

# Green Investment Banks

POLICY PERSPECTIVES



BETTER POLICIES FOR BETTER LIVES

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*Cities around the world face pressing needs for greater investment in infrastructure. Meeting those needs will require new financial tools that cities can use to invest in smart policies, including energy-efficiency measures and renewable-energy initiatives. That's why green investment banks and funds with similar missions are so important, and they will play a critical role in creating the low-carbon cities of the future.*

**Michael R. Bloomberg**, United Nations Secretary-General's Special Envoy for Cities and Climate Change

*To achieve zero net greenhouse emissions globally by the end of this century, governments need to make full use of their capacity to leverage and unlock much larger flows of private investment in low-carbon infrastructure. Public green investment banks can help accelerate the shift to low-carbon investment at the national and sub-national levels.*

**Angel Gurría**, OECD Secretary-General

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**December 2015**

# Green Investment Banks

Leveraging innovative public finance to scale up low-carbon investment

This Policy Perspectives describes the relatively new phenomenon of publicly-capitalised green investment banks and examines why they are being created and how they are mobilising private investment. It draws on the forthcoming OECD report *Green Investment Banks: Scaling up Private Investment in Low-carbon, Climate-resilient Infrastructure*.

## KEY MESSAGES

- Investment is growing in renewable energy and energy efficiency, but not quickly enough to get the world on track to achieve zero net greenhouse gas emissions globally by the end of this century. Mobilising investment from the private sector will be essential to meet climate change goals. Governments can find ways to make efficient use of available public funding to mobilise much larger pools of private capital.
- To leverage the impact of relatively limited public resources, 13 national and sub-national governments have created public green investment banks (GIBs) and GIB-like entities (as of December 2015).
- A GIB is a public entity established specifically to facilitate private investment into domestic low-carbon, climate-resilient (LCR) infrastructure. Using innovative transaction structures, risk-reduction and transaction-enabling techniques, and local and market expertise, GIBs are channelling private investment, including from institutional investors, into low-carbon projects. GIBs are facilitating investment in such areas as commercial and residential energy efficiency retrofits, rooftop solar photovoltaic systems and municipal-level, energy-efficient street lighting.
- Many of the investments GIBs mobilise are undertaken in urban areas where 54% of the world's population lived in 2014 and where 66% is projected to live by 2050.
- GIBs are typically established in countries that do not have national development banks or other entities that are actively promoting private investment in domestic LCR infrastructure. To mobilise more investment, governments can consider establishing a GIB or can "mainstream" green investment objectives in existing national development banks.
- Governments tailor their GIBs based on their unique national and local contexts. GIBs and GIB-like entities have diverse rationales and goals including meeting ambitious emissions targets, supporting local community development, lowering energy costs, developing green technology markets, creating jobs and lowering the cost of capital.
- Using a range of metrics, GIBs are measuring and tracking their performance. These metrics generally focus on emissions saved, job creation, leverage ratios (i.e. private investment mobilised per unit of GIB public spending) and – for those GIBs that are required to be profitable – rate of return.
- The creation of a GIB can send a signal to the marketplace and other countries that a country or region is seeking to become a leader in scaling up private low-carbon investments.

# 1

## The problem: Climate change and the need to shift to low-carbon investment

At COP15 in Copenhagen in 2009, major economies agreed to achieve the peaking of global and national GHG emissions as soon as possible. Nations also recognised that to achieve the ultimate objective of the UNFCCC – to “stabilise greenhouse gas concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system” – we must limit global average temperature rise to below 2 degrees Celsius (2°C) above pre-industrial levels. But even if this objective is achieved, significant risks and costs will be borne by citizens, businesses, investors and governments around the world.

### The opportunity: Clean energy is increasingly cost competitive and energy efficiency retrofits are increasingly attractive

The good news is that electricity generated by renewable energy sources is becoming more cost-competitive every month. The International Energy Agency (IEA) estimates that from 2010 to 2015, average costs for new onshore wind plants fell by 30% and average costs for new utility-scale solar photovoltaic (PV) installations declined by two-thirds (IEA, 2015). As of December 2015, contracted prices for PV-generated electricity were as low as USD 58/MWh<sup>1</sup> in the United Arab Emirates (UAE) (IEA, 2015) and USD 38.70/MWh<sup>2</sup> (escalating 3% per year) in Nevada, United States (PVTech, 2015).<sup>3</sup> While prices vary significantly across regions and delivered project costs may differ from contracted costs, the IEA notes that the UAE deal and recent bid and auction prices for solar PV and offshore wind in South Africa and Brazil “signal a step change in generation costs where deployment is starting to ramp up quickly” (IEA, 2015).

In addition to cost reductions for clean energy, new approaches for improving energy efficiency in commercial and residential buildings and municipal street lighting are gaining traction and realising energy savings.

### Infrastructure investment needs are massive, but the incremental costs of “going low-carbon” are low

An estimated USD 93 trillion in infrastructure investment across transport, energy and water systems, much of it in cities, will be needed in the next 15 years to meet global infrastructure needs, while ensuring the transition to a low-carbon economy (Global Commission on the Economy and Climate, 2014). The Global Commission’s *New Climate Economy* report estimated that making these infrastructure investments “low-carbon” will impose incremental costs of only 4.5% relative to business-as-usual, while yielding benefits (including better health, improved energy security and reduced traffic congestion) that by far outweigh these incremental costs. The IEA also estimates that incremental costs are relatively low. To get the world onto a 2°C

emissions path, cumulative energy investment will need to reach USD 53 trillion by 2035, which is just 10% higher than under current policies (and those under discussion), and would result in significant energy savings (Figure 1) (IEA, 2014a).

Some low-carbon private investment is occurring but it needs to be scaled up faster. For example, in IEA’s “450” (i.e. 2°C) scenario, investments in energy efficiency will need to increase eight-fold by 2035 compared with 2013 levels. Investments in “low-carbon power generation” (including renewable energy, nuclear energy, and carbon capture and storage) will need to increase threefold (IEA, 2014a).

