. In many cases, repayments are structured in such a way that the monthly energy savings achieved through the investment equal or outweigh the loan repayments. If structured properly, an OBF program can substantially reduce the cost of and improve access to financing.

Public finance institutions (PFIs)

Publicly created and/or mandated financial institutions that have often been created to correct for the lack of market-based finance through the provision of missing financial services.

Pure play

In financial management, “pure play” entities are focused on only one industry or product.

Private equity fund

A fund which invests its money in asset class consisting of equity securities in operating companies that are not publicly traded on stock exchange, to control the company.

Risk-adjusted return

A concept that refines an investment’s return by measuring how much risk is involved in producing that return, which is generally expressed as a number or rating. Risk-adjusted returns are applied to individual securities and investment funds and portfolios.

Risk-profile

An assessment of the degree to which an investor is prepared to accept losses at the expense of potential gain.

Securitisation

Securitisation is the process of transforming illiquid financial assets into tradable products.

Tax-lien

A legal claim by a government entity against a property if tax debts are unpaid. Tax liens are a last resort to force an individual or business to pay back taxes. Tax liens take precedence over all other liens on a property and (in case of liquidation) must be satisfied first.

Underwriting

In the case of loans, underwriting is the process by which a lender decides whether a potential creditor is creditworthy and should receive a loan. For securities issuances, underwriting is the procedure by which an underwriter, such as in investment bank, brings a new security issue to the investing public in an offering. In such a case, the underwriter will guarantee a certain price for a certain number of securities to the party that is issuing the security (in exchange for a fee). Thus, the issuer is secure that they will raise a certain minimum from the issue, while the underwriter bears the risk of the issue.

“Valley of death”

This term has been used to refer to the situation in which many seemingly promising renewable energy technologies do not progress along the innovation chain towards commercialisation and diffusion (Murphy and Edwards, 2003). The “valley of death” has more recently been described as “the place where a technology is too capital intensive for a venture capital firm to continue investing, but too risky for a project financier to bring it to scale (<http://www.renewableenergyworld.com/rea/blog/post/2010/07/boldly-crossing-the-valley-of-death>). It has also been described as a scenario in which “investment in renewable productive capacity is required well before the energy price is sufficient to cover the full long run cost of that capacity” (<http://www.usaee.org/usaee2014/submissions/ExtendedAbs/IAEEAbstract.doc>).

ANNEX

Annex Table 1: Status of GIBs under consideration³³

GIBs under consideration	Status
California Green Bank (United States)	Proposed. Senator Kevin De León introduced Senate Bill 1121 in February 2014 (Coalition for Green Capital, 2014a).
Green Energy Market Securitisation (GEMS) (Hawaii, United States)	Nearly operational. Senate Bill 1087 signed into law in June 2013 by Governor Neil Abercrombie. Implementation is targeted for 2014 (Hawaii State Energy Office, 2014).
New Jersey Energy Resilience Bank (United States)	Proposed. Funding allocation was proposed by Governor Chris Christie in February 2014 but has not yet been approved (State of New Jersey, 2014).
US Federal Green Bank	Proposed. Congressman Chris Van Hollen introduced the Green Bank Act in April 2014 (Coalition for Green Capital, 2014c).

³³A broad-based coalition has advanced a blueprint for the establishment of a California Green Bank. This coalition includes CalCEF (a California public private venture capital fund), the Coalition for Green Capital, the Natural Resources Defense Council (NDRC) and Environmental Defense Fund (EDF). Similar to the NY Green Bank, the California Green Bank would be capitalized in part by the State's cap-and-trade auction proceeds, be a new quasi-independent division of an existing state entity, and aim at using available public and utility ratepayer dollars to leverage private capital and animate markets. Based on the blueprint, the Bank would provide a single-point-of-contact for private capital providers to engage with California's existing energy and climate financing programs; invest in green infrastructure, projects at the water/energy nexus and clean agriculture strategies, if such investments reduce carbon emissions; and seek to bring the benefits of clean energy to low income communities, and to commercialise promising new technologies.

