

## *Chapter 4.*

### **Green investment banks and energy efficiency**

*This chapter discusses how green investment banks are working to reduce barriers for private investment in energy efficiency and explores the range of interventions they use to scale up energy efficiency investment. It also describes the investment partnerships that green investment banks pursue in the field of energy efficiency.*

## Key takeaways

- Energy efficiency represents a massive investment opportunity across multiple sectors, such as industry, buildings and power generation, with a global market valued in the hundreds of billions (USD). Green investment banks are addressing multiple barriers to energy efficiency investment in buildings, including:
  - small average investment size and relatively high transaction costs
  - the need for long-term capital to match the flow of savings
  - difficulty in measuring or underwriting energy savings
  - lack of familiarity among private investors.
- Many of the investments green investment banks 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.
- Green investment banks use a range of credit-enhancement and direct investment mechanisms to deploy public capital and leverage private investment in energy efficiency.
- On-bill financing and linking energy efficiency loan repayment to tax payments through tax liens are two innovative structures that increase the chances of repayment and reduce risks 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 energy efficiency loans and then selling those loans at scale through securitisation.

## Introduction to energy efficiency investment

### *The opportunity of increased energy efficiency and key sectors*

The International Energy Agency (IEA) describes energy efficiency as the “first fuel” because energy efficiency improvements satisfy more energy demand than any single fossil fuel (IEA, 2014a).<sup>1</sup> 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 provide savings from avoided investments in generation capacity and transmission and distribution. They also provide multiple benefits beyond GHG reductions, such as reduced air pollution and improved energy security (Box 4.1).

Significant energy efficiency opportunities exist across all sectors. However, due to the many barriers that limit the uptake of energy efficiency, such as split incentives, information failures and subsidised energy prices, the IEA estimates that two-thirds of “economically viable”<sup>2</sup> energy efficiency potential will remain unrealised (IEA, 2014b). As transport and industry have already made important energy efficiency gains, the sectors with the greatest unrealised potential for energy efficiency are buildings and power generation (IEA, 2014b). This chapter focuses primarily on green investment bank (GIB) activities to facilitate the financing of energy efficiency projects in buildings, many of which are undertaken in cities (Box 4.2).

### Box 4.1. 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* identified 15 distinct benefits of energy efficiency. These include:

- macroeconomic development 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, 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, green investment banks 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.

Sources: Ryan, L. and N. Campbell (2012), "Spreading the net: The multiple benefits of energy efficiency improvements", *IEA Energy Papers*, No. 2012/08, OECD Publishing, Paris, <http://dx.doi.org/10.1787/20792581>; IEA (2014b), *Capturing the Multiple Benefits of Energy Efficiency: A Guide to Quantifying the Value Added*, International Energy Agency, Paris, <http://dx.doi.org/10.1787/9789264220720-en>; UNEP FI (2015), "Voluntary Energy Efficiency Investment Principles for G20 Participating Countries", [www.unepfi.org/fileadmin/energyefficiency/EnergyEfficiencyInvestmentPrinciples.pdf](http://www.unepfi.org/fileadmin/energyefficiency/EnergyEfficiencyInvestmentPrinciples.pdf) (accessed 25 January 2016).

### Box 4.2. Green investment banks mobilising green investment in cities

Many of the investments green investment banks (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), *World Urbanization Prospects: The 2014 Revision, Highlights*, United Nations Department of Economic and Social Affairs, Population Division, New York, <http://esa.un.org/unpd/wup/Highlights/WUP2014-Highlights.pdf>; IPCC (2014), "Summary for policymakers", in: Edenhofer, O. et al. (eds.), *Climate Change 2014: Mitigation of Climate Change, Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, United Kingdom and New York, New York, [www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc\\_wg3\\_ar5\\_summary-for-policymakers.pdf](http://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_summary-for-policymakers.pdf); CEFC (2015c), "Factsheet: CEFC and the city of Melbourne accelerate sustainability initiatives", October, **Error! Hyperlink reference not valid.** [www.cleanenergyfinancecorp.com.au/media/107528/cefc-factsheet\\_cityofmelb\\_lr.pdf](http://www.cleanenergyfinancecorp.com.au/media/107528/cefc-factsheet_cityofmelb_lr.pdf).

### ***Financing investment in energy efficiency***

The IEA valued global energy efficiency markets at between USD 310 billion and USD 360 billion in 2012, with high potential for growth (IEA, 2014a). Capital and savings from individuals, businesses and governments account for over half of this market. In order to achieve the full potential of energy efficiency, investment from other sources will be crucial.

Energy efficiency finance tools can be adapted to suit the investment needs and structures of various sectors and borrowers and can take the form of loans, bonds and equity investment. On-bill finance, performance contracting and leasing are also used as financing mechanisms.