**93 trillion...**  
needed in infrastructure investments over the next 15 years

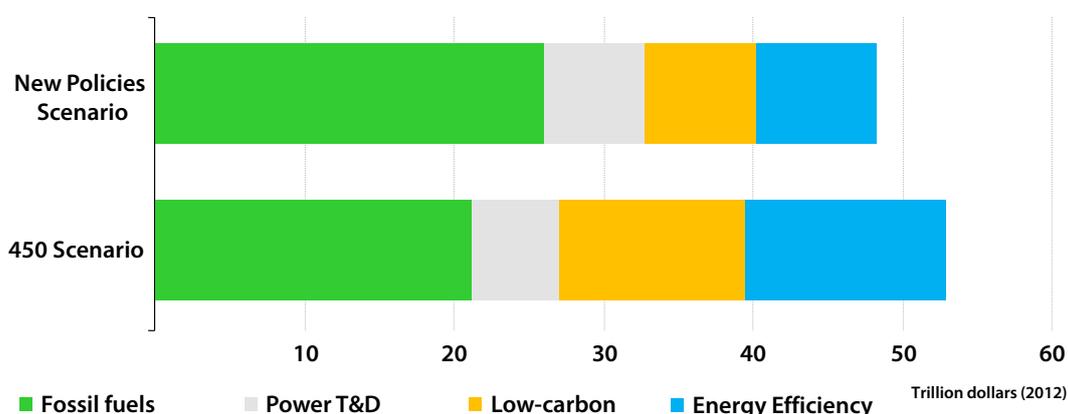
**4.5%...**  
incremental costs relative to business-as-usual for infrastructure to be “low-carbon”

**8-fold...**  
the amount energy efficiency investments will need to increase compared with 2013 levels

**Two-thirds...**  
cost reduction for new utility-scale solar PV, from 2010-15

**FIGURE 1. A NEW ENERGY INVESTMENT LANDSCAPE FOR A 2°C WORLD**

### Investment in the New Policies and 450 Scenarios, 2014-2035



Source: IEA, 2014a.

### What needs to be done?

#### 1) Shift private investment away from fossil fuels and towards a low-carbon economy

- Because infrastructure investments typically fund projects and facilities with long lifespans, decisions made today about such investments have the potential to “lock-in” future emission levels. For instance, any new investments in fossil-fuel based infrastructure have implications for the remaining “carbon budget”, which is of the order of 1000 billion tonnes for CO<sub>2</sub> emissions. We are currently emitting some 38 billion tonnes of CO<sub>2</sub> per year. As the carbon budget shrinks and temperatures rise, such investments will eventually force a choice between stranding high-carbon assets “or stranding the planet” (Gurría, 2013).
- There is no shortage of available capital. The challenge for governments is to ensure that public policies and investment conditions facilitate a re-allocation of investment from high-carbon to low-carbon and climate-resilient (LCR) options. It is only by such a re-allocation that we can get on a global emissions trajectory to meet the 2°C target.
- To promote the re-allocation and scaling up of investment in LCR infrastructure, governments can make efficient use of available public capital to mobilise much larger pools of private capital.

#### 2) Scale up private investment in LCR infrastructure

- Flows of climate finance – i.e. finance that specifically targets low-carbon or climate-resilient development – are predominantly

domestic. 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).

- Given the importance of domestic climate finance and the broader need to scale up all low-carbon investment flows, governments need to provide the right policy framework to increase both domestic and international private investment in their domestic LCR infrastructure (Box 3). As discussed in this Policy Perspectives, countries can also catalyse low-carbon investment by establishing institutions like GIBs which address investment barriers through innovative interventions.
- Because international flows of private investment will need to grow significantly to meet global LCR investment needs, domestic policies also need to avoid imposing harmful barriers to international investment (OECD, 2015a; OECD, 2015b).
- In countries with less-developed financial markets, public climate finance can play a particularly important role in scaling up private climate finance. The provision of public climate finance from domestic, bilateral and multilateral sources (Box 9) has a positive and significant mobilisation effect on volumes of private finance globally, but appears to play a relatively more important role in developing than developed countries on the initial decision for a private investor whether to invest at all (Hašćic et al., 2015).

# 2

## What are green investment banks and why do governments create them?

To mobilise private investment in domestic LCR infrastructure and leverage the impact of available public resources, 13 national and sub-national governments have created public green investment banks (GIBs) and GIB-like entities (as of December 2015).

**A GIB is a public entity established specifically to facilitate private investment into domestic LCR infrastructure through different activities and interventions. While GIBs differ in name, scope and approaches, they generally share the following core characteristics:**

