

Improving Conditions for Green Building Construction in North America

Financing Models and Opportunities

December 2013



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Please cite as: CEC. 2013. *Improving conditions for green building construction in North America: Financing models and opportunities*. Montreal: Commission for Environmental Cooperation. 47 pp.

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Commission for Environmental Cooperation, 2013

Publication Details

Publication type: *Project Report*

Publication date: *December 2013*

Original language: *English*

Review and quality assurance procedures:

Final Party review: *August 2013*

QA12.26

Disponible en français – Disponible en español

For more information:

Commission for Environmental Cooperation

393, rue St-Jacques ouest, bureau 200

Montréal (Québec) Canada H2Y 1N9

t 514.350.4300 f 514.350.4372

info@cec.org / www.cec.org



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List of Acronyms

BMO	Bank of Montreal
CapEx	Capital expenditure
CEC	Commission for Environmental Cooperation
CMHC	Canada Mortgage and Housing Corporation
Conae	<i>Comisión Nacional para el Ahorro de la Energía</i>
Conagua	<i>Comisión Nacional del Agua</i>
Conavi	<i>Comisión Nacional de Vivienda</i>
Conuee	<i>Comisión Nacional para el Uso Eficiente de la Energía</i>
CSLP	Climate Smart Loan Program
EEM	Energy-efficient mortgage
ESCos	energy service companies
ESPAs	Energy service purchase agreements
ESPCs	Energy service performance contracts
FHA	US Federal Housing
Fide	<i>Fideicomiso para el Ahorro de la Energía Eléctrica</i>
HERS	Home Energy Rating System
INECC	<i>Instituto Nacional de Ecología y Cambio Climático</i>
Infonavit	<i>Instituto del Fondo Nacional de la Vivienda para los Trabajadores</i>
LICs	Local improvement charges
MUSH	Municipal, university, school and hospital
MVMR	Measurement, verification, monitoring and reporting
NAMAs	Nationally Appropriate Mitigation Actions
NYSERDA	New York State Energy Research and Development Authority
OpEx	Operational expenditure
PACE	Property Assessed Clean Energy
PAYS	Pay-As-You-Save
QECBs	Qualified Energy Conservation Bonds
SCEIP	Sonoma County Energy Independence Program
Semarnat	<i>Secretaría de Medio Ambiente y Recursos Naturales</i>
SIR	Savings-to-investment ratio
TAF	Toronto Atmospheric Fund



Abstract

Among other factors, increasing uptake of green-building construction in North America requires access to financial capital, enabling policies, and a skilled workforce. As part of the report series “Improving Conditions for Green Building Construction in North America,” this report describes three financial mechanisms with strong potential for changing the green-building financing landscape in North America and recommends changes and supporting initiatives that may help overcome existing barriers to a more widespread adoption of those models. The three models identified are: Pay-As-You-Save, Property Assessed Clean Energy, and Green Mortgages. For commercial retrofits in the United States and Canada, the report finds that leveraging private capital markets is critical, reducing transaction costs will improve participation, and negative perceptions about the benefit-to-cost ratio of green-retrofit financing can be overcome with information-sharing, awareness-raising, and education. Residential retrofits in Mexico will benefit from leveraging new sources of capital to scale up green retrofit investments and using a whole-house approach to measurement, verification, monitoring and reporting.



Executive Summary

Financial capital is the lifeblood of any construction, renovation, or retrofit project. Building owners and developers have to raise or allocate funds before a project can begin and they do this in the face of competing demands for that financing. With green projects, there may also be misconceptions that sustainability measures add costs out of proportion to the benefits gained.

This report, then, considers all aspects of financing mechanisms:

- Funding source
- Financing delivery
- Security to investors
- Security to building owners/occupants
- Repayment/collection vehicle
- Methods for measurement, evaluation, monitoring, and reporting

Focusing on three financial mechanisms with strong potential for changing the financing landscape, the report lists their strengths as well as factors that are holding them back from more widespread application. It then suggests changes or supporting initiatives that could break through those barriers and allow these mechanisms to enable widespread adoption of green practices.

1. Pay-As-You-Save

Pay-As-You-Save (PAYS) encompasses a wide range of mechanisms, including utility on-bill financing and energy service performance contracts. Focusing on its application to commercial retrofits in the United States and Canada, CEC's report highlights the modest interest rates and opportunity for long-term repayment timelines as advantages of this model, but notes that it suffers from high up-front costs. To reduce those costs and expand the use of PAYS financing, the report recommends attracting private capital and reducing the complexity of contracts.

2. Property Assessed Clean Energy

Property Assessed Clean Energy (PACE) financing includes loans secured against property and loans repaid with property taxes. Like PAYS, PACE is seen as an opportunity to encourage green commercial retrofits in the United States and Canada by offering debt that is readily transferred with a property. Relatively high interest rates need not be a barrier in this model and PACE loans benefit from very low default rates. PACE loans can expand the availability of green financing, especially with a warehoused-bond approach, which makes the capital immediately available to borrowers. PACE programs can expand by accounting for improved cash flows over the life of the project when assessing borrower capacity to repay, and by seeding the market with government funds.



3. Green Mortgages

Green mortgages have been successful at financing residential retrofits in Mexico, thanks to their low interest rates, low transaction costs, and long repayment periods, which can make these arrangements cash-flow positive from day one. To expand these programs, the report recommends finding new sources of private capital, providing mortgage loan insurance or other back-up security from the government, and promoting a whole-house approach to green performance, which can improve the cost-effectiveness of investments.

Financing Model Lessons Learned

For commercial retrofits in the United States and Canada, the report finds that leveraging private capital markets is critical, reducing transaction costs will improve participation, and negative perceptions about the benefit-to-cost ratio of green-retrofit financing can be overcome with information-sharing, awareness-raising, and education. Residential retrofits in Mexico will benefit from leveraging new sources of capital to scale up green retrofit investments and using a whole-house approach to measurement, verification, monitoring and reporting.



Foreword

Green building practices have the potential to save energy, save money, and improve the quality of human habitat across North America. They can also contribute to water conservation, more-efficient use of raw materials, and ecosystem health around the globe. The Intergovernmental Panel on Climate Change (IPCC) singled out the building sector as having the most cost-effective opportunities for reducing carbon emissions—in fact, many building-related opportunities are cost-neutral, or even cost-positive, to the building owner.

These benefits have made green building practices the fastest-growing trend in the building industry, but they still represent only a fraction of new construction, and the enormous stock of existing buildings has barely been touched at all. Even projects that are pursuing green strategies rarely go as far as they could, settling for marginal improvements in energy efficiency or introductory green certification when much more could be readily achieved.

In accordance with its mission of improving the natural environment by fostering collaboration among the three North American countries, the Commission for Environmental Cooperation (CEC) is exploring the barriers to more-widespread and deeper adoption of green building practices, and is identifying ways to overcome those barriers.

This work is guided by the Trilateral Green Building Construction Task Force, which includes members from Canada, Mexico, and the United States. Charged with following up on the issues raised in CEC's authoritative 2008 report, *Green Building in North America: Opportunities and Challenges*, the task force has led the Improving Conditions for Green Building Construction in North America project as part of the Cooperative Work Plan for 2011–2012.

This initiative seeks to identify opportunities and drive changes needed to support the construction of green buildings and green renovation of existing buildings in North America. As a central component of its work, the task force commissioned three reports to guide both public and private sector efforts in critical areas.

Covering financial mechanisms, education and training programs, and local government initiatives, the three reports identify challenges and recommend solutions for leaders in each of these areas. Each report addresses the particular needs and opportunities of a specific area, while complementing the others.

Financing is the lifeblood of any building project. Workforce skills and capabilities are essential to realizing the project. And local government policies are needed to raise awareness of the benefits of green building, encourage the creation of green projects, and represent the collective interest of each community in a built environment that supports the health and well-being of the public.



While the findings and recommendations of each report are noteworthy individually, collectively they point to a huge opportunity in the green building and public policy sector. As science fiction author William Gibson pointed out in *The Economist* in 2003, “The future is already here—it's just not evenly distributed.” This observation is particularly apt in the realm of green building, where some cities and regions are implementing programs and seeing technology and design innovations that are well ahead of the rest of the North American continent. As a result, rather than inventing new approaches from scratch, we now have successful precedents to emulate and adapt—those examples are highlighted throughout these reports.

The three reports—one of which you are now reading—are further enhanced by several related initiatives from the CEC: a comprehensive online resource repository that provides, in one place, a library of relevant source materials; a guide to green building rating systems and programs in North America; and support for Mexico’s adoption of the Energy Star benchmarking methodology.

This report, in conjunction with its two siblings and the other related projects, constitutes an important resource that financial organizations, local governments, and educational institutions can use to create their own effective green building initiatives. By connecting the specific interests of building owners and occupants with the common interests of communities, countries, and a whole continent, the CEC is bringing green building to the forefront as a solution we all can use.