Annex Table 2: Missions and objectives of operational GIBs and GIB-like entities

Entity	Mission and Objectives
Clean Energy Finance Corporation (CEFC) Australia	<u>Mission</u> : "To accelerate Australia's transformation towards a more competitive economy in a carbon constrained world, by acting as a catalyst to increase investment in emissions reduction" (CEFC, 2013: 6)
Clean Energy Finance and Investment Authority (CEFIA) Connecticut, United States	<u>Mission</u> : "To support the governor's and legislature's energy strategy to achieve cleaner, cheaper and more reliable sources of energy while creating jobs and supporting local economic development" (CEFIA, n.d.)
Green Fund Japan	<u>Mission</u> : To encourage private investment in domestic low-carbon projects which contribute to reducing CO2 emissions (Japanese Ministry of Environment, 2013)
Green Fund South Africa	<u>Mission</u> : "To provide catalytic finance to facilitate investment in green initiatives as a critical resource mechanism to achieve a green economy" (Green Fund, 2013: 7) <u>Long-term Vision</u> : "To support the transitioning of the South African economy to a low carbon, resource efficient and climate resilient growth path" (Green Fund, 2013: 7)
Green Investment Bank (UK GIB) United Kingdom	<u>Mission</u> : "To accelerate the UK's transition to a green economy and to create an enduring Institution, operating independently of Government." (UK GIB, 2013: 8)
Korea Environmental Industry & Technology Institute (KEITI) South Korea	<u>Mission</u> : "To contribute to sustainable development through technology development, industry nurturing and green lifestyle promotion"(KEITI, 2012) <u>Vision</u> : "To be a leading environmental institute with the aim of harmonizing the environment and the economy" (KEITI, 2012)
Masdar Capital* United Arab Emirates	<u>Mission</u> : "To advance renewable energy and sustainable technologies through education; research and development; investment; commercialisation and adaptation." (Masdar, n.d.: 4) <u>Long-term Vision</u> : "To make Abu Dhabi the preeminent source of renewable energy knowledge, development and implementation, as well as the world's benchmark for sustainable development." (Masdar, n.d.: 4)
Malaysian Green Technology Corporation (GreenTech Malaysia) Malaysia	<u>Objective</u> : "To position Malaysia as a global hub for green technology by 2020 and subsequently develop the country into a green nation by 2030." (GreenTech Malaysia, n.d.) <u>Purpose</u> : "To develop and promote green technology as a strategic engine for the nation's socio-economic growth." (GreenTech Malaysia, n.d.)
NY Green Bank New York, United States	<u>Mandate</u> : "To accelerate deployment of clean energy by removing barriers in financing markets. It will not compete with private sector entities but will instead partner with them, nor will its principal role be to provide subsidy. The Bank will focus its activities on clean energy projects that are economically viable but not currently financeable." (Booz & Co, 2013: 5)
Vermont Sustainable Loan Fund Vermont, United States	<u>Purpose</u> : "To make loans and provide other forms of financing for projects that stimulate and encourage development and deployment of sustainable energy projects in the State of Vermont." (Vermont Economic Development Authority, 2013)

*The missions and objectives for Masdar Capital reflect its parent organization Masdar

Annex Figure 1: Many green sector ventures are “hard to fund”

<i>Capital intensity</i>	High	<p>Project Finance/Existing firms</p> <ul style="list-style-type: none"> • Wind farms • Utility-scale solar • First-generation biofuel refineries • Manufacturing of solar cells using established technologies 	<p>Hard to Fund (“Valley of Death”)</p> <ul style="list-style-type: none"> • First commercial plants for unproven technologies • Advanced biofuel refineries • Offshore wind farms • Carbon sequestration 	
	Low	<p>Bank Debt/ Existing firms</p> <ul style="list-style-type: none"> • Wind and solar component of proven technologies • Internal combustion engines • Insulation/building materials • Energy efficiency services 	<p>Venture Capital</p> <ul style="list-style-type: none"> • Energy efficiency software • Lightning • Electric drive trains • Fuel cells / Power storage • Wind and solar components of unproven technologies 	
		Low	<i>Technology risk</i>	High

Source: Ghosh, S. and Nanda R, (2010), “Venture Capital Investment in the Clean Energy Sector.” Harvard Business School Working Paper, 11-020.