While the private sector is a key energy efficiency investor, with commercial banks leading, the public sector plays an important role by catalysing additional private investment and improving energy efficiency in public buildings, state-owned industries and other public infrastructure (IEA, 2014a). Governments can reduce high transaction costs and risk by facilitating standardisation, creating loan warehouses or providing loan guarantees.

Public financial institutions (PFIs), discussed in Chapter 1 and Annex 1.A1, are investing significant amounts of capital in energy efficiency. An OECD working paper on “Public financial institutions and the low-carbon transition” provides case studies of five PFIs and highlights their role in mobilising investment in renewable energy and energy efficiency (Cochran et al., 2014). These institutions are generally much larger than GIBs, and as such, their investments in energy efficiency are also at a greater scale. For example, the German development bank KfW made an estimated EUR 6.5 billion in lending commitments for residential energy efficiency in 2011 (Cochran et al., 2014).<sup>3</sup>

Bilateral and multilateral development banks are also active in supporting energy efficiency investment through a range of interventions including making direct investments and providing risk mitigants and transaction enablers. For example, the Inter-American Development Bank (IDB) provided a USD 50 million line of credit to energy service companies which will originate and pool energy efficiency loans to Mexican small and medium-sized enterprises. The IDB will also provide up to USD 25 million in partial credit guarantees for the subsequent securitisation of the loan pool (IDB, 2014).

International climate finance funds such as the Climate Investment Funds (CIFs) and the Green Climate Fund (GCF) also target energy efficiency. For example, the European Bank for Reconstruction and Development (EBRD) and the Clean Technology Fund (CTF) launched a USD 350 million fund in 2014 to support residential energy efficiency programmes in Turkey through on-lending to local banks (Rosca, 2014).

### ***Barriers to scaling up energy efficiency investment***

Barriers to energy efficiency investment are generally well understood and often specific to the particular type of energy efficiency investment. High up-front costs are one type of barrier which is also common to renewable energy projects. Other barriers such as the principal-agent problem, where parties such as a landlord and tenant have different objectives and unequal access to information, are specific to energy efficiency investment (IEA, 2014a; 2014b). There are also a number of barriers that apply specifically to the finance element of energy efficiency investment (Box 4.3).

### Box 4.3. Barriers to increasing the supply of energy efficiency finance

There are many barriers to energy efficiency investment. These barriers include the following:

- **Small project size:** Projects are often diffuse and too small to be attractive to lenders. As a result, project development and implementation costs are higher.
- **Transaction costs:** Companies may not apply for grant or loan programmes because filling out forms or reporting on energy savings is burdensome. Companies may also lack the technical expertise to implement energy efficiency projects. This is a significant factor affecting access to finance for businesses, particularly for small and medium-sized enterprises.
- **Intangibility:** Financial institutions may not consider energy savings (i.e. avoided energy costs) to be a potential source of cash flow that could be used for debt repayments. This is particularly problematic in industry, where a significant amount of savings can be achieved by altering processes rather than investing in new assets.
- **Lack of harmonised monitoring and verification (M&V) protocols:** Independent assessment of projects using M&V protocols is needed to win the trust of financiers, as energy savings typically change over time depending on production volumes, process changes and equipment degradation.
- **Lack of data and skills to assess transactions and risk:** A lack of transparent data and research makes it difficult to compare performance and attract investors. Performance data for energy efficiency projects are not collected systematically.
- **Lack of financial instruments and funds with attributes that are attractive to institutional investors:** Few available financial instruments and funds have the investment grade ratings, low transaction costs and liquidity that would be attractive to institutional investors.
- **Policies and regulations that favour investment in unabated fossil-fuel intensive activities:** Inconsistent policy signals, such as continued support for fossil fuel use, low or no carbon prices, and unpredictable changes to energy efficiency policies can limit the attractiveness of energy efficiency investments.
- **Financial regulations with unintended consequences:** International financial regulations to increase banks' level of capital and reduce their exposure to long-term debt may discourage long-term investments in areas such as energy efficiency.

*Source:* IEA (2014a), *Energy Efficiency Market Report 2014*, International Energy Agency, Paris, <http://dx.doi.org/10.1787/9789264218260-en>.

## Role of green investment banks in energy efficiency investment

GIBs are joining other actors in efforts to promote private investment in energy efficiency projects. To capitalise on the opportunities energy efficiency presents to reduce energy consumption, lower GHG emissions and generate returns for private investors, several GIBs have launched energy efficiency programmes and invested in energy efficiency projects. Many GIBs also have a strategic mandate to promote job creation and economic growth. Energy efficiency investment can satisfy these mandates as projects typically require on-the-ground contractor labour and can spur business development. Table 4.1 highlights the energy efficiency investment offerings found at operational GIBs to date.