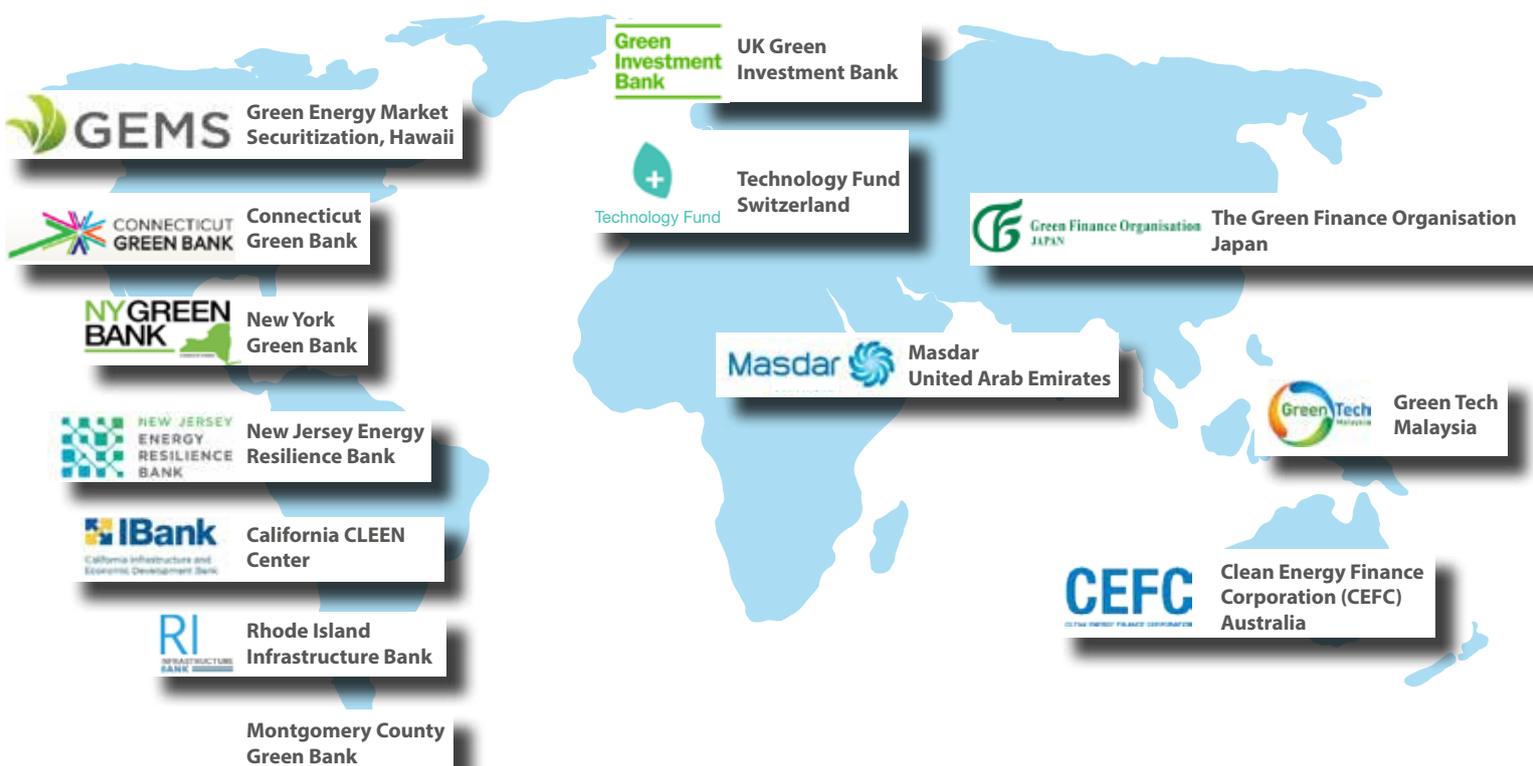
- A narrow mandate focusing mainly on mobilising private LCR investment using interventions to mitigate risks and enable transactions;
- Independent authority and a degree of latitude to design and implement interventions;
- A focus on cost-effectiveness and performance reporting.

“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).

GIBs are mobilising private investment to meet domestic targets for renewable energy deployment, energy efficiency and GHG emission reductions. GIBs channel private investment to e.g. commercial and residential energy efficiency retrofits, rooftop solar photovoltaic installation and municipal-level, energy-efficient street lighting through innovative investment structures which minimise upfront payments.

GIBs come in different shapes and sizes. GIBs and GIB-like entities have been established at the national level (Australia, Japan, Malaysia, Switzerland, United Kingdom), the state level (California, Connecticut, Hawaii, New Jersey, New York and Rhode Island in the United States), the county-level (Montgomery County, Maryland, United States) and the city-level (Masdar, United Arab Emirates).

FIGURE 2. GREEN INVESTMENT BANKS AROUND THE WORLD



As of December 2015, the latest green banks to be established are the Rhode Island Infrastructure Bank, which will administer new programmes on commercial and residential energy efficiency in addition to existing water and wastewater

programmes, and the Montgomery County Green Bank. The People's Republic of China is considering the creation of a National Green Development Fund that could dwarf other GIBs (Box 1).

### BOX 1. 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.”

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

Sources: CCICED, 2015; IEA, 2014a.



### Green investment banks are designed to address local market and policy failures

The core objective of GIBs is to increase private sector investment in domestic LCR infrastructure using limited public capital. However, governments tailor their GIBs and GIB-like entities based on their unique national and local contexts, and have diverse rationales and goals:

- In the United Kingdom, the Green Investment Bank was conceived as a means to meet ambitious emissions targets.
- In Japan, The Green Finance Organisation aims to support local community development to address the impacts of slow economic growth and an ageing society.
- The Connecticut Green Bank prioritises reducing carbon emissions and lowering energy costs while creating local jobs through clean energy investment.
- Switzerland's Technology Fund focuses on scaling up innovative environmental and low-carbon technologies that face a deployment gap.
- The Malaysia Green Technology Corporation's (GreenTech Malaysia) objective is to develop sustainable and widespread green technology markets and strengthen the local green technology industry.
- The goals of the Rhode Island Infrastructure Bank's clean energy programmes are to reduce consumers' and businesses' energy prices and stimulate employment opportunities.
- Other goals pursued by GIBs include improving capital market efficiency, lowering the cost of capital and meeting other (non-climate-related) environmental objectives.

## How are GIBs different from government programmes?

GIBs adopt a different approach from that of many grant-making public institutions and follow strict mandates to mobilise investment using limited public capital. Some GIBs are also required to be profitable. For example, the UK Green Investment Bank must meet a minimum 3.5% annual nominal return on total investments, after operating costs but before tax (UK GIB, 2015a). Australia's Clean Energy Finance Corporation (CEFC) is required to compare its financial performance with a portfolio benchmark return (CEFC, 2014a). GIBs also tend to operate as independent or semi-independent entities. This provides more flexibility and agility to respond to the needs of the market.

## Are GIBs the only institutions that can mobilise investment in domestic LCR infrastructure?

Green investment banks and GIB-like entities are typically established in countries that do not have national development banks or other entities that are actively promoting private investment in domestic green infrastructure. To mobilise more private investment, governments can consider establishing a GIB or can “mainstream” green investment objectives in existing national development banks (Box 2).