Acknowledgments

The Secretariat of the Commission for Environmental Cooperation (CEC) extends its appreciation to the members of the Trilateral Green Building Construction Advisory Group and its experts’ Task Force, and particularly to the Chair of the Task Force, Ann Edminster (Principal at Design AVenues), for her leadership and support, as well as the staff at the CEC responsible for this report, including Benjamin Teitelbaum (Program Manager), Catherine Hallmich (Project Coordinator), and the editorial team of Johanne David, Jacqueline Fortson and Douglas Kirk.



Introduction

Objectives

The Commission for Environmental Cooperation (CEC) has been actively engaged in promoting research and discussions on green buildings. Following the publication of its 2008 report on green buildings in North America (CEC 2008), the CEC created the Trilateral Green Building Task Force, with the mission of supporting the mainstreaming of green-building construction in North America. To deliver on this challenging task, the CEC is working toward gaining a better understanding of the business models capable of driving green-building construction and creating new market growth opportunities in North America. This report constitutes a first step in engaging in a discussion between government and industry in Mexico, Canada and the United States on such models.

The aim of this report is to assess the potential for uptake of financing models capable of increasing green-building investments in Mexico, Canada and the United States.

Approach

Based on a literature review and interviews with green-building experts in North America, a review of the financing landscape for green buildings in North America was performed. In this review, financing models tested in Mexico, Canada and the United States were described, and cross-cutting trends and findings on financing the greening of new-built and existing buildings were highlighted. One of the findings of this review is that green-building financing models are structured on six fundamental components, each of which can have a number of different features (as shown in Figure 1). The six components are:

1. the funding source (sources of capital funds);
2. financing delivery (arrangements for delivering funds to building owners/occupiers);
3. security to investors (arrangements for providing security so that the expected benefits, e.g., utility cost savings or return on investments, will be realized);
4. security to building owners/occupiers;
5. the repayment and collection vehicle (the ways that repayment is collected); and
6. the methods to measure, evaluate, monitor and report green benefits associated with new-building construction and retrofits (e.g., greenhouse gas emissions reduction, energy savings, water conservation, etc.).

A roundtable discussion held during San Francisco's 2012 GreenBuild conference brought together governments, building developers and contractors, and the finance community to discuss some of the key trends, drivers and barriers concerning financing green buildings in North America. Four key lessons learned produced by this roundtable informed this report:



1. Green retrofits of retail and office-space buildings in Canada and the United States (hereafter, “Canada/US commercial retrofit”) are faced with financing barriers that need to be addressed.
2. The market for green retrofits in single- and multi-unit residential buildings in Mexico (hereafter, “residential retrofit in Mexico”) also possesses considerable financing needs.
3. A form of government security (e.g., a reserve loss fund, insurance) is an essential condition to successful green-building financing.
4. Appropriate measurement and verification of green-building benefits (e.g., energy-use reduction; greenhouse gas / pollutant emission reductions; renewable energy generation; water conservation; etc.) is at the core of successful green-building financing.

This report summarizes the findings of a detailed analysis of three financing models with potential for promoting green-building investment in Mexico, Canada and the United States. More specifically, it discusses whether:

- Pay-As-You-Save (PAYS) and Property Assessed Clean Energy (PACE) financing can be used to promote Canada/US commercial retrofit; and
- green-mortgage products can help to scale up investments in residential retrofits in Mexico.

Report structure

This report contains four distinct chapters and two appendices.

Chapters 1 to 3 describe three financing models which have shown some potential for promoting green-building investment in North America but face limitations preventing higher market uptake and further greening. More specifically, Chapters 1 and 2 assess whether PAYS and PACE respectively have the potential to promote investments in green retrofits for retail and office buildings in Canada and the United States, and Chapter 3 considers whether green-mortgage financing can help to scale up green retrofit investments for residential buildings in Mexico.

These three financing models have been tested in a number of jurisdictions in North America, in one shape or another. In Chapters 1 to 3, the strengths and weakness of these models have been reviewed against each of the components of green-building financing (see Figure 1), based on published material and ten interviews with selected experts (see Appendix 1). Chapters 1 to 3 also consider whether slight variations in funding sources, security arrangements, and measurement, verification, monitoring and reporting (MVMR) could help to overcome obstacles to market uptake and greening.

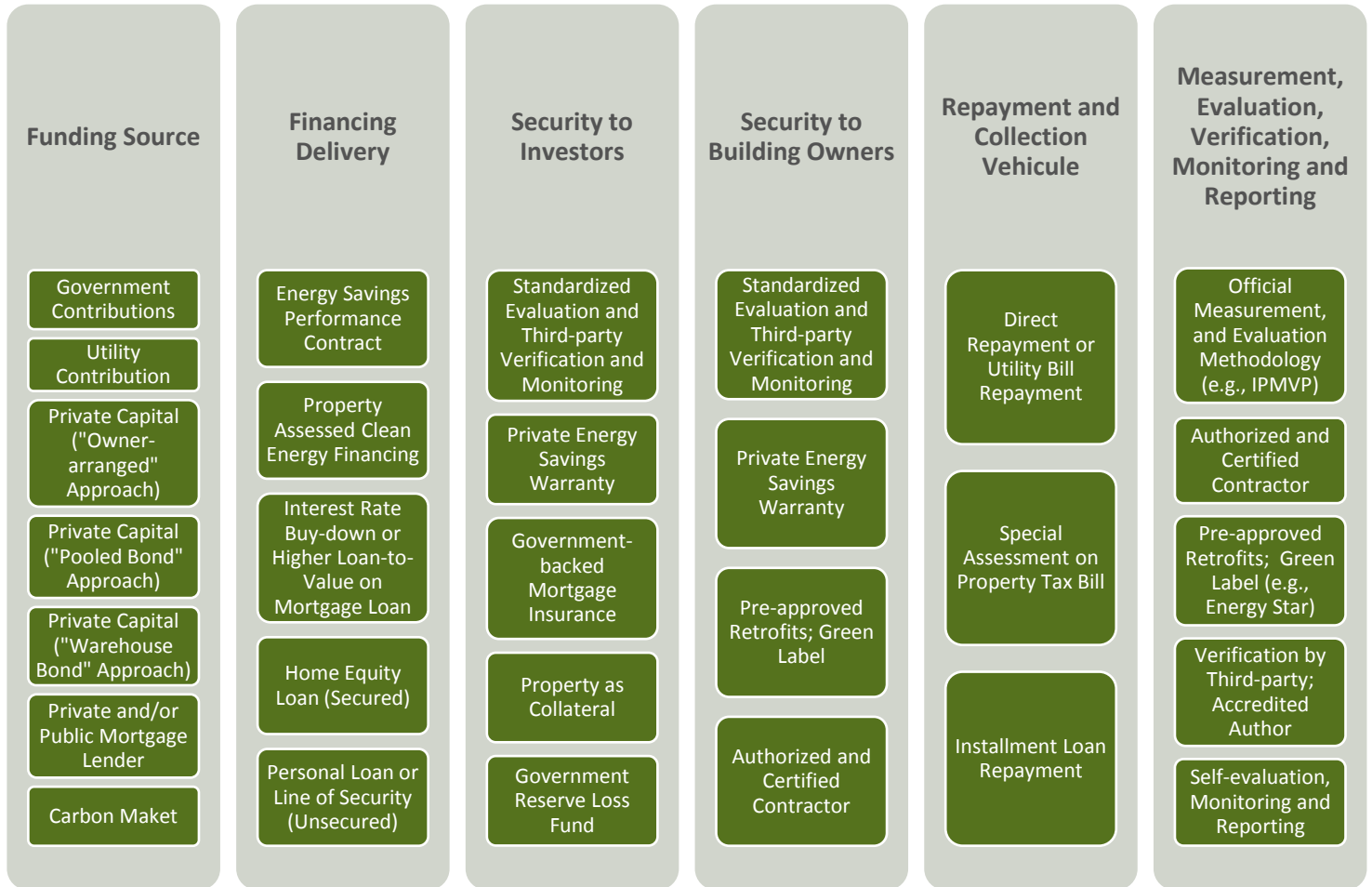
Chapter 4 presents a summary of lessons learned. It also describes practical ways forward to introduce changes to existing financing models, and the needed commitments from the financing community and governments to scale up green-building investment in North America. These lessons have been discussed and validated by a group of experts during two focus group discussions (see Appendix 2).

Appendix 1 provides the names of the green-building experts we interviewed as part of this work.



Appendix 2 summarizes the outputs of the focus group meetings held in Ottawa and Mexico City, on PAYS/PACE and green-mortgage financing, respectively.

Figure 1: Essential elements of green-building financing models



Source: Adapted from Palmer et al. 2012.