Table 4.1. Green investment bank energy efficiency offerings

Entity	Energy efficiency financing (target sector)
Clean Energy Finance Corporation (CEFC) (Australia)	<ul style="list-style-type: none"> <li>– On-bill financing (commercial)</li> <li>– Efficiency fund (manufacturing)</li> <li>– Corporate financing (commercial)</li> <li>– Debt fund (local government)</li> <li>– Pass-through concessional loan (commercial equipment and vehicles)</li> </ul>
Connecticut Green Bank (Connecticut, United States)	<ul style="list-style-type: none"> <li>– Loan loss reserve (residential)</li> <li>– Credit enhancement (commercial, multi-family housing)</li> <li>– Property-assessed clean energy (PACE) origination and warehousing (commercial)</li> </ul>
Malaysia Green Technology Corporation (GreenTech Malaysia) (Malaysia)	<ul style="list-style-type: none"> <li>– Loan guarantees (commercial, municipal, universities, hospitals, schools)</li> </ul>
NY Green Bank (New York, United States)	<ul style="list-style-type: none"> <li>– Efficiency fund (commercial)</li> <li>– Equipment leasing (commercial)</li> <li>– Warehousing and credit enhancement (residential)</li> </ul>
Technology Fund (Switzerland)	<ul style="list-style-type: none"> <li>– Loan guarantees (innovative technologies)</li> </ul>
UK Green Investment Bank (United Kingdom)	<ul style="list-style-type: none"> <li>– Efficiency fund (non-residential including hospitals)</li> <li>– Corporate financing (municipal lighting)</li> </ul>

A challenge facing GIBs in their effort to scale up energy efficiency investment is a lack of demand, as manifested by low uptake reported by some lenders that offer traditional energy efficiency products. GIBs report that when they ask banks to consider new or increased efficiency lending, banks sometimes assert that increased financing is unnecessary due to low demand. Commercial banks may deny the existence of a financing gap (and therefore the need for GIB interventions) based on their view that financing is available but unused. However, other factors may impact demand for financing.

The lack of demand for energy efficiency finance can be a result of insufficient or ineffective marketing efforts or a lack of co-ordination with contractor networks. With respect to marketing, successful energy efficiency financing programmes tend to be simple, are tailored to a target market and place minimal burden on the customer. Efficiency upgrades are rarely something a customer actively seeks, so an efficiency financing product is typically “sold” rather than “bought”. With respect to contractors, successful financing products tend to be integrated with the efficiency service itself, easy to understand and repayable through minimal additional effort (e.g. through on-bill payments or tax payments). To increase demand, banks can inform contractors that they offer this financing product and encourage them to inform customers (DeVries, 2015).

Unattractive financing terms can also reduce demand for energy efficiency investments. Energy efficiency financing offered at high rates or with short tenors may impede cost-effective projects. In contrast, offering loan tenors and payment schedules and amounts to align with project savings can allow borrowers to save money on a monthly basis. For example, the UK Green Investment Bank has developed a tailored lending programme for local municipalities that is initially focused on street lighting upgrades and that matches payment schedules to when project savings are generated.

Successful GIB energy efficiency activities to date have highlighted the importance of designing “whole market” solutions and financing “whole building” efforts. “Whole market” solutions call for differentiated marketing and finance approaches for different segments of the local efficiency market, such as new buildings, buildings to be renovated,

government-owned buildings, residential homes, commercial properties, etc. A “whole building” approach considers synergies involving efficiency upgrades and other renovations in buildings. For example, the Connecticut Green Bank has found that commercial buildings scheduled for renovation for some other purpose are the ideal target for energy efficiency lending. In addition, a majority of buildings suitable for energy efficiency investing are also good candidates for rooftop solar or combined heat and power (CHP) facilities.

GIBs understand that without origination of projects, very little market activity will occur. To provide advice and one-stop shopping for residential and commercial building owners, a GIB operating at the retail level may design an integrated financing and efficiency offering in partnership with local lenders and origination firms. Alternatively, a GIB may provide its own origination services or may on-lend to firms that in turn extend loans to building owners.

Some GIBs also facilitate market development by using aggregation techniques to build portfolios of similar loans large enough to attract private investors. For example, the Connecticut Green Bank issues energy efficiency loans to individual projects for commercial buildings and sells the cumulative portfolio to private investors in order to recapitalise the pool (US Department of Energy, 2014). Other GIBs like NY Green Bank and Australia’s Clean Energy Finance Corporation (CEFC) have taken a wholesale approach, offering warehouses and lines of capital that project developers and lenders can draw upon to directly finance projects. Both approaches help to overcome investment barriers associated with small and disparate projects.

To facilitate pooling or bundling of loans, GIBs can increase standardisation by creating consistent loan documentation and technical assessment processes. The wide range of documentation, processes and project types can make it costly for investors to underwrite energy efficiency loans and also inhibits the creation of secondary markets for energy efficiency. Selling a portfolio of loans, either through private placement or public securitisation, requires a certain level of consistency across the loan within the portfolio. GIBs can promote standardisation in their deals to create greater uniformity across the market (Lowder and Mendelsohn, 2013).