### BOX 2. 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 National Development Banks (NDBs) (or public investment, infrastructure or industrial development banks) which focus on domestic investment. 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 58 billion in domestic low-carbon projects in 2010-12. Some factors to consider when evaluating the need for a new GIB 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**  
Creating a new GIB with an independent status can provide flexibility to experiment, innovate and adapt to market developments. It can also facilitate a focus on targeted objectives. In the case of the UK GIB, a separate bank structure was preferred to signify independence from the government that would shield the institution from day-to-day political interference. This was deemed essential to attract long-term capital from institutional investors.
- **Mandate and culture**  
Many NDBs lack a clear mandate to promote national climate change mitigation. 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 International Development Financial 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 99 billion in green finance in 2013 alone. Among IDFC members, 78% of financing in 2013 was in the form of concessional loans, followed by non-concessional loans (17%) and grants (3%). Other financial instruments such as equity and guarantees accounted for only 1% of investment. 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. Some NDBs, such as KfW, as well as Multi-lateral 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 CEFC and Connecticut Green Bank use them only on a limited, targeted basis.

**Sources:** Cochran et al., 2014; UK House of Commons, 2011; Smallridge et al., 2013; IDFC, 2014.

# 3

## What types of investments do GIBs mobilise?

The majority of GIBs focus on promoting investment in clean energy and energy efficiency. However,

some entities target broader areas such as promoting innovation, resilience or sustainable cities.

TABLE 1. TARGET SECTORS FOR GIBs AND GIB-LIKE ENTITIES

Entity		Target Sectors and Sub-sectors
California CLEEN Center (California, United States)		<ul style="list-style-type: none"> <li>Municipal clean energy projects</li> <li>Clean electricity generation, distribution, transmission and storage</li> <li>Energy conservation, environmental mitigation and water treatment</li> </ul>
Clean Energy Finance Corporation (Australia)		<ul style="list-style-type: none"> <li>Renewable energy (wind, solar PV, thermal and CSP, biomass, geothermal, tidal and other renewable energy [50%])</li> <li>"Low emissions" (CEFC 2014a) and energy efficiency [50%]</li> </ul>
Connecticut Green Bank (Connecticut, United States)		<ul style="list-style-type: none"> <li>Energy efficiency</li> <li>Renewable energy</li> <li>Other clean technologies, including combined heat and power (CHP), anaerobic digestion, fuel cells, alternative fuel vehicles and infrastructure, storage and others</li> </ul>
Green Energy Market Securitization (Hawaii Green Infrastructure Authority) (Hawaii, United States)		<ul style="list-style-type: none"> <li>Low and moderate-income homeowners, renters and non-profits</li> <li>Distributed solar PV (initial phase)</li> <li>Clean energy and energy efficiency (deployed in phases)</li> </ul>
The Green Finance Organisation (Japan)		<ul style="list-style-type: none"> <li>Low-carbon projects (e.g. wind, solar, small-scale hydro, biomass, waste management, geothermal, hot springs, renewals of mid-sized hydro)</li> </ul>
Malaysian Green Technology Corporation (GreenTech Malaysia) (Malaysia)		<ul style="list-style-type: none"> <li>Energy (renewable energy)</li> <li>Water and waste management</li> <li>Building (energy and water efficiency, indoor air quality)</li> </ul>
Masdar (United Arab Emirates)		<ul style="list-style-type: none"> <li>Clean energy</li> <li>Energy efficiency</li> <li>Carbon capture and storage</li> </ul>
New Jersey Energy Resilience Bank (New Jersey, United States)		<ul style="list-style-type: none"> <li>CHP, fuel cells and solar-tied storage at water and wastewater treatment facilities</li> </ul>
NY Green Bank (New York, United States)		<ul style="list-style-type: none"> <li>Energy efficiency</li> <li>Renewable energy</li> <li>Other clean technologies, including CHP, electric vehicle infrastructure, fuel cells and offshore wind</li> </ul>
Technology Fund (Switzerland)		<ul style="list-style-type: none"> <li>GHG reduction technologies</li> <li>Energy efficiency</li> <li>Renewable energy</li> <li>Natural resource conservation technologies</li> </ul>
UK Green Investment Bank (United Kingdom)		<p>Priority areas:</p> <ul style="list-style-type: none"> <li>Offshore wind</li> <li>Waste recycling &amp; bioenergy</li> <li>Energy efficiency</li> <li>Small-scale renewables</li> </ul> <p>Other:</p> <ul style="list-style-type: none"> <li>Biofuels for transport, biomass power, carbon capture and storage, marine energy, renewable heat</li> </ul>

**Note:** The Rhode Island Infrastructure Bank and the Montgomery County Green Bank are not included in Table 1 as they were still relatively new as of December 2015.

## A focus on both mature and less-mature technologies

GIBs typically have a mandate to avoid “crowding-out” private investment and to catalyse investment that is additional to what would have otherwise occurred. This implies they must shift into new technologies with less attractive risk-return profiles when their interventions are no longer needed to attract investment. To date, GIBs have focused mainly on proven commercial technologies, while retaining flexibility to invest in new technologies that are on the cusp of commercial viability. For example, NY Green Bank seeks to invest where there is a financing gap and focuses on “clean energy projects that are economically viable but not currently financeable” (NY Green Bank, 2013).

While they rarely support research or early-stage technological development, some GIBs are already targeting less commercial technologies such as offshore wind energy, for which the global average levelised cost of electricity (LCOE) is USD 174/MWh (as of October 2015), compared to USD 122/MWh for crystalline silicon PV solar energy and USD 83/MWh for onshore wind energy (Solarserver.com, 2015). (LCOEs vary significantly by region.) The UK Green Investment Bank has created the world’s first offshore wind fund (UK GIB, 2015b). NY Green Bank’s mission is to “transform financing markets” and its list of potential target technologies for investment is broad and includes ocean and tidal power, fuel cells and electric vehicle infrastructure (NY Green Bank, 2015). Switzerland’s Technology Fund targets companies that “market an innovative product or process which has a good chance of market success” (Technology Fund, 2015).

Moving forward, GIBs will face the challenge of building a track record of success and cost-effectiveness in mobilising investment in less commercial technologies. To date, GIBs in Connecticut, the UK and Australia have pursued a mix of investments with relatively lower financial returns (e.g. smaller projects or technologies requiring the use of concessional financing) combined with investments with higher returns to meet financial performance objectives as well as operational mandates.