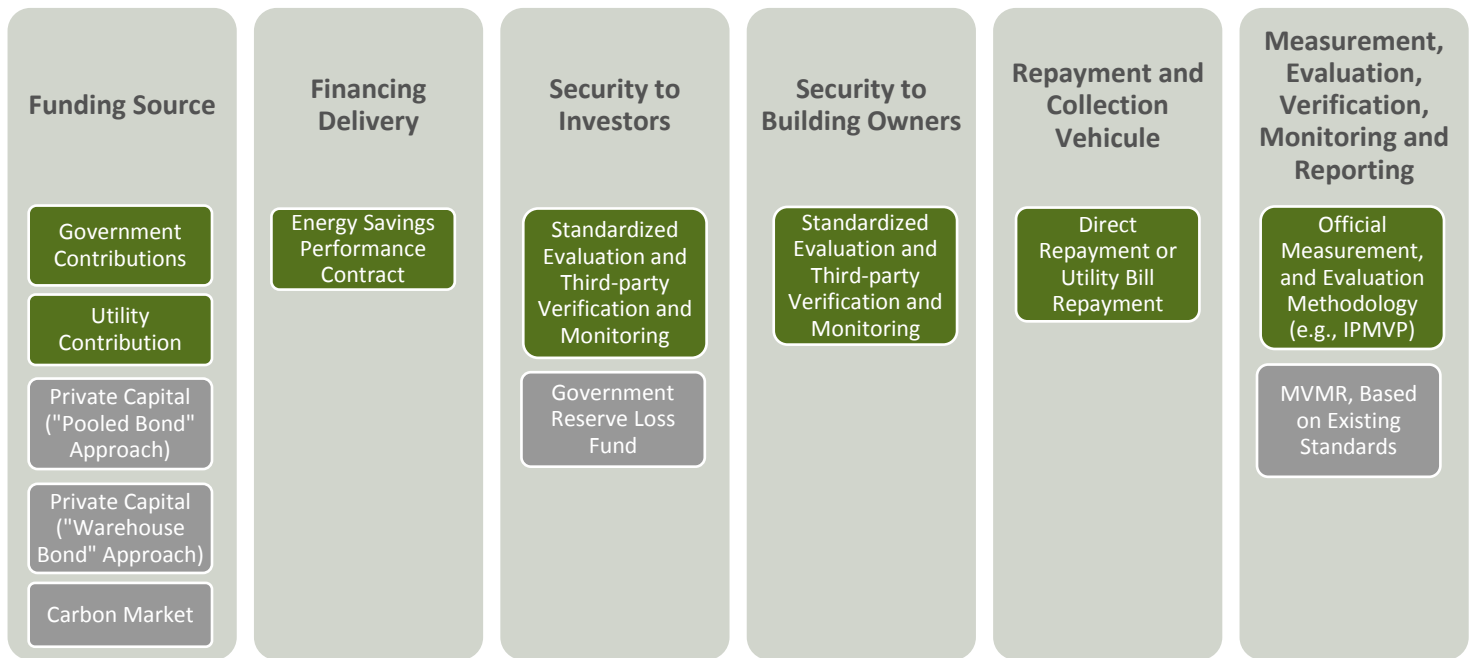


Chapter 1: Pay-As-You-Save

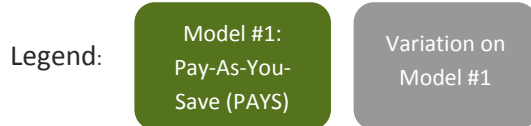
This section describes Pays-As-You-Save (PAYS), one of three green-building financing models which have shown some potential for promoting green-building investment in North America, and more specifically for serving the financing needs of commercial building owners for green retrofits in Canada and the US.

PAYS is not new. Variations of it have been tested in a number of jurisdictions in North America, in one shape or another, and some have shown tangible positive results in promoting green-building retrofits. An analysis of this evidence base is provided in the following pages; it highlights the strengths and weaknesses of PAYS, using examples, and it analyzes whether slight variations in funding sources, security arrangements, and measurement, verification, monitoring and reporting could help to overcome obstacles to market uptake and greening (see Figure 2).

Figure 2: Description of the PAYS financing model (model #1) in support of green retrofits in commercial buildings in Canada and the US, and three possible slight variations with potential for improving market uptake



Source: Adapted from Palmer et al. 2012.



Description of PAYS

PAYS is an umbrella term for programs that provide finance to building owners for green investment as part of new purchases or retrofits (most often, energy efficiency investments). PAYS programs come in various forms: utility on-bill loan and tariff financing, Energy Service Performance Contracts (ESPCs) from energy service companies (ESCOs), and Energy Service Purchase Agreements (ESPAs) from third-party specialist organizations.

Although PAYS programs vary in their structure and application, they are linked by the following common features:

1. **Assumption of financial risk by financing organization:** The financing organization takes on the risk of operation and management failure, by maintaining responsibility over the “green” equipment and/or material installed during the term of the financing.
2. **Repayment is “hassle-free”:** Repayment is made either directly, on utility bills, or indirectly, to a financing organization through a portion of utility bill savings.
3. **The “Golden Rule”:** Expected green-investment savings cover at least loan repayments, and are built into PAYS explicitly or implicitly; i.e., several PAYS programs restrict the amount of financing available to a portion of the expected savings and others stop at validating the positive benefit-to-cost ratio, as based on expected savings over the project’s useful life.

In some instances, green investments with PAYS financing can be kept off the balance sheets of commercial building owners if they are considered a utility expense or a service that does not affect borrowing capacity, rather than a debt obligation. In these cases, PAYS constitutes an “unencumbered” form of finance that does not compete for internal capital against projects with higher internal rates of return.

Utility On-bill Financing

Utility on-bill financing is used in many North American jurisdictions to promote green investment in residential and commercial buildings. For instance, at least twenty US states have implemented an on-bill financing program (Bell et al. 2011). The on-bill financing model has existed for many years; however, it has since undergone some transformations to meet market demand. For instance, tariff-based financing has emerged as an alternative form of on-bill financing, charging customers for green-building improvements through an energy service charge, alongside more traditional loan-based financing. Over half of existing on-bill programs offer financing products to commercial and/or industrial building owners (Bell et al. 2011).

A few North American utilities have also started diversifying their offering by developing other PAYS financing products. For example, this is the case of Manitoba Hydro, which launched in 2012 its PAYS program. This program differs from standard on-bill loans in that the amount of financing available is limited to the financial value of the estimated utility bill savings.



Energy Service Performance Contracts

ESPCs with ESCos have been slow to catch on in the North American commercial real estate market (Buonicore 2012). Some people have explained this slow uptake as resulting from the “split” that separates incentives for making capital investments from those for paying operating costs, which limits interest in long-term performance contracts.

However, innovative ESPC structures have emerged which hold potential to attract demand from commercial building owners. For instance, ESPCs built on the shared savings model arrange for repayment to be done directly from building owners to the financing organization through a portion of realized energy savings, and for the ESCo to take charge of the operation and maintenance of the green-building equipment (White 2011).

Energy Service Purchase Agreements

Across North America, a number of third-party specialist organizations have started offering ESPA products. This is the case with the Toronto Atmospheric Fund (TAF), a municipal arm’s length organization which finances green-building projects in Toronto. In the US, a number of financing service firms offer ESPA products (Buonicore 2012).

Market performance

PAYS achieves a not-negligible market size but is constrained by low participation rates. A study of US on-bill programs found that more than half attracted less than 0.5 percent of their customer base (Bell et al. 2011). PAYS success examples have achieved slightly higher participation rates; for instance, the Connecticut Small Business Energy Advantage program had a participation rate of 1.5 percent between 2000 and 2011, corresponding to over 10,000 loans distributed over that period (Bell et al. 2011).

Through the provision of additional incentives, such as interest rate buy-downs and longer amortization periods and/or transfer of loan repayment responsibility with property ownership, some PAYS programs manage to attract considerable financing applications. For instance, the United Illuminating on-bill loan program managed to double the number of program participants by extending payback periods (Simon and Bertolotti 2012).

Green performance

Overall, measurement and reporting by PAYS programs of their green performance remain poor. In some programs, the success in average energy consumption savings and in avoided greenhouse gas emissions is measured at the facility level. For instance, the Connecticut Business Energy Advantage Program has found that it typically contributes to utility savings of 15 to 30 percent (Brown 2009). Other programs aggregate the total green benefits across all PAYS projects.



Overview of strengths, challenges, trends, and possible variations in PAYS financing

Table 1 summarizes the key strengths, challenges and trends of PAYS for green retrofits in commercial buildings, together with potential variations in PAYS financing models that could help overcome barriers to green-building investment in Canada and the US.