Risk mitigation techniques are often used for energy efficiency projects that have very low project risk but still require additional support to make private lenders comfortable to participate in the projects. Risk mitigation may be provided through subordinated debt investments, loan loss reserves or loan guarantees. GreenTech Malaysia provides loan guarantees for energy efficiency investments, with varying fee schemes (GTFS, 2014). The Connecticut Green Bank’s Smart-E Loan Program offers a standard loan loss reserve to local banks that make residential energy efficiency loans. In exchange for use of the reserve, lenders must provide loans below a maximum rate and longer than a minimum term.

GIBs employ these strategies through a range of different financing structures. A set of increasingly common techniques is used to overcome barriers and facilitate energy efficiency investment, while fulfilling the GIBs’ mission of expanding efficiency markets by leveraging private investment. The following sections and Table 4.2 highlight the types of GIB energy efficiency investments and risk-mitigating and transaction-enabling offerings.

Table 4.2. **Types of green investment bank energy efficiency investments by entity**

Entity	On-bill financing	PACE	Credit enhancements	Efficiency funds	Direct lending	Leasing	Warehousing
Clean Energy Finance Corporation (CEFC) Australia	X	X		X	X	X	X
Connecticut Green Bank Connecticut, United States	In development	X	X		X		X
Malaysia Green Technology Corporation (GreenTech Malaysia) Malaysia			X				
NY Green Bank New York, United States			X	X		X	X
Technology Fund Switzerland			X				
UK Green Investment Bank United Kingdom				X	X		

## Energy efficiency instruments and funds

In addition to making private investment less risky and costly, GIBs also directly invest public capital in energy efficiency projects. GIBs use a range of investment financing instruments, including dedicated efficiency funds, direct loans, equipment leases and warehousing for smaller efficiency loans. By directly investing, GIBs create opportunities for private sector co-investment, thereby mobilising private investment into underserved markets.

### *Energy efficiency funds*

GIBs have created numerous project-based funds to provide loans to or otherwise support energy efficiency projects (UK Green Investment Bank, 2014a; CEFC, 2015a). GIBs may act directly as the marketer and underwriter for each loan, or partner with a private actor who is responsible for finding projects and disbursing loans. These funds demonstrate to the market that energy efficiency investments can be profitable and provide sufficient size to attract larger investors, such as investment banks or institutional investors.

In February, 2014 the UK Green Investment Bank formed a GBP 50 million energy efficiency partnership with Société Générale Equipment Finance, with each party committing GBP 25 million. The partnership will provide loans for CHP plants, boilers, building retrofits, lighting or energy reduction technologies for production processes. Loans will be structured so that repayments are less than the value of energy savings, meaning borrowers can save money on day one of the loan (UK Green Investment Bank, 2014a). Similarly, Australia's CEFC formed an energy efficiency fund with Commonwealth Bank, with each party investing AUD 50 million. The fund will make individual loans in the range of AUD 500 000-5 million, aimed at reducing energy costs (CEFC, 2015a).

### *Corporate finance for efficiency products*

GIBs may provide direct corporate financing to companies to undertake energy efficiency projects and upgrades on their own buildings. Though corporations may recognise that investing their own resources in energy efficiency can create a positive return, other capital projects are typically given higher priority. Direct corporate finance



addresses this challenge by enabling companies to implement projects without using their own capital. Australia’s CEFC has directly financed a range of projects including: improving energy efficiency in lighting, heating and insulation at a local aquatic centre; cutting energy consumption through improved ventilation and LED lighting in a Brisbane office block; and helping a local council building reduce energy costs through improved air conditioning and energy-efficient lighting (CEFC, n.d.). The corporate loan facility funded by the UK Green Investment Bank to promote street lighting energy efficiency is discussed in Box 4.4.

#### Box 4.4. UK Green Investment Bank’s municipal street-lighting loan

There are over 7 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 1 million street lamps are energy efficient.

To encourage municipalities to make the switch to low-energy lighting, the UK Green Investment Bank created an innovative “Green Loan” product in 2014 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. The product’s fixed rates and terms designed to match the payback period allow cities and towns to enjoy net savings on their street lighting from day one of the project and municipalities save 80% of their lighting costs. By using this product, participating municipalities reduce their operating budgets and take advantage of investment opportunities that otherwise would be left untapped because of competing investment needs deemed to be of higher priority.

*Source:* UK Green Investment Bank (2014b), “Low energy streetlighting: Making the switch”, Market Report, UK Green Investment Bank, February, [www.greeninvestmentbank.com/media/5243/gib-market-report-low-energy-streetlighting-feb-2014-final.pdf](http://www.greeninvestmentbank.com/media/5243/gib-market-report-low-energy-streetlighting-feb-2014-final.pdf).