### BOX 3. GIBs COMPLEMENT (BUT CANNOT REPLACE) CORE CLIMATE AND INVESTMENT POLICIES



GIBs can be an effective component of efforts to provide coherent and consistent signals to investors to incentivise investments in domestic green infrastructure and provide predictability. If core climate policies are absent or weak, institutions like GIBs will not maximise their potential for mobilising private investment. The OECD has developed guidance for governments to integrate climate and investment policy considerations and establish strong enabling conditions for LCR infrastructure investment. Elements of a “green investment policy framework” include removing fossil fuel subsidies, pricing carbon, setting clear, long-term policy goals, and providing time-bound, tailored incentives for renewable energy investment which correct for market failures. When governments make enabling LCR investment a priority, they provide a supportive environment for GIBs to mobilise private investment. Econometric analysis confirms that renewable-energy incentive policies play an important role in encouraging investment.

GIBs are a tool to mobilise private investment that can complement policies but cannot act as a substitute for a supportive policy framework and enabling environment. Policy makers establishing a GIB should consider how the institution can be integrated with existing public policies and investment promotion initiatives.

Sources: OECD, 2015a; Corfee-Morlot, J., et al., 2012; Haščič et al., 2015.

## BOX 4. GREEN INVESTMENT BANKS MOBILISING GREEN INVESTMENT IN CITIES

Many of the investments GIBs mobilise are undertaken in urban areas, where 54% of the world's population lived in 2014 and where 66% is projected to live by 2050. For example, Australia's GIB, the Clean Energy Finance Corporation, is providing finance to help the City of Melbourne undertake an AUD 30 million programme of clean energy initiatives to help it reach its goal of zero net emissions by 2020. GIBs' energy efficiency activities focus particularly on buildings, which account for 19% of global GHG emissions.

Sources: UN DESA, 2014; CEFC, 2015a; IPCC, 2014.



### What investment channels and risk-mitigating interventions are used by GIBs?

GIBs directly invest in LCR infrastructure using a range of instruments and funds including senior and subordinate loans, bond-based financing and equity. GIBs also employ risk mitigants, which are targeted interventions aimed at reducing, re-assigning or re-apportioning different investment risks. Risk mitigants increase the attractiveness and acceptability of investments by providing coverage for risks which are new and are not currently covered by financial actors, or are simply too costly for investors. These **risk mitigants** include:

- **Loan loss reserves**, in which capital is set aside to cover potential losses from borrower defaults, helping to reduce loan repayment risk.
- **Guarantees**, a credit enhancement tool used to mitigate perceived or actual risks to improve the attractiveness of investments, often debt instruments.
- **Insurance**, another credit enhancement tool used to protect investments against a range of risks such as construction, operational or market risks.
- **Debt subordination**, in which particular classes of lenders are given priority to claims on assets and cash flows. By offering repayment priority to certain holders of 'senior' debt, a project can attract financing from this source.

**Transaction enablers** increase the flow of capital by bundling small-scale projects to achieve scale and reduce transaction costs. GIBs use transaction enablers such as:

- **Warehousing**, an aggregation technique used to reduce transaction costs and facilitate investment. Small projects are bundled together to reach a scale where they become attractive for on-sale to large investors or for securitisation through bond issuances.

- **Securitisation**, a technique whereby non-traded or small-scale assets, such as cash flows from solar leases or power-purchase agreements, are transformed into a standardised, tradable asset.
- **Co-investing**, a form of direct (project-level) investing whereby investors lacking sufficient scale or expertise partner up with other specialised and expert investors to invest in a project.
- **On-bill financing**, which allows borrowers to repay clean energy or energy efficiency loans through an additional charge on their existing utility bill.
- **Leasing**, which enables customers to make use of certain assets such as rooftop solar PV systems without purchasing them, thereby lowering costs and overcoming investment barriers.

### HOW ARE GIBS FUNDED?

Funding sources for GIBs are diverse:

- Appropriations (Australia)
- Carbon tax revenue (Japan)
- Reallocation of funds from existing programmes (New York)
- Emissions trading schemes revenue (Connecticut, New York)
- Utility bill surcharges, Renewable Portfolio Standards, Energy Efficiency Resource Standards (Connecticut, New York)
- Loans (Connecticut)
- Bond issuance (Hawaii)
- National government funding (UK, New Jersey)

## What scale of investment and types of investors are targeted by green investment banks?

Green investment banks work with a range of private investors, including large institutional investors, community banks and local contractors. The types of co-investors that GIBs target vary based on the types of market gaps and barriers being addressed, and on whether GIBs are pursuing a “wholesale” or “retail” strategy.

A wholesale strategy aims to attract relatively large amounts of private capital to combine with public capital for on-lending or investing in funds. Co-investment with investment banks and institutional investors is a common wholesale approach (e.g. the UK Green Investment Bank’s offshore wind fund). A retail strategy, in contrast, involves delivery of funds to the project developer or individual (e.g. energy efficiency retrofits, residential rooftop solar PV). Wholesale lending can move large volumes of investment, while retail lending can be useful for jump-starting activity in new markets. Partnerships, outreach and co-investment with local banks, contractors and even individuals are typical elements of a retail strategy. Under either type of strategy, a GIB may help investors bring their investments to secondary markets through bond issuances, securitisation or private placement.



**Did you know?** The UK Green Investment Bank created the world’s first offshore wind fund

### BOX 5. THE ECONOMIC CASE FOR GREEN INVESTMENT BANKS

In addition to the profitability or financial sustainability of some GIBs, they have several other characteristics which provide an economic case for GIBs, including the following:

- **Focus on overcoming investment barriers:** GIBs typically have a specific mandate to overcome barriers to scaling up 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 like residential rooftop solar 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.
- **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.
- **Market transformation role:** 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 private companies, which face competitive pressures.
- **Impact on local financing costs:** By dispersing information, sharing expertise and demonstrating that investments are profitable, GIBs help accelerate reductions in financing costs.