Table 1: Summary of analysis of strengths, challenges and trends of existing PAYS models, and of possible variations in PAYS financing to increase market uptake

	Strengths, challenges and trends*	Possible variations in PAYS financing
Sources of capital, amounts raised, cost and repayment terms	<ul style="list-style-type: none"> ↗ PAYS historically has relied on public funding; however, new forms of PAYS manage to leverage private capital, thanks to public seeding investment. ● PAYS programs have raised modest amounts of capital, except those that have managed to leverage effectively private capital. ● Thanks to low default risk and additional incentives, PAYS manages modest interest rates and long-term repayment terms. 	<p>→ Attracting private capital investors can help to scale up PAYS programs. Other forms of green-building financing routinely raise funding from private capital markets by issuing green bonds, and this is an opportunity that can be leveraged by PAYS programs, thanks to low credit-risk ratings.</p>
Transaction costs for building owners/occupiers and operation costs for program managers	<ul style="list-style-type: none"> ●● Transaction costs vary between low costs for small-size on-bill loans and high costs for large-size ESPC financing. ●● PAYS involves high upfront costs, but modest long-term operation costs. 	<p>→ Reducing the complexity of PAYS contracts is critical to reducing transaction costs for building owners/occupiers.</p>
Security to building owners/occupiers	<ul style="list-style-type: none"> ● Trust in utilities and ESCos has created good levels of confidence in the positive cash flow and credit impacts of PAYS financing. 	
Security to private capital investors	<ul style="list-style-type: none"> ● Low default-risk levels ensure modest risk premiums. 	<p>→ Additional backstop guarantees can help to bring capital costs down; however, without government support these additional guarantees add to the cost of capital.</p>
Measurement, verification, monitoring and reporting (MVMR) of green benefits	<ul style="list-style-type: none"> ● PAYS success for financing commercial building retrofits depends on whether MVMR costs to customers can be brought down. 	<p>→ Building on existing robust MVMR standards helps to reduce cost, while guaranteeing useful and robust MVMR.</p>

*Legend: ● indicates strengths, ● indicates challenges, ↗ indicates trends and → indicates suggested variations in financing to achieve greater market penetration



Sources of capital, amounts raised, cost and repayment terms

Overall, as a result of low default risk, PAYS manages modest interest rates and long-term repayment terms.

PAYS, in the form of utility on-bill financing, has achieved very low default rates. Two studies of US utility on-bill programs found that the default rates range between 0 and 3 percent, on average (Bell et al. 2011).

Such reduced credit risk has enabled modest interest rates. For instance, the New York State Energy Research and Development Authority (NYSERDA) on-bill recovery program offers on-bill loans with fixed interest rates of up to 3.99 percent, and repayment terms of up to 15 years (provided repayment terms do not exceed the useful life of green-building measures). In the longer term, when the interest rate subsidy (known as Qualified Energy Conservation Bonds—QECBs) expires, interest rates of up to 5.99 percent are expected, depending on market conditions. Similarly, low interest rates are achieved by utility on-bill programs created in Canada under a legislative mandate. For instance, annual interest rates for the on-bill Power Smart loans are fixed at 3.9 per cent for five years.

On-bill, tariff-based programs achieve attractive repayment terms, as they attach the financing service to the building's meter and, as a result, they are transferable to new building owners/occupiers, unlike on-bill loans. This allows for longer repayment terms, which are essential for energy efficiency projects that have long payback periods (Brown, undated). In some jurisdictions an on-bill tariff is not considered a loan, since it is a tariff charge assigned to the meter, and can be kept off the balance sheets of building owners/occupiers (Brown, undated).

PAYS historically has relied on public funding; however, new forms of PAYS manage to leverage private capital, thanks to public seeding investment.

Sources of capital for PAYS financing have historically relied on public funding, with the exception of ESPCs which rely on private capital. For instance, over 60 percent of US utility on-bill programs leverage federal and/or state government funding or build on contributions from utility customers (Bell et al. 2011). In a study of nine US on-bill financing programs, six programs had achieved zero interest rates thanks to government funding.

However, new PAYS models relying on private capital are emerging. For instance, the NYSERDA on-bill recovery loan program mobilizes proceeds from the auction of carbon allowances from the Regional Greenhouse Gas Initiative. In the UK, Green Deal financing (or a Green Deal Plan) is provided by private Green Deal providers with Consumer Credit Licences and which comply with government guidance on credit lending. However, in return, interest rates on Green Deal Plans are expected to be relatively high, with a central government estimate of 7.5 percent.



It is clear through these examples that a number of these privately funded PAYS programs are made possible thanks to public seeding investment; for example, through subsidies toward low interest rates (as is the case of the QECBs NYSERDA benefits for its on-bill program), and where such public seeding money is not available the cost of capital is not negligible.

Because PAYS financing benefits from low default risk overall, there is potential for bundling PAYS loans into a new low-risk financial asset class sold to private capital investors (Bell et al. 2011). However, the complexity of defining homogeneous underwriting criteria has thus far prevented the creation of such secondary capital markets for PAYS.

PAYS programs have raised modest amounts of capital, except those that have managed to effectively leverage private funds.

The amounts of capital raised by utility on-bill programs in the US have ranged between a couple million dollars to US\$40 million, with a few notable exceptions. One of these is the NYSERDA on-bill program, which has managed to secure over US\$150 million in financing for single and multifamily buildings, small businesses and not-for-profits, through a combination of government grants and private capital. Of all Canadian on-bill programs, Manitoba-Hydro has been described as the most successful (Bierth et al. 2010, Fuller 2009). A total of US\$167 million¹ in financing has been distributed to residential building owners between 2001 and 2010, representing over 40,000 loans (Bierth et al. 2010).

The amounts of capital raised by ESPCs for green-building investment are considerable. A review of ESPC programs delivered by ESCos in the US showed the median and average project costs were US\$700,000 and US\$1.8 million, respectively (Hoyle 2013).

The UK Green Deal, which is to date one of the most ambitious PAYS financing programs for green buildings, put in place in 2012 a complex framework to raise over US\$2 billion² in private finance by 2015 for energy efficiency investments in buildings (DECC 2012).

Other forms of green-building financing have managed to raise funding from private capital markets quasi-routinely by issuing green bonds. For instance, the Ygrene Fund Property Assessed Clean Energy program has plans to raise US\$650 million in bonds in order to replenish a secured commercial line of credit used to finance loans to commercial building owners.

¹ Converted from Canadian dollars, based on the official 2012 average exchange rate of US\$1 = C\$0.9995. Available at: <www.federalreserve.gov/releases/g5a/current/>. Accessed 24 June 2013.

² Converted from pounds sterling (£), based on the official 2012 average exchange rate of US\$1 = 1.5853 £. Available at: <www.federalreserve.gov/releases/g5a/current/>. Accessed 24 June 2013.



However, most financing from North American PAYS programs thus far has supported green investments in MUSH (municipal, university, school and hospital) and residential buildings. For instance, except in the US, there has been limited ESPC activity for commercial buildings in North America (Kats et al. 2012). In Canada, it is only recently that utilities such as BC Hydro or Manitoba Hydro have started developing and/or launching PAYS programs for commercial buildings.

Transaction costs for building owners/occupiers and operation costs for program managers

Transaction costs vary between low costs for small-size on-bill loans and high costs for large-size ESPC financing.

Overall, on-bill financing in North America supports green-building projects of a modest size; for instance, one of the most successful on-bill programs for commercial buildings (the Connecticut Business Energy Advantage Program) offers loan financing ranging from US\$8,000 to \$12,000 (Bell et al. 2011). The most successful Canadian example of on-bill financing has distributed over 40,000 loans to residential owners over a 10-year period, but with an average loan size of US\$5,000 (Bierth et al. 2010).³ However, there are exceptions; for example, the Sempra On-Bill Financing Program in California offers US\$5,000 to US\$1 million in financing (Bell et al. 2011).

The application process for on-bill programs is much more streamlined, compared to other forms of financing, due to the ability of these programs to leverage existing customer-utility relationships. This in turn helps to keep transaction costs low for customers. For instance:

- most utilities do not require a credit check, as they have the possibility to rely on customer payment history (e.g., this is the case with the Connecticut United Illuminating on-bill program); and
- billing and repayment collection is done through the existing billing system (Brown 2010).

Due to their relative complexity to set up, ESPCs are typically offered for large-scale green projects, usually exceeding US\$500,000 in value, and they tend to have long repayment periods, often 10 to 20 years. For example, Metrus Energy in the US offers ESPCs for energy efficiency projects in large industrial and commercial buildings, with durations of up to 10 years and financing of up to US\$10 million (Hinkle and Kenny 2010). Transaction costs are often considerably higher than for other forms of financing (Kats et al. 2012).

³ Converted from Canadian dollars based on the official 2012 average exchange rate of US\$1 = C\$0.9995. Available at <www.federalreserve.gov/releases/g5a/current/>. Accessed 24 June 2013.



PAYS requires high upfront costs to set up financing program frameworks and systems, but it involves reasonable operation costs by building on existing administration and financing structures.

Setting up a PAYS programs often requires considerable upfront costs for government and program management and financing organizations. For instance, the creation of utility on-bill programs requires legislation and/or regulation mandating regulated utilities to set up such programs. As an example, in 2011 the BC government passed amendments to the Clean Energy Act in order to direct two BC regulated utilities, Fortis BC and BC Hydro, to establish a financing program for energy efficiency improvements; the amendments also include provisions empowering these utilities to incorporate financing agreements into utility rates and allowing the transfer of the loan repayment obligation (Province of British Columbia 2010).