In another example, Australia’s CEFC has financed National Australia Bank via a corporate bond purchase in exchange for offering a concessional loan product for financing equipment and vehicles that meet CEFC standards of efficiency. The “Energy Efficient Bonus” is offered to the end user as a 70 basis point (0.7%) discount from the prevailing equipment finance rate. This provides equipment sales persons with a talking point about energy efficiency and entices the purchaser to compare the costs of a more efficient product with the costs of less efficient products that do not qualify for the bonus (CEFC, 2015b).

### ***Equipment leasing***

Through an equipment lease, the lessor maintains ownership and the lessee makes regular payments. The lessee gets the benefits of using the new equipment – in this case the reduced energy cost – without having to use internal resources to pay for the equipment upfront. This financing method allows borrowers looking for new energy-efficient equipment to replace one operating expense (energy) with another (lease payments) without making a capital expenditure. The corporate balance sheet is therefore unaffected by the lease and there may also be tax benefits from lease payment deductions (NRDC, 2011).

In 2014, NY Green Bank announced the creation of an energy equipment financing fund. In partnership with Bank of America Merrill Lynch, NY Green Bank announced an agreement in principle to co-invest long-term capital aimed at expanding commercial market offerings for equipment leasing and enabling deeper energy retrofits (NY Green Bank, 2014). The fund will finance public and private sector renewable energy projects, including renewable energy, energy efficiency and CHP.

### **Risk mitigants and transaction enablers for energy efficiency investment**

GIBs are engaged in a range of activities to reduce the risk of energy efficiency investments or to help lower the high transaction costs often associated with energy efficiency projects. Investment in energy efficiency projects is often unsecured, with the lender unable to claim ownership of a physical asset in the event of default. Due to the lack of collateral and associated risks, interest rates may be high, reducing the attractiveness of energy efficiency loans. To address this challenge, several GIBs use new mechanisms such as on-bill finance and property-assessed clean energy (PACE) financing, which allow energy efficiency loans to be paid back through utility bills or property taxes, reducing repayment risk. GIBs can also offer traditional risk mitigants such as loan guarantees or first-loss provisions.

#### ***Guarantees***

Malaysia's Green Technology Financing Scheme (GTFS) offers loan guarantees to energy efficiency projects. Properly certified green projects may seek loans from participating commercial banks, which in turn receive a 60% loan repayment guarantee from the GTFS. A broad range of energy efficiency technologies and solutions are eligible for the guarantee (GTFS, 2012). In addition to guaranteeing loan repayment, GIBs could (in principal) guarantee the energy savings achieved through an efficiency project to increase consumer confidence and spur investment.

#### ***On-bill finance***

In the most basic on-bill finance structure, a lender issues a loan to a borrower for an energy efficiency project. Instead of having the lender send a loan repayment bill to the borrower, the cost of repayment is listed directly on the monthly energy utility bill the borrower already receives. The utility collects payment from the borrower and remits the payment back to the lender. This technique is attractive for the borrower because bills are consolidated and the borrower can see on a single bill the reduced energy expenditure and the corresponding cost of the loan repayment. It is attractive for lenders due to the low historical default rate of utility bills compared to unsecured consumer financing (State and Local Energy Efficiency Action Network, 2014). The additional repayment security can lower the interest rate on the loan, as in the case of Australia's CEFC's on-bill finance programme described in Chapter 3 (Origin, n.d.).

On-bill finance can be enhanced to provide even greater lender security by creating a tariff-based on-bill programme. Using this approach, the loan is tied to the utility meter of the building, not the individual borrower, so if a property is sold the loan stays with the building instead of the individual owner. This provides greater transparency for building sales and eliminates potential borrower concerns regarding cost recovery if a property is sold.

GIBs can support and facilitate on-bill finance by acting as the primary lender of an on-bill programme, aggregating a portfolio of loans that can then be sold to a private investor. GIBs could also co-invest with a private lender or provide a credit enhancement like a loan loss reserve to support loan origination provided directly by a private investor. GIBs could also play an administrative role, helping to establish a new on-bill programme by co-ordinating lenders, policy makers and regulators.

### ***Property-assessed clean energy***

Property-assessed clean energy, or “PACE”, is a form of renewable energy financing through which a borrower repays a loan through property taxes attached to the building that is being upgraded. When a PACE loan is issued, a new property tax lien is placed on the building that benefits from the energy efficiency improvement. By creating a lien, the loan repayment is treated like a new tax obligation on the borrower, with the building itself used as collateral. If a building owner does not pay their property taxes, the government can foreclose on the building and sell it in order to recover the unpaid tax obligation. Under PACE, the efficiency loan is treated the same way, with a penalty of foreclosure in the event the borrower does not repay the efficiency loan. This is a powerful tool to be applied to energy efficiency financing, which is typically why PACE statutes require PACE projects to be cash-flow positive from the start of the loan term (NREL, 2010).

Much like on-bill financing, the lien makes repayment effortless for borrowers and creates increased security for lenders. Rather than treating an energy efficiency loan as unsecured consumer or corporate debt, banks can treat the PACE structure as a far more secure repayment which enables lower rates and longer term lending and attracts new investors. PACE financing is most commonly used in the United States.