**Source:** OECD, 2016 (forthcoming), personal communication with Douglass Sims, Natural Resources Defense Council, October 2015.

## GIBs measure and report their benefits

Since GIBs are created with public capital, accountability to taxpayers is a priority. GIBs measure their performance using a range of metrics, which generally focus on investment and economic results or climate-related outcomes.<sup>4</sup> Self-reported achievements of GIBs and GIB-like entities include:

### Leverage / mobilisation

- For every GBP 1 of public investment it has made since its inception, the UK Green Investment Bank has mobilised an estimated GBP 3 of private capital (UK GIB, 2015a).
- The Connecticut Green Bank attracted USD 10 in private investment for every USD 1 of public capital spent in 2013 (Connecticut Green Bank, 2013). In 2014 the ratio was USD 3 of private investment for every USD 1 of private capital spent (Connecticut Green Bank, 2015a).
- In 2014-15, CEFC reported AUD 1.8 private dollars mobilised for each AUD 1 in CEFC investment (CEFC, 2015b, 2015c). CEFC's reported a leverage ratio (i.e. private investment mobilised per unit of public spending) of 2.2:1 in 2013-14 (CEFC, 2014a).

### Co-investors

- Since inception, the UK Green Investment Bank has worked with over 70 co-investors (UK GIB, 2015a).

### Rate of return

- The UK Green Investment Bank has a minimum target return of 3.5% (annual nominal return on total investments, after operating costs but before tax). The UK GIB turned profitable in the second half of the 2014-15 year, and projects that once its current portfolio of investments is fully operational, it will generate an overall return of 9% (UK GIB, 2015a).
- In 2014, CEFC achieved a 4.15% return (net of operating costs) on an expected deployed capital of AUD 931 million, exceeding the portfolio benchmark return of 3.14% (CEFC, 2014a). The current portfolio of investments in 2015 is projected to generate an annual yield of 6.1% once fully deployed (CEFC, 2015c).<sup>5</sup>

### Emissions saved

- Once constructed and in operation, the projects in which Australia's CEFC is investing are estimated to achieve annual emissions abatement of 4.2 million tonnes CO<sub>2</sub>-equivalent (tCO<sub>2</sub>e), with a net financial return to the CEFC (inclusive of government borrowing costs and operating costs) of approximately AUD 10 million (i.e. emission reductions are achieved at a "cost" of negative AUD 2.40 per tonne) (CEFC, 2014a, 2015b).<sup>6</sup>

## BOX 6. INSTITUTIONAL INVESTORS

Institutional investors such as insurance companies, pension funds, investment funds, public pension reserve funds, foundations and endowments are an important potential source of alternative capital for domestic LCR infrastructure investment. In OECD countries alone, these investors held USD 93 trillion of assets in 2013. They often seek long-term and low-risk investments, and allocate significant amounts of capital domestically.

Institutional investors are typically reluctant to take on construction risk or be the first movers into a new market; as such, green investment banks can create attractive opportunities for institutional investors to collaborate with the public sector to finance low-carbon and climate-resilient infrastructure. The UK Green Investment Bank, the CEFC and NY Green Bank are all targeting institutional investors. The OECD report *Mapping Channels to Mobilise Institutional Investment in Sustainable Energy* highlights the barriers that specifically limit institutional investment in sustainable energy projects.

Sources: OECD, 2015c.



- Since 2010, the Green Technology Financing Scheme operated by GreenTech Malaysia has funded 165 projects which have avoided close to 2.4 million tCO<sub>2</sub>e (GreenTech Malaysia, 2015).
- Since its inception, the Connecticut Green Bank has enabled the reduction of an estimated 1.4 million tonnes of CO<sub>2</sub> emissions over the life of these projects (Connecticut Green Bank, 2015b).
- In 2014-15, the UK Green Investment Bank's estimated average annual GHG emission reduction reached 4.2 million tonnes of CO<sub>2</sub> emitted, equivalent to taking 1.9 million cars off the road for the year (UK GIB, 2015a). The UK GIB's estimate of the average annual renewable power generation associated with the projects it funds reached 16.3 TWh, enough to power the domestic electricity of 3.9 million homes (UK GIB, 2015a).

### Job creation

- As of June 2015, Connecticut Green Bank made investments that generated 3 094 direct jobs and over 5 200 indirect and induced jobs (Connecticut Green Bank, 2015b).
- The CEFC has financed projects for businesses that employ over 35 000 Australians (CEFC, 2015b).
- Since 2010, the 165 projects funded by the Green Technology Financing Scheme have created 2 491 jobs (GreenTech Malaysia, 2015).

### Waste

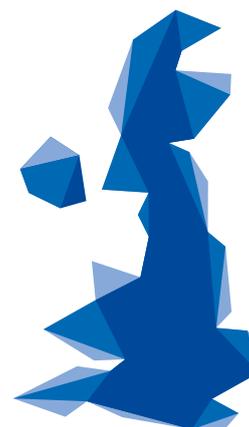
- UK GIB investments are projected to avoid 2.1 million tonnes of waste from landfill each year, the equivalent of the waste of 2.1 million homes (UK GIB, 2015a).

## BOX 7. GIBs CREATE FUNDS TO ATTRACT INSTITUTIONAL INVESTORS: UK AND AUSTRALIA

### UK Green Investment Bank creates world's first dedicated offshore wind fund

In April 2015, the UK Green Investment Bank reached a first close of GBP 463 million for a fund to support offshore wind development (the Operating Offshore Wind Fund), for which it intends to provide 20% of capital when it reaches its full size of GBP 1 billion. The UK Green Investment Bank has secured investment from UK pension funds and a sovereign wealth fund, and is seeking further private, ideally institutional, co-investors. The fund intends to purchase already-operating offshore wind farms from utilities to allow them to recapitalise and invest in further offshore wind farm development.