The example of the UK Green Deal is also insightful with respect to required legislative and regulatory changes needed to set up on-bill programs. For instance, the UK government passed a number of new legislations and regulations and secondary guidance, in addition to industry consultations, to create a framework for the Green Deal; these included:

- the Energy Act 2011, which set out the Green Deal framework and created the Energy Company Obligation, placing obligations on energy companies to generate a specific amount of energy reduction credits;
- the Green Deal Framework (Disclosure, Acknowledgement, Redress, etc.) Order 2012;
- the Green Deal (Specified Energy Efficiency Improvements) Order 2012;
- the Green Deal (Qualifying Energy Improvements) Order 2012;
- the Electricity and Gas (Energy Company Obligation) Order 2012; and
- the Green Deal Code of Practice for all participants and certification bodies.

Further, in many cases the creation of on-bill financing programs requires an overhaul of utility billing systems. For instance, the NYSERDA on-bill program required the state government to overhaul its utility billing system at a cost of US\$500,000 (Bell et al. 2011). In cases where utilities have chosen to use third-party organizations to carry out loan financing, additional operational costs are incurred. However, this remains less common than utilities directly taking care of on-bill billing/collection and loan financing (Elenchus Research Associates Inc. 2012).

With regard to operation costs, because on-bill financing benefits from existing utility financing, billing and payment collection systems, costs usually remain modest. For other PAYS programs, there is not much information about long-term operation costs.



Security to building owners/occupiers

Trust in utilities and ESCos and backstop guarantees have created good levels of confidence in the positive cash flow and credit impacts of PAYS financing.

Among the top concerns for building owners/occupiers, with regard to PAYS, is the risk that the green-building equipment installed and/or material used will not have a positive benefit-to-cost ratio, due to improper operation and/or management. A number of PAYS programs have acknowledged this barrier to green-building investment and have put in place security mechanisms. For instance, under TAF's ESPA product, TAF retains ownership of the energy efficiency equipment installed and takes responsibility for replacement and maintenance costs during and until the end of financing terms. As a result, a two-percent charge is built into the cost of financing to cover potential replacement cost and maintenance costs after the manufacturer warranty expires (T. Stoate interview 2013). This model is thought to be advantageous to commercial building owners/occupiers, who usually put aside annually around two percent of capital budgets to cover replacement and maintenance costs (T. Stoate interview 2013).

Some ESPCs go further to provide security to customers by building in a guarantee of energy savings, whereby building owners/occupiers are guaranteed a minimum amount of savings, provided payment of a service charge. This is usually important to shoring up the confidence of building owners/occupiers in the cost effectiveness of green-building investments.

Finally, while many utility on-bill systems do not provide any form of green saving guarantee, the existing trust that customers have in their utilities and the experience and quality of the network of contractors involved in green-building construction and/or retrofit is assumed to go a long way in overcoming negative risk perceptions of building owners/occupiers and in promoting green investments. This trust has been identified by Manitoba Hydro as being instrumental in the success of its on-bill program (T. Stoate interview 2013).

Security to capital providers

Low default-risk levels help to maintain modest risk premiums.

Research has found that capital investors generally perceive the credit risk of PAYS financing to be lower than that of other forms of financing because it benefits from utility back-office and collection resources, and the risk of utility service shutoff is often enough of an incentive to make repayments on time (Palmer et al. 2012, Byrd and Cohen 2011). In particular, utility on-bill financing provides a unique "de-risking" mechanism by attaching the debt obligation to an existing billing and repayment collection channel (Sweatman and Managan 2010).



Additional backstop guarantees can add to financing costs in the absence of government funding.

Some PAYS programs deliver additional security to capital providers in the form of a loss reserve fund. About a third of utility on-bill programs benefit from such a credit risk reduction mechanism (Bell et al. 2011). For example, the Connecticut United Illuminating on-bill program benefits from a loss reserve fund that covers 100 percent of potential defaults (Brown 2010). Similarly, a portion of NYSERDA on-bill loans (Tier 2)⁴ benefits from a US\$9.3 million debt service reserve funded by the US Department of Energy; this covers green-bond investors against default risk on loans of a total amount of US\$25 million (NYSERDA 2012).

The vast majority of PAYS programs with loss reserve funds have benefited from federal and/or state/provincial government funding (Palmer et al. 2012). For instance, the government of British Columbia has made available a US\$1 million⁵ loss reserve fund to reduce the risk exposure of BC Hydro and Fortis BC in the utility on-bill financing program.

When such government funding is not available, the creation of a loss reserve fund comes at a cost. For instance, the New Hampshire PAYS program adds a 5 percent one-time charge to the amount of the loan that goes towards a loss reserve fund (Brown and Braithwaite 2011). Portland's municipal loan program (Clean Energy Works) had earmarked a 10 percent loss reserve fund but later decided to reduce this fund over time down to 1 to 2 percent of total capital mobilized in order to increase by a factor of 5 to 10 the amount of loans distributed (Brown 2011). In some cases, up to 20 percent of total program costs are held in a loss reserve fund (Brown 2009).

⁴ While NYSERDA Tier 1 loans have to satisfy strict underwriting criteria, Tier 2 loans have slightly relaxed credit conditions; this is why Tier 2 loans are covered by a debt service reserve fund.

⁵ Converted from Canadian dollars based on the official 2012 average exchange rate of US\$1 = C\$0.9995. Available at <www.federalreserve.gov/releases/g5a/current/>. Accessed 24 June 2013.



Measurement, verification, monitoring and reporting of green benefits

PAYS success for financing commercial building retrofits demands lower MVMR costs to customers.

Measurement, verification, monitoring and reporting (MVMR) are important to all PAYS programs as they influence how much financing can be made available while evaluating and controlling whether investments generate positive benefit-to-cost ratios. In some cases, the results of green benefit measurements determine the eligibility and/or amounts of capital available for financing; for example, this is the case for the NYSERDA on-bill recovery loan, which has pre-qualified a number of green-building investments based on a “total savings-to-investment ratio” (SIR) threshold. Similarly, Manitoba Hydro PAYS makes available funding within the limits of the expected positive cash flow returns from green-building retrofits.

MVMR arrangements vary considerably across PAYS programs. Some utility on-bill programs base their MVMR on existing standards: for instance, the International Measurement and Verification Protocol (IMVP), or the Energy Star program Improve Your Home’s Energy Efficiency. In other cases, MVMR is done through the use of complex energy and/or thermal flow models and verifications by third-party specialist auditors. This approach is commonly used for large commercial ESPCs in order to understand expected energy efficiency improvements, taking into account peak and off-peak loads and load variability, and the climate and thermal characteristics of the building.

Research has shown that the costs of MVMR for large ESPC projects have averaged 3.3 percent of annual project cost savings in the US (FEMP 2008). Although research on the subject is limited, in an analysis of modeled and realized green benefits of 133 US ESCo projects, it has been found that, on average, over 100 percent of modeled cost savings are realized, thus showing how complex ESPC MVMR does achieve good results and high confidence (Shonder et al. 2010). In the context of its ESPA, TAF estimates that 3 percent of the costs of a green-building project should be directed toward MVMR (T. Stoate interview 2013).

Building on existing robust MVMR standards helps to reduce cost, while guaranteeing useful measurement.

Sophisticated and costly MVMR is not universally thought to be necessary for PAYS; and in certain instances it is thought to be an obstacle to green-building financing. For instance, Manitoba Hydro required a third-party evaluation of expected energy savings for the first 10 years of its on-bill financing program; however, after observing that eligible green investments generally led to expected savings and green benefits, the utility decided to abandon this costly requirement (T. Stoate interview 2013).