PACE financing programmes typically require enabling legislation and can be complex to implement. Many local jurisdictions have a long history of using tax liens and “special improvement districts” to facilitate investment in public infrastructure with repayment through property taxes. If, for example, a city decides to improve the local sewage system, it may issue a bond to pay for the improvement. To recover project costs, the city could identify the “special improvement district” and place a new property tax lien on all properties that benefit from the system. To enable PACE programmes, legislation must be passed that allows local tax-collecting jurisdictions to treat renewable energy investment like other infrastructure which can be repaid through tax liens. A given jurisdiction must then opt to allow the placement of these liens within its property tax base. PACE liens, unlike other infrastructure liens, are entirely voluntary and are only placed on buildings that receive a renewable energy loan.

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 states in the United States this complexity has hindered market growth. While many US states have passed PACE-enabling legislation, the tool is only used at scale in California for residential PACE and in Connecticut for commercial PACE. Growth is slowed not by lack of consumer demand but by inefficient legal and programme structures that place the burden on each local jurisdiction to create their own PACE programme with independent financing sources. The Connecticut Green Bank, however, has found notable success by centrally administering and financing a state-wide commercial energy efficiency programme (see Box 4.5 for details). 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. The first portfolio sale of USD 30 million in early 2014 represented the first securitisation of its kind. Other US states are exploring the use of GIB financing to create similar commercial PACE programmes.

### ***Reducing transaction costs through warehousing***

Warehousing can be an element in many forms of energy efficiency financing, paired with tools such as PACE, on-bill financing or equipment leases. For example, the Connecticut Green Bank warehouses its PACE loans, which are then sold as a whole portfolio to private investors (described in Box 4.5). By using the warehouse structure, the Connecticut Green Bank is able to create consistency and address many small projects, and then aggregate them to a scale that is attractive for private investors.

#### **Box 4.5. The Connecticut Green Bank C-PACE programme**

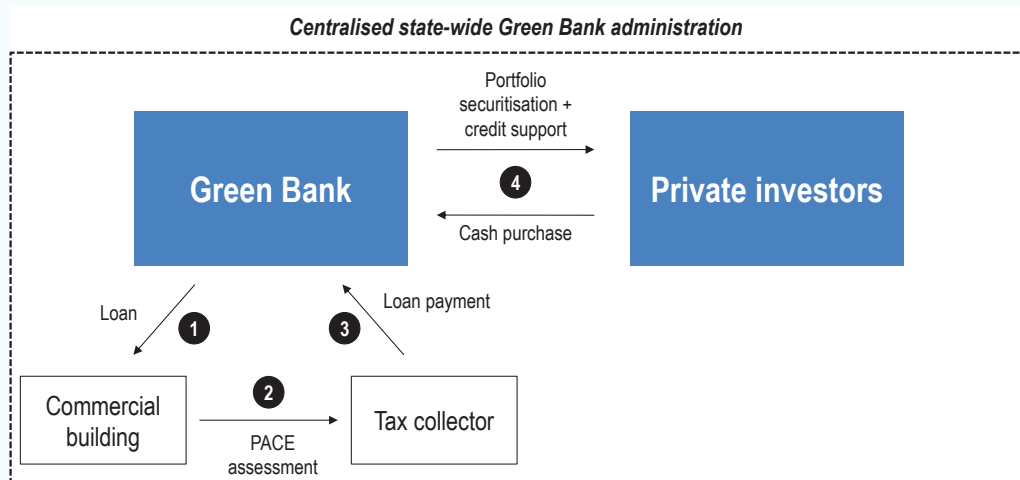
The Connecticut Green Bank has implemented one of the most successful commercial building energy efficiency programmes in the United States, using the property-assessed clean energy (PACE) structure. The programme was launched in early 2013 and in less than two years the Green Bank has financed nearly 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 green investment bank (GIB) to facilitate similar commercial PACE programmes.

Connecticut is one of 29 US states to pass PACE-enabling legislation, but it is the only one to have created a state-wide programme with centralised administration through a GIB. This structure was created to avoid the pitfalls of relying on individual jurisdictions to each create distinct programmes, guidelines and financing strategies. The Connecticut Green Bank provides a standardised approach for all commercial PACE deals in the state, allowing for greater scale. In addition, the Green Bank committed to educating municipalities, contractors, building owners and private banks about the programme. Many other states have found that private actors are slow to take on this public goods-generating role. Connecticut's legislation also tasked the Green Bank with certifying that each PACE deal in the state meets a certain level of quality, as measured by the savings-to-investment ratio of the project. Each PACE project must have a savings-to-investment ratio above 1.0, meaning all projects must be cash-flow positive.