**Green  
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Bank**



### CEFC's CFS Infrastructure Fund mobilises capital from institutional investors

In July 2014, Australia's CEFC agreed to provide the cornerstone stake in a new unlisted clean energy infrastructure fund, the CFS Australian Clean Energy Infrastructure Fund, alongside a large institutional investor, Colonial First State Global Asset Management (CFSGAM). The fund is the first unlisted infrastructure investment fund to focus on clean energy investment in Australia. CEFC is providing an AUD 80 million equity investment; CFSGAM will raise AUD 300 to 500 million for the fund over the next three to five years. The fund will invest in commercial-scale solar leases, large-scale utility renewable projects and other large-scale clean energy projects, including commercial and industrial energy efficiency. As noted by the CEFC, these kinds of projects are typically financed by commercial banks, financial intermediaries and utilities. The new fund will create a new long-term investment opportunity for institutional capital.

Sources: UK GIB, 2014b; UK GIB, 2015; Morales, 2014; CEFC, 2014a.

# 4

## Focus on energy efficiency

Along with renewable energy, energy efficiency is a primary focus of GIBs' interventions to mobilise private investment. Energy efficiency investments are a central part of national greenhouse gas (GHG) emissions mitigation strategies and energy planning, as they reduce energy consumption, lower GHG emissions and reduce the need to expand generation capacity and invest in additional transmission and distribution. They also provide multiple benefits beyond GHG reductions such as reduced air pollution and improved energy security (Box 8). Nevertheless markets have tended to underinvest in energy efficiency due to a range of financial and non-financial barriers. GIBs can therefore play an important role in attracting private investment into this under-invested area.

Green investment banks can address multiple barriers 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.
- Local lenders often do not account for estimated energy savings from energy efficiency projects during the underwriting process, and instead focus only on the borrower's credit rating.
- Lack of familiarity with energy efficiency investments among private investors.

Green investment banks can identify and address investment barriers at the city and national level that are not currently being addressed by other entities (e.g. national and multilateral development banks, and public and private Energy Service Companies (ESCOs)). They use a range of tools, including credit-enhancing and direct investment mechanisms to deploy public capital and leverage private investment in energy efficiency, such as:

### BOX 8. THE MULTIPLE BENEFITS OF ENERGY EFFICIENCY

Improving energy efficiency can provide a range of benefits to different stakeholders. The IEA study *Capturing the Multiple Benefits of Energy Efficiency* identifies 15 distinct benefits of energy efficiency. These include:

- Macroeconomic development can be encouraged through energy efficiency investment that can increase employment and economic activity.
- Reduced strain on public budgets through reduced government expenditures on fuel for heating, cooling and lighting.
- Improved health and well-being as a result of energy efficiency retrofits and weatherisation programmes that can reduce respiratory and cardiovascular and allergy risks and stress.
- Greater industrial productivity through energy efficiency can enhance competitiveness, increase productivity and improve working environments.
- Improved energy delivery through reduced energy generation, transmission and distribution costs, greater system reliability, and less volatility in wholesale markets.

Governments can employ a range of measures and policies to stimulate demand for energy efficiency investments. For example, GIBs can serve as a key element of a country's (or sub-national jurisdiction's) policy framework for energy efficiency investment. At the international level, there is increasing recognition of the importance of domestic policies to support energy efficiency investment. In October 2015, G20 Energy Ministers welcomed the Voluntary Energy Efficiency Investment Principles for G20 participating countries.

Source: IEA, 2012; IEA, 2014c; UNEP FI, 2015.

- On-bill financing and linking energy efficiency loan repayment to property tax payments through tax liens (e.g. “Property Assessed Clean Energy” in the United States) are structures that overcome investment barriers while increasing chances of repayment and adding security for the lender.
- Green investment banks are developing efficiency-focused funds and providing direct lending and leasing offerings to fill gaps in the efficiency lending marketplace.
- Green investment banks can attract large institutional investors by warehousing smaller efficiency loans and then selling those loans at scale through securitisation.



**Did you know?**

Energy efficiency has been coined the world’s “first fuel” as energy efficiency improvements satisfy more energy demand than any single fossil fuel (IEA, 2014b)

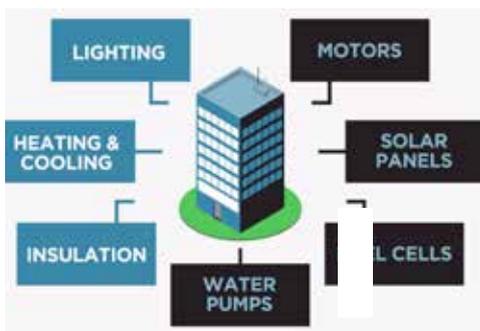
**Energy efficiency case studies**

**C-PACE: Connecticut Green Bank’s Energy-Efficiency Programme**

The Connecticut Green Bank has implemented one of the most successful commercial building energy efficiency programmes in the United States, using the property-assessed clean energy (PACE) structure. Through this structure, building owners can receive long-term financing (up to 20 years) to perform energy upgrades on buildings and pay the loan back as a new tax lien on the property. Linking the lien to the property increases lending security and enables a much longer payback term; default rates on tax payments are typically lower than for debt repayments. The lien structure also makes it easier to buy and sell property with an outstanding efficiency loan (Connecticut Green Bank, 2015).

PACE programmes can be difficult to structure, as they require legal authorisation and close co-ordination between lenders, local governments, programme administrators and contractors. In many US states this complexity has hindered market growth. The Connecticut Green Bank, however, has overcome these challenges by centrally administering and financing a state-wide commercial energy efficiency program. Its “C-PACE” programme co-ordinates all commercial PACE activity in the state, originating loans with public capital and then selling the portfolio of loans to private investors (PACE Now, n.d.; Lombardi, 2014).