Chapter 2: Property Assessed Clean Energy

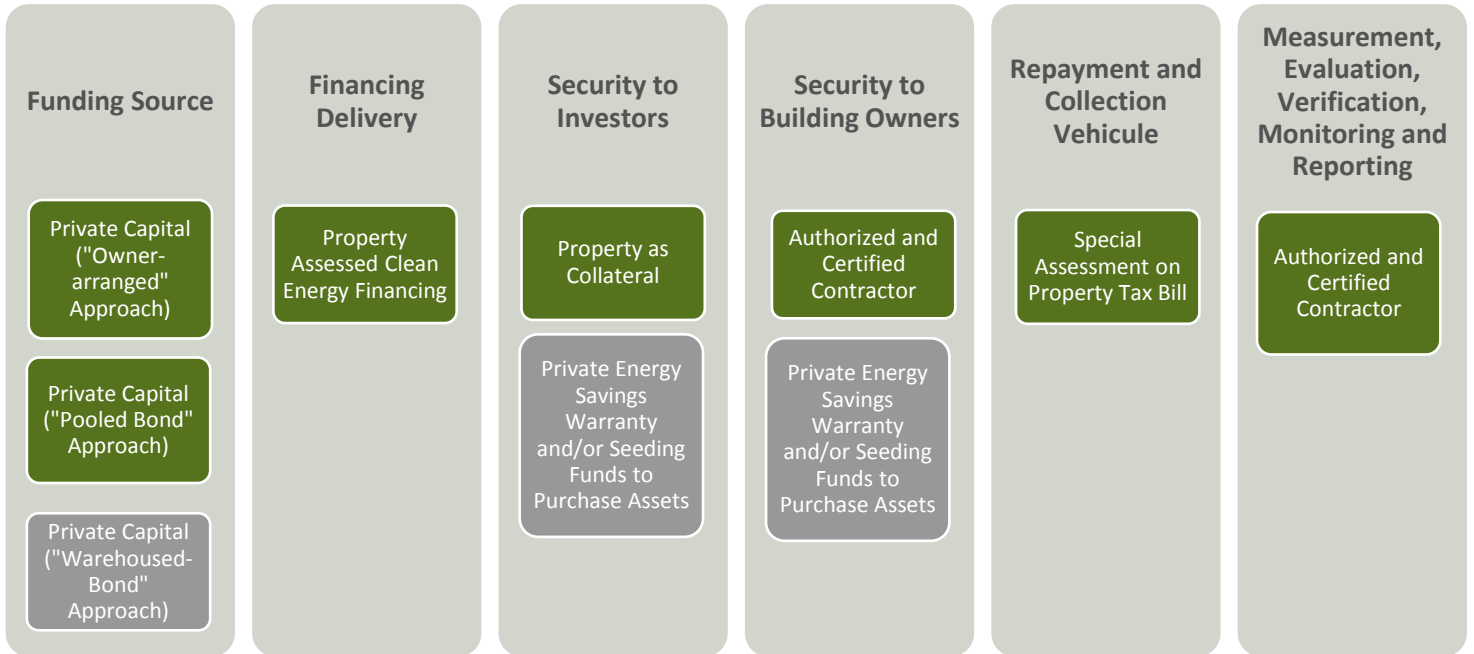
This section describes Property Assessed Clean Energy (PACE), one of three green-building financing models which have shown some potential for promoting green-building investment in North America and, more specifically, serving the financing needs of commercial building owners for green retrofits in Canada and the US.

The PACE model is relatively new. It has been used in the United States to offer financing to residential and commercial building owners' investments in green retrofits. Some recent legislative changes in the Canadian provinces of Ontario and Nova Scotia and in the Yukon territory have introduced the possibility of using local improvement charges (LICs) to finance green-building retrofits, similarly to US PACE programs.

Different variations of PACE financing have been tested in a number of jurisdictions in North America and some have shown tangible positive results in promoting green-building retrofits. An analysis of this evidence base is provided in the following pages. This analysis highlights the strengths and weaknesses of PACE, using examples, and judges whether slight variations in funding sources, security arrangements, and measurement, verification, monitoring and reporting could help to overcome obstacles to market uptake and greening (see Figure 3).



Figure 3: Description of the PACE financing model (model #2) in support of green retrofits in commercial buildings in Canada and the US, and two possible slight variations for improving market uptake



Source: Adapted from Palmer et al. 2012.

Legend:



Description of PACE model

In the PACE model, private finance is mobilized through green bonds issued by public authorities, and PACE loan repayments by building owners are done through property tax bills. Thus, PACE debt is attached to property rather than to building owners, which addresses the concerns of building owners who are worried about keeping the option of selling the property before green retrofit investments are totally repaid.

Since 2010, most PACE programs for homeowners have been discontinued in the US because of opposition from the Federal Housing Financing Agency and mortgage lenders Fannie Mae and Freddie Mac on the priority given to PACE loans over existing mortgages, in the event of default on repayments. Commercial-building PACE programs have not been affected by this opposition and, in fact, a number of residential PACE programs have evolved to become programs for commercial-building owners. PACE programs for commercial buildings differ somewhat from residential PACE programs in how they raise



capital, what security mechanisms they have in place to increase levels of confidence of building owners and investors, and how they measure, verify, monitor and report green benefits.

Market performance

The participation rates for PACE financing programs remain very low despite a widespread enabling legislative framework. Over 26 US states have authorized PACE through special legislation, and at least 16 US PACE programs were actively accepting financing requests in early 2013 (C2ES 2013, Managan and Klimovich 2013). While PACE does not exist in Canada yet, over recent years the Yukon, Nova Scotia and Ontario have passed legislative amendments to open up the possibility for local governments to use PACE-based financing in support of green-building investments.

Market penetration remains low in the commercial sector. However, recent innovations in PACE financing (e.g., use of private capital markets) are expected to achieve higher rates of market penetration. For instance, the Ygrene Energy Fund aims to have a participation rate of 3.5 percent of all eligible buildings where it has active PACE programs (Ygrene Energy Fund 2013a, 2013b).

The potential positive economic implications of PACE financing are considerable. In a study on the potential economic impact of four residential and commercial PACE programs with US\$1 million in funding each, the benefits included US\$10 million in gross economic output, US\$1 million in tax revenue, and 60 jobs (Pozdena and Josephson 2011).

Green performance

Due to the relatively recent existence of PACE programs, there is very limited information on their green performance.

Overview of strengths, challenges, trends, and possible variations in PACE financing

The following table summarizes the key strengths, challenges and trends of PACE for green retrofits in commercial buildings, together with potential variations in PACE financing models that could help overcome barriers to green-building investment in Canada and the US.



Table 2: Summary of strengths, challenges and trends associated with PACE financing, and descriptions of possible variations in PACE financing to increase market uptake

	Strengths, challenges and trends*	Possible variations in PACE financing
Sources of capital, amounts raised, cost and repayment terms	<ul style="list-style-type: none"> ● The participation rates for PACE financing programs remain very low despite a widespread enabling legislative framework. ↗ Different approaches to raise capital exist, and in a short time span a few examples have shown that PACE has potential for contributing to large financing amounts for green commercial retrofits. ● Relatively high interest rates compared to other forms of debt financing are not a barrier to commercial PACE financing, provided long repayment terms and fixed interest rates are offered. 	<p>→ The warehoused-bond approach demonstrates that PACE can succeed in promoting commercial green retrofits with no cost to government.</p>
Transaction costs for building owners/occupiers and operation costs for program managers	<ul style="list-style-type: none"> ● The complexity and uncertainty of setting up PACE programs create considerable operation costs. ● The transaction costs borne by building owners determine market uptake; until these costs are brought down, demand for PACE financing from commercial building owners will remain limited. 	
Security to building owners/occupiers	<ul style="list-style-type: none"> ● It is by increasing confidence of building owners in the quality of green retrofit projects that PACE programs can succeed in achieving investment scale. 	<p>→ Consideration of improved cash flows over the useful life of PACE projects is critical to avoiding the exclusion of projects with longer paybacks.</p>
Security to private capital investors	<ul style="list-style-type: none"> ● PACE loans benefit from very low default rates. ● Strict underwriting rules are essential to attract investors toward a new asset class. ● Market liquidity remains a critical barrier to investment in PACE assets. 	<p>→ The use of pledged government funds to “seed” the market for PACE assets, support a loss reserve fund, and subsidize insurance products and/or education and capacity-building is essential to overcoming barriers to PACE financing.</p>
Measurement, verification, monitoring and reporting (MVMR) of green benefits	<ul style="list-style-type: none"> ↗ Most PACE programs rely on external standards to leverage existing networks of contractors and minimize transaction and operations costs. ● Accuracy of green retrofit benefits is not as critical in PACE as it is in PAYS. 	

*Legend: ● indicates strengths, ● indicates challenges, ↗ indicates trends and → indicates suggested variations in financing to achieve greater market penetration.



Sources of capital, amounts raised, cost and repayment terms

Out of the three existing funding models for PACE, the warehoused-bond approach has managed to raise the most private capital for PACE loans.

Three different approaches have been used to raise private capital in support of commercial PACE loans: warehoused bonds, pooled bonds, and owner-arranged financing. These approaches differ from each other in the following ways:

- **Warehoused bond:** PACE loans are approved against a pre-secured line of credit, and when these reach a certain amount, green bonds are issued against the group of approved PACE loans and used to pay down the credit line.
- **Pooled-bond:** When a sufficient pool of PACE loan applications has been approved, individual PACE loan applications are aggregated and green bonds are sold against the pool to fund all of the included projects.
- **Owner-arranged financing:** The property owner has responsibility to find a lender that is interested in providing green-building finance and willing to accept the PACE securitization and payback framework; financing terms and conditions are negotiated between the owner and the lender.

The advantage of the warehoused-bond approach compared to the pooled-bond approach is that the pre-secured credit line makes funding available on demand for eligible and approved building owners, without additional delay to raise funding. The owner-arranged approach is known to involve high transaction costs for property owners, as financing terms are negotiated individually for each transaction.