As originally designed, the Green Bank intended to establish the PACE programme structures and then invite private lenders to originate loans, with the Green Bank co-ordinating with municipalities and approving deals. However, despite pre-approving multiple banks to participate in the programme, private lenders did not enter the market after the programme was launched as they were still hesitant to be the first investors in a new and unfamiliar structure. This led the Green Bank's Board of Directors to authorise the origination of PACE loans using its own balance sheet and the creation of an internal USD 40 million warehouse which could be used to originate loans through contractor networks and direct marketing. Loans are currently issued at 5-6% rates, with terms up to 20 years, intended to match the useful life of the energy conservation measures. The Green Bank performs financial underwriting for each deal, and partners with a technical administration firm that produces detailed technical assessments, savings projections and return calculations to facilitate deal closing and approval.

### Box 4.5. The Connecticut Green Bank C-PACE programme (continued)

Figure 4.1. Connecticut Green Bank's C-PACE enables secure efficiency investment at scale



To leverage private capital and recapitalise the warehouse, in early 2014, the Green Bank invited bids from investors interested in purchasing the PACE loans. After achieving the necessary scale and creating project consistency, the offer attracted bids from numerous firms, including Clean Fund, a niche PACE investment firm and the eventual bid winner. Under the deal terms, Clean Fund bought USD 24 million of a USD 30 million bond issuance, with the Green Bank repurchasing USD 6 million worth of bonds in a subordinate tranche as a credit enhancement to Clean Fund. The deal marked the first commercial energy efficiency securitisation of its kind and serves as a model for how GIBs can overcome barriers to finance, bring markets to scale and attract private capital. The Green Bank is now seeking to build a larger external origination warehouse funded with both Green Bank and private capital, with a goal of selling the PACE loans through a public securitisation.

*Sources:* Lombardi, N. (2014), “In a ‘watershed’ deal, securitization comes to commercial efficiency”, Greentech Media, 19 May, [www.greentechmedia.com/articles/read/the-first-known-commercial-efficiency-securitization](http://www.greentechmedia.com/articles/read/the-first-known-commercial-efficiency-securitization); Connecticut Green Bank (2015), “Innovating, educating and activating to accelerate clean energy: 2014 annual report”, Connecticut Green Bank, Stamford, Connecticut, [www.ctgreenbank.com/wp-content/uploads/2015/12/AnnualReport\\_FINAL\\_5.4.15-SinglePages.pdf](http://www.ctgreenbank.com/wp-content/uploads/2015/12/AnnualReport_FINAL_5.4.15-SinglePages.pdf); Coalition for Green Capital (2015), “Creating state financing tools to make clean energy markets grow quickly”, presentation by Reed Hundt, May, [www.coalitionforgreencapital.com/uploads/2/5/3/6/2536821/cgc\\_-\\_summary\\_presentation\\_may\\_2015.pdf](http://www.coalitionforgreencapital.com/uploads/2/5/3/6/2536821/cgc_-_summary_presentation_may_2015.pdf); PACE Now (n.d.), “List of all PACE enabling statutes by state,” PACE Now website, [www.pacenow.org/resources/pace-enabling-legislation](http://www.pacenow.org/resources/pace-enabling-legislation) (accessed 25 August 2015).

## Energy efficiency investment partners

Given the range of barriers preventing the scaling up of energy efficiency investment, GIBs engage with a range of partners to mobilise private investment in energy efficiency, including local banks, retail energy efficiency firms and local development authorities.

#### Box 4.6. Warehouse for Energy Efficiency Loans (WHEEL)

The Warehouse for Energy Efficiency Loans (WHEEL) is a cross-state energy efficiency financing platform launched in the United States to attract institutional investors by achieving scale through aggregation of projects and consistency through project standardisation. Based on a programme started in Pennsylvania, WHEEL provides a credit enhancement to a centralised, privately-funded, national warehouse, which, in exchange, provides capital to fund energy efficiency loans in that state. This structure allows each state to design its own deployment and retail lending strategy while taking advantage of low-cost institutional capital drawn from the national warehouse. The initial investors Citi and Renewable Funding have built a USD 100 million loan pool, which will be securitised and recapitalised once funds are fully deployed. The first WHEEL securitisation of USD 12.58 million backed by pools of residential energy efficiency loans took place in June 2015 with plans to execute additional transactions in the next several years. Pennsylvania and Kentucky were charter members of WHEEL, and in October 2014 WHEEL expanded into New York through a NY Green Bank investment. As per the requirements of WHEEL, NY Green Bank offered a credit enhancement to the central loan fund, allowing New York borrowers to access the warehouse.