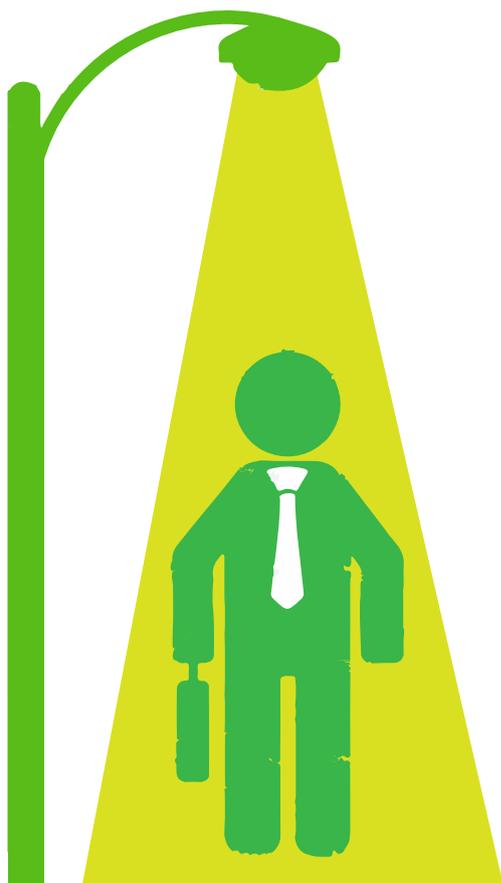
The programme was launched in early 2013 and in less than two years the Green Bank has financed nearly USD 54 million in energy upgrades for 89 buildings. This accounts for about one-third of the commercial PACE market in the United States. More recently, the Green Bank has established a programme to facilitate private platforms to provide PACE financing, with the Green Bank retaining its central administration role. Other US states such as Rhode Island are exploring the use of a GIB to facilitate similar commercial PACE programmes (PACE Now, 2015).



## UK GIB's innovative Green Loan helps municipalities switch to energy-efficient street lighting

There are over seven million street lights in the United Kingdom which generate over GBP 300 million in electricity costs. The electricity needed to power street lights produces 1.3 million tonnes of CO<sub>2</sub> annually, equivalent to the emissions of 330 000 cars on the road or 674 000 households. Despite the financial and environmental case for improved energy efficiency, fewer than one million street lamps are energy efficient (UK GIB, 2014).

To help municipalities make the switch to low-energy lighting, the UK Green Investment Bank created an innovative "Green Loan" for municipalities which is specifically tailored to help cities upgrade their street lighting to more energy efficient light emitting diodes (LEDs). The efficient lighting technology produces energy savings that exceed the cost of the loan payment, allowing borrowers to be cash-flow-positive throughout the period of the loan. With fixed rates and terms designed to match the payback period, municipalities are able to save 80% of their lighting costs by switching to LEDs (UK GIB, 2014).



### BOX 9. THE ROLE OF INTERNATIONAL PUBLIC CLIMATE FINANCE

International public finance institutions, which include both multilateral development banks (MDBs) and bilateral finance institutions, provide long-term financing in line with policy-oriented objectives, including green investment. MDBs reported that they provided over USD 28 billion in climate finance (18% of which was adaptation finance) in 2014. In the specific context of the commitment made by developed countries under the UNFCCC to mobilise 100 billion per year by 2020 for climate action in developing countries, the OECD estimates volumes of public and private climate finance mobilised at USD 61.8 billion in 2014, up from USD 52.2 billion in 2013, with an average of USD 57.0 billion.

**Sources:** AfDB et al., 2015; OECD, 2015e.



# GREEN INVESTMENT BANKS AS A MEANS FOR GOVERNMENTS TO ACHIEVE AMBITIOUS CLIMATE OBJECTIVES

- The creation of a GIB can send a signal to the marketplace and other countries that a country or region is seeking to become a leader in scaling up private, low-carbon investments.
- GIBs can bring attention to a fundamental, yet under-appreciated, element of a country's GHG mitigation strategy and commitments – the need for a cost-effective approach to mobilise investment in LCR infrastructure.
- GIBs are developing valuable expertise in implementing effective public interventions to overcome investment barriers and mobilise private investment in infrastructure. GIB experiences and lessons can inform countries' mitigation and adaptation planning and targets, including those made in advance of and following COP 21 in Paris in December 2015.
- GIBs are relevant for both developed countries and emerging economies as a tool in their domestic climate policy framework to help meet emissions, technology and infrastructure deployment and green investment targets.
- GIB experiences are also relevant for international climate finance as the tools they use and innovative approaches to mobilise private investment are often applicable or adaptable to various contexts. In emerging economies, GIBs may be able to work alongside multilateral development banks and other sources of public climate finance to de-risk LCR infrastructure projects to enable private investment capital to flow.
- COP 21 is shining a spotlight on the role of “non-state actors” (which are referred to in the UNFCCC context as “non-Party stakeholders”) in the climate negotiations. GIBs at the sub-national level, such as those in the United States, are demonstrating how one category of non-Party stakeholders is contributing to GHG emission reductions and actively promoting and scaling up investment.
- GIBs in some jurisdictions have mandates to deliver a positive financial return or achieve financial sustainability. Achieving such goals can increase political support for dedicating public resources to mobilise private investment in climate change mitigation, adaptation and resilience.

*“#COP21 should send clear directional signals that countries as well as non-state actors must, can and will create their own pathways to a zero net carbon future. This requires the full engagement of all the major economies of the world, both developed and developing.”*

- Angel Gurría, OECD Secretary-General, 2015 Climate Lecture



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## ENDNOTES

- For a 25-year Power Purchase Agreement (PPA) for electricity to be delivered by a 200 MW solar PV plant in 2017.
- For a 20-year PPA for electricity to be delivered by a 100 MW solar PV plant by December 2016.
- The levelised cost of electricity (LCOE) for the Nevada project is USD 48.61/MWh, which includes the Business Energy Investment Tax Credit and network upgrade costs (Public Utilities Commission of Nevada, 2015; personal communication with Heymi Behar, IEA).
- Figures in this section derive from green investment banks. Metrics are not harmonised across GIBs and methodologies for calculating performance metrics may differ. Only a sample of GIB results is provided.
- In 2015 CEFC had a mid-year change in both its statutory benchmark rate and the method of calculation (see (CEFC, 2015c) for more information).
- The CEFC notes that it does not claim that this abatement occurs independently of complementary policy such as the Australian Government's Renewable Energy Target.

**FOR MORE INFORMATION:**

[www.oecd.org/environment/cc/financing.htm](http://www.oecd.org/environment/cc/financing.htm)

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