There are only a few examples of how these approaches have been used in practice, as residential and commercial PACE programs remain relatively new. For instance, in Colorado's Boulder County, the Climate Smart Loan Program (CSLP) followed the pooled-bond approach to raise US\$9.8 million for residential homeowners by issuing green bonds (Goldberg et al. 2011). The Sonoma County Energy Independence Program (SCEIP) is using the warehoused-bond approach to fund commercial retrofit projects. By June of 2012, after three years of operation, SCEIP had received over 2,400 applications for financing from residential and commercial building owners, worth over US\$89 million in energy efficiency projects, of which more than US\$62 million had been approved for PACE financing thanks to pledges by local government (US Committee on Energy and Natural Resources 2013). Both the Los Angeles commercial PACE program and GreenFinanceSF in San Francisco follow the owner-arranged funding approach.

However, the number of projects and total financing provided to commercial buildings alone remain modest to date, as these programs are typically only a few years or months into operations and they are in the process of building their project pipelines. Since late 2011, GreenFinanceSF has supported one



commercial PACE project worth US\$1.4 million in PACE bond financing (Managan and Klimovich 2013, R. Chien interview 2013).

Since its launch in Sacramento in early 2013, Clean Energy Sacramento, the PACE program partnership between the Ygrene Energy Fund and the City of Sacramento, has reviewed pre-approved projects worth US\$22 million amidst a potential project pipeline worth over US\$200 million (Ygrene Energy Fund 2013, D. Schaeffer interview 2013). Other local PACE programs are expected to launch over 2013 and 2014, including in Miami-Dade County, where the Ygrene Energy Fund trained over 120 contractors, searched over 2,000 properties for potential green retrofit opportunities and identified over US\$300 million in available green retrofit projects (Ygrene Energy Fund 2013, D. Schaeffer interview 2013).

Relatively high interest rates are not a barrier to green retrofits in commercial buildings, provided long repayment terms and fixed interest rates are offered.

PACE interest rates to building owners depend on lenders' and investors' perceived financing risk in issuing the bond, and the program's set-up and operational costs. How interest rates are set varies among programs; while some programs decide on a given rate, others are set by bond-market rates.

Interest rates for PACE loans are higher on average than interest rates for other kinds of secured financial products: they range between 6 and 9 percent (Ygrene Energy Fund 2013, D. Schaeffer interview 2013). For instance, the GreenFinanceSF PACE transaction approved in October 2012 is said to carry an interest rate of about 7 percent over a 20-year term, and the Ygrene Energy Fund reports similar interest rates (Ygrene Energy Fund 2013, D. Schaeffer interview 2013). GreenFinanceSF granted a PACE loan with an interest rate of 6.9 percent over 20 years, a portion of which was bought down thanks to government subsidies (R. Chien interview 2013).

While these interest rates are high, PACE program managers report that they are not an obstacle to green-building retrofits for commercial owners, and that they are partly justified by long-term repayment terms and fixed rates. These two considerations, on the other hand, are what appear to matter the most to building owners (R. Chien interview 2013). Many of the existing PACE programs have managed to "lock in" long-term interest rates, thus reducing financial risk for investors (Managan and Klimovich 2013); and compared to other forms of commercial debt financing, PACE loans offer repayment terms extending beyond five to seven years (R. Chien and D. Schaeffer interviews 2013). Therefore, there is a poor basis of comparison between the interest rates of PACE loans and the cost of capital of other forms of debt financing.

Furthermore, while relatively more costly than other sources of debt finance, PACE loans remain an attractive source of green-building financing for commercial building owners because of their



unencumbered nature:⁶ PACE loans provide funding upfront and do not compete internally with other capital projects for finance. As a result, PACE loan projects also do not have to achieve the same internal rates of return, as they are amortized over much longer periods of time (D. Schaeffer interview 2013). This means that, provided that the US Federal Accounting Standards Board issues guidance confirming that PACE loans can be kept off the balance sheets of building owners, PACE financing does not affect the ability to take on additional debt for other projects (Managan and Klimovich 2013).

In cases when high interest rates are perceived as a barrier to green-building investment by building owners (for instance, in locations where utility costs are kept low through subsidies, and/or in the mid-size commercial building market), the addition of pledged government funds, for instance in the form of a loss reserve fund or of purchases of green bonds, has the capacity to reduce PACE interest rates by 2 percent or more (Executive Office of Energy and Environmental Affairs 2012). Finally, education on the costs of low energy efficiency and poor environmental performance in buildings and on the benefits of investing in new green buildings and/or making green-building improvements, and capacity-building can also help to overcome these negative perceptions against green retrofits.

Transaction costs for building owners/occupiers, and operation costs for program managers

The complexity of setting up PACE programs creates considerable operational costs.

All PACE programs involve some government resources, including for the infrastructure to authorize the issuance of debt and the imposition, collection and enforcement of tax assessments.

Most of the costs to set up PACE programs come from the changes in legislation required to create an assessment district, and the time and human resources spent to work on the underwriting criteria for PACE loans. For instance, the Boulder Colorado CSLP program incurred US\$3.2 million in program costs and fees, US\$2.4 million of which were used to create a loss reserve fund (Goldberg et al. 2011).

Some programs rely on third-party providers to take care of setting up PACE programs. One such example, the Ygrene Energy Fund, reports that between 12 and 18 months are required to launch a local PACE program. This involves discussing and supporting local governments in the creation of assessment districts for PACE financing; building and training contractors who will carry out energy retrofits; assisting building owners in the PACE financing process; and educating the building construction, management and property communities on the benefits of green retrofits and PACE financing (D. Schaeffer interview 2013).

⁶ The unencumbered nature of PACE loans is thought to be one of their prevailing advantages for financing commercial green retrofits, whether it is confirmed by the accounting community that PACE loans can be kept off balance sheets or not.



Another source of uncertainty and transaction costs is consent of existing mortgage lenders: according to a study of 25 lending institutions in the US, lenders do believe that they have a right to consent to PACE financing, as it has the potential to affect the debt repayment capacity of borrowers (Managan and Klimovich 2013).

In Canada, PACE does not exist, but recent legislative changes in the provinces of Ontario and Nova Scotia and in the Yukon territory have opened up the option of financing green retrofits using an instrument similar to PACE. Until setting up a PACE program based on LICs is made simpler and bears little costs to the municipalities, market uptake is expected to remain limited (Persram 2011).

The transaction costs borne by building owners determine market uptake.

PACE program managers report that complexity and transaction costs, and associated perceptions by building owners and investors are what prevent market and financing scale-up for commercial green retrofits (R. Chien and D. Schaeffer interviews 2013). Overall, it has been reported that PACE projects typically take six to 18 months from initial contact with a building owner to project completion, including the time to structure the financing package (Managan and Klimovich 2013). For instance, in the owner-arranged funding approach, considerable transaction costs are borne by building owners, as they have the responsibility to find investors who agree on the PACE collection terms and to negotiate financing terms.

A number of “turnkey” PACE program examples (e.g., the Ygrene Energy Fund, whereby contractors take care not only of construction/installation but also of the financing application process, the verification of lien releases and the fulfillment of project underwriting criteria) have managed to reduce the transaction costs for building owners considerably by simplifying the application process and by securing lines of credit to cover the costs of the first round of approved projects, which reduce waiting periods.

Targeting projects of a large size can help to overcome high transaction costs through economies of scale. This approach, however, excludes smaller-size projects in the mid-size commercial building market.

Security to lenders and capital investors

PACE loans benefit from very low default rates.

PACE loans have very low default rates compared to conventional mortgages. For example, the Sonoma PACE bore a 1.1 percent default rate, compared with an average default rate for debt finance products in Sonoma County of 8 to 10 percent (Energy Upgrade California 2012).

Other studies have found that out of 2,565 PACE projects in the US, up until 2011 there had only been two defaults and PACE had an average default rate of 0.1 percent while the average default rate for non-PACE loans was 3.2 percent (PACENow 2011).



Strict underwriting rules are essential to attracting investors toward a new asset class.

Public bonds securitized by PACE loans represent a new asset class; as such, they carry a certain level of risk to investors, be they federal, provincial or state government providers or private capital providers. Further, the low levels of awareness of investors on green-build benefits compound to increase perceived risk.

PACE loans are secured against property; this is what makes it possible to set up repayments through the property tax roll and transfer responsibility for PACE loan repayment with property ownership. However, opposition from mortgage lenders in the US has put this backstop guarantee into jeopardy. There are a number of other provisions that have been tested across North America, to mitigate default risk for investors, municipalities and mortgage lenders, in the absence of and/or in addition to property liens. Such provisions are: reserve loss funds, strict underwriting criteria, and insurance products.

The use of a reserve loss fund is a standard feature of PACE programs in the US, to cover default risk. The Boulder Colorado CSLP and the LA PACE programs each benefit from a US\$2.4 and a US\$2 million loss reserve fund, respectively (Los Angeles County PACE 2013, Goldberg et al. 2011). Interestingly, some PACE programs report that the existence of loss reserve funds does not trigger reduced risk premiums from investors and that these funds could be used differently to incentivize building owners (R. Chien interview 2013). For example, GreenFinanceSF is in discussions to use the capital of its loss reserve fund to support interest rate buy-downs or other kinds of economic incentives for green-building investment (R. Chien interview 2013).