*Sources:* PR Newswire (2014), “U.S. homeowners to benefit from groundbreaking home energy loan financing platform”, 9 April, [www.prnewswire.com/news-releases/us-homeowners-to-benefit-from-groundbreaking-home-energy-loan-financing-platform-254545821.html](http://www.prnewswire.com/news-releases/us-homeowners-to-benefit-from-groundbreaking-home-energy-loan-financing-platform-254545821.html); NY Green Bank (2014), “NY Green Bank’s initial transactions,” NY Green Bank website, <http://greenbank.ny.gov/initial-transactions>; Citi (2015), “Citi and Renew Financial announce first-ever energy efficiency loan asset-backed security transaction”, press release, 15 June, Citigroup Inc., [www.citigroup.com/citi/news/2015/150615a.htm](http://www.citigroup.com/citi/news/2015/150615a.htm).

#### **Local banks**

Building partnerships with smaller local banks is important for GIBs, particularly for residential and small commercial energy efficiency projects which, by their nature, have relatively low upfront costs. Local banks in regions with higher demand for energy efficiency projects, based on local climate and energy infrastructure, can play an important role in originating energy efficiency loans for individuals. They are also well positioned to pair energy efficiency loans with other forms of home lending, like mortgages and home equity loans. Home purchase or remodelling are ideal decision points for homeowners to consider energy efficiency upgrades, so positioning local banks to offer efficiency-specific lending products in tandem with a mortgage could prove an effective strategy for increasing consumer demand (Energy Star, n.d.).

GIBs can take on the role of originating small, disparate loans for a range of types of energy efficiency projects, and they can also work with local banks to take on the role of underwriting and originating loans. GIBs can support local banks with technical assistance or training, and also through financial support like credit enhancements or co-lending to incentivise local lending activity.

A barrier to increased local lending in energy efficiency is that local banks are often unfamiliar with or averse to unsecured lending that is paid back through energy savings. Local banks primarily issue mortgages and other home-equity based lending, or business loans to expand or improve local businesses. For these types of lending, risk assessment is based primarily on an individual borrower’s credit worthiness and the perceived likelihood that income sources will be great enough to pay back the loan. Energy efficiency projects, despite creating their own income stream through energy savings, are frequently assessed using the same risk considerations as other loans that do not produce

income to repay the loan. Because local banks do not account for project savings in the underwriting process, they treat efficiency loans as they do other loans that have greater risk of default (Schopp, 2014).

GIBs can work with local lenders to educate them on the nature of efficiency payback and help them develop more appropriate underwriting criteria that account for project savings. This can increase lenders' comfort with this kind of loan. GIBs can also drive market entry by local lenders through credit enhancements. As described earlier, the Connecticut Green Bank's Smart-E Loan Program targets local banks by offering a loan loss reserve to support energy efficiency loans. By enrolling in the programme, local lending institutions are ensured that the reserve would cover a portion of late payments and defaults. In exchange, banks agree to comply with "not-to-exceed" rates and offer better terms to borrowers than they would without the reserve. The Connecticut Green Bank also informs contractor networks on which banks are participating in order to drive customer demand to the banks offering Smart-E loans. In Malaysia, the GTFS's loan guarantee structure necessitates the participation of other private lenders to originate loans.

### ***Retail efficiency firms***

In addition to traditional local lending institutions, there are a growing number of niche private investment firms that exclusively focus on providing retail energy efficiency loans paired with direct energy efficiency services. These "one-stop shop" firms are often funded by institutional investors and provide an integrated solution tailored to market segments too small to attract large ESCO firms. For example, Renovate America operates residential PACE financing programmes throughout California, with large loan portfolios securitised through public sales (Hales, 2015). GIBs can partner with or support these private firms by creating funds or providing a credit enhancement to enable the private firm to target customers with lower incomes or credit rating.

### ***Local development authorities***

Sub-national governments may have associated development authorities which have the power to issue bonds to support infrastructure projects. These authorities can directly access low-cost debt in public markets based on the backing of sub-national government credit. GIBs can work with development authorities to identify private investment partners, help structure deals, identify energy project opportunities and create sustained energy finance programmes. For example, the Port of Greater Cincinnati Development Authority in the state of Ohio issued bonds to finance the local PACE programme (Port of Greater Cincinnati Development Authority, 2015).

## Notes

1. In 2011, energy savings from efficiency improvements in 11 IEA member countries was greater than the energy consumed by any single energy source across those countries (IEA, 2014a).
2. In the IEA's *World Energy Outlook 2012* (IEA, 2012), investments were classified as competitive if the payback period for the up-front energy efficiency investment is equal to or less than the amount of time an investor might be reasonably willing to wait to recover the cost, using the value of undiscounted fuel savings as a metric. The payback periods used were (in some cases) longer than current averages, but they were always shorter than the technical lifetime of individual assets.
3. The EUR 6.5 billion commitment led to EUR 18.4 billion in total investments in 282 000 households. The cost to the federal budget was EUR 934 million (for funding for subsidised lending, repayment bonuses, etc.). This represents a leverage effect of nearly EUR 20 of private investment for every EUR 1 of public capital (Cochran et al., 2014). However, methodologies for calculating leverage ratios may differ and caution should be used when comparing relative mobilisation rates across institutions.

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