Conservative and strict underwriting criteria for PACE loans are also an important security feature to lenders and investors, as they dictate how well projects are screened (based on stringent debt-to-service ratios) and how expected improvements in net operating income and/or cash flows are taken into account in credit scores. They are important to building the confidence of investors, in that loans will be repaid and credit risk remains negligible.

For instance, the CaliforniaFirst PACE residential program, underwritten by RBC Capital Markets, has been built on the following underwriting criteria:

- Owners must be up-to-date on property tax payments for the past three years.
- Owners must not have any involuntary liens over US\$500.
- Owners must not have defaulted on mortgage repayment and there must not be any foreclosure filings during the previous five years;
- The assessment value and special tax liens on property cannot exceed 10 percent of the assessment value or market value (this is also recommended by the US Department of Energy).



- The sum of the mortgage and the special assessment cannot be more than 80 percent of either the assessed value or the market value (Persram 2011).

To date, most commercial PACE programs require, as part of their underwriting criteria, that projects receive the prior consent of existing mortgage lenders.

The Ygrene Energy Fund has developed a set of simple but robust common underwriting criteria, standardized across US state legislations. It claims that this is one of the necessary conditions to launching successful PACE financing programs, because this creates low-risk environments for local governments and private capital investors. Thanks to its standardized underwriting criteria, the Ygrene Energy Fund expects to reach at least a single A credit rating for its PACE bonds in the first year of the program (D. Schaeffer interview 2013).

In Canada, there have been some calls to consider the use of an insurance product similar to CMHC's mortgage loan insurance as a way to reduce default risk for those owners whose debt service capacity is highly leveraged (e.g., mortgage lenders in Canada require CMHC mortgage loan insurance for building owners with equity of less than 20 percent) (Persram 2011).

Market liquidity remains a critical enabling driver.

Over the long term, the quality of PACE loan underwriting alone cannot guarantee investment scale-up, without market liquidity. To ensure success of PACE financing, it is important that short-term investors have confidence that there are long-term investors in PACE bonds (R. Chien and D. Schaeffer interviews 2013). By providing funds used to purchase PACE bonds, governments can play an important role in seeding markets for PACE assets; however, thus far, government funding has been mostly focused on replenishing loss reserve funds.

Security to building owners/occupiers

It is by increasing confidence of building owners in the quality of green retrofit projects that PACE programs can succeed in achieving investment scale.

There is limited evidence that PACE programs provide security to building owners, other than through expert modeled calculations that green-building investments will improve net operating income and cash flows by the end of project useful life (LLC Buonicore Partners 2012).

However, capacity building and training of contractors are seen as fundamental conditions for successful commercial green retrofit markets.

In the case of the Ygrene PACE program, tailored training is a condition of eligibility for contractors wishing to participate in PACE projects. This brings high levels of credibility and confidence in the quality of the PACE loans supported by Ygrene.



Consideration of improved cash flows over the useful life of PACE projects is critical to avoiding exclusion of projects with longer paybacks.

The US Department of Energy's *Guidelines for Pilot PACE Financing Programs* includes the provision that the savings generated by PACE projects need to outweigh project costs on an annual basis. While this offers a degree of protection to owners, it excludes projects that could have considerable benefits over the long term, albeit with not-negligible upfront costs (DOE 2010). Furthermore, commercial PACE loans do not compete against other internal CapEx or OpEx projects.

Most commercial PACE programs do not provide any guarantee that PACE projects will be cash-flow positive from day one. Conversely, they consider the saving-to-investment ratio of green retrofit projects over their useful lives.

Measurement, verification, monitoring and reporting (MVMR) of green benefits

Most PACE programs rely on external standards to leverage existing networks of contractors and minimize transaction and operations costs.

There is no uniform MVMR standard for PACE in the US; however, a number of local ordinances in the US require monitoring and third-party verification of PACE projects. San Francisco's GreenFinanceSF and Toledo's PACE program use the Energy Star Portfolio Manager standard to measure and verify energy use savings (Managan and Kilmovich 2013). The Washington, DC, PACE program requires two years of detailed measurement and verification based on the International Performance on Measurement and Verification Protocol.

The choice of an MVMR standard is often partly motivated by the trust of building owners and investors in the given standard, as well as by the concern for minimizing operations and transactions costs (R. Chien and D. Schaeffer interviews 2013).

Accuracy of green retrofit benefits is not as critical in PACE as it is in PAYS.

Some PACE programs have minimum energy savings requirements. This is the case of Toledo's PACE program, which requires that project portfolios reach 15 to 20 percent savings to qualify for financing. However, this remains an exception overall (Managan and Kilmovich 2013).

Some experts believe that improving green benefit modeling, by fine-tuning assumptions on standard operating conditions and/or leveraging observed historic data, is an essential condition for the success of PACE financing, especially in order to overcome problems with building owners who have low confidence in the accuracy of projected green benefits (Persram 2011). There has been limited work to compare the benefit-to-cost ratios of MVMR, based on modeled data, and MVMR, based on observed data, so it is difficult to confirm whether improved MVMR accuracy and costs maximize returns on investment for building owners.



However, the need for higher accuracy in MVMR can be bypassed for the commercial building sector by providing energy savings guarantees built into the cost of financing. For instance, the PACE programs managed by the Ygrene Energy Fund benefit from an Energy Savings Warranty from private companies Energi and Hannover Re. Furthermore, compared to PAYS, PACE includes no guarantee that improved operating cash flows due to realized green benefits would translate into enhanced debt servicing capacity. Thus, accuracy of MVMR for PACE is not critical to investors in the same way that it is for PAYS.

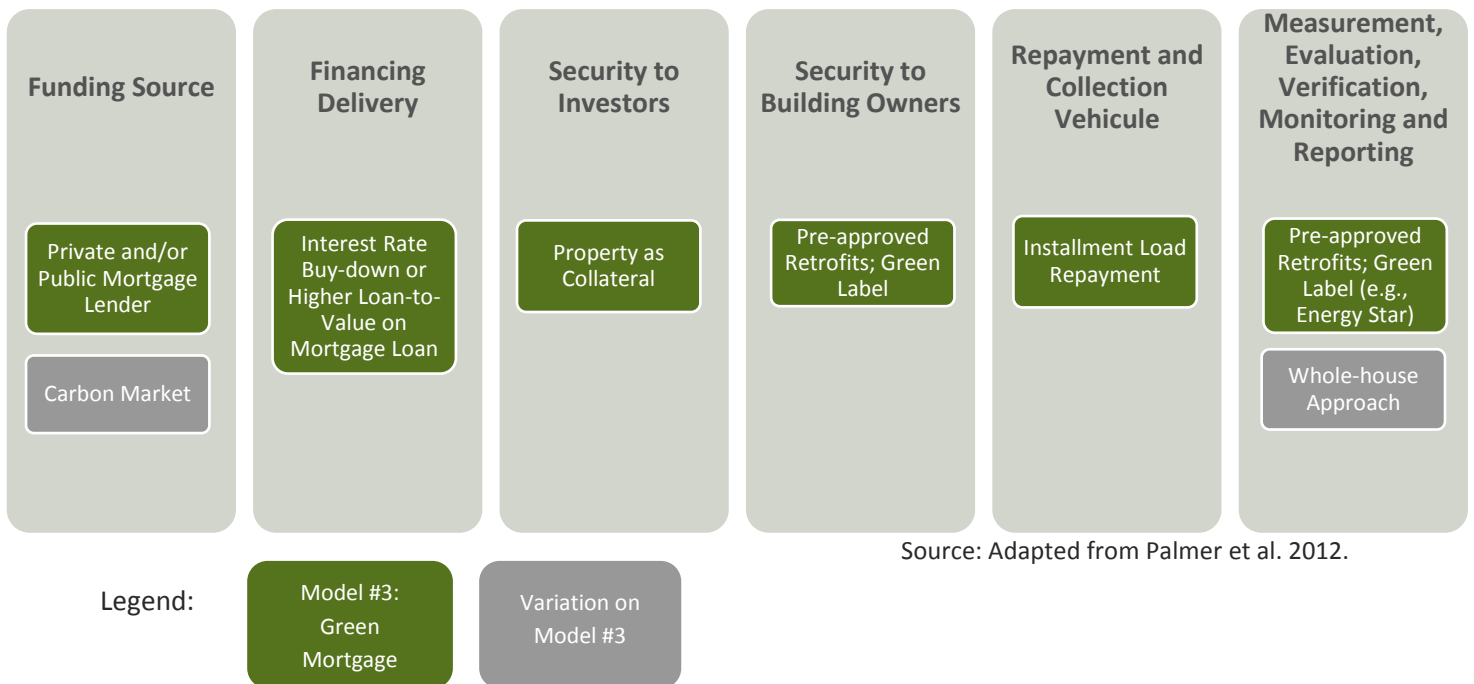


Chapter 3: Green Mortgage

This section describes green mortgage, one of three green-building financing models which have shown some potential for promoting green-building investment in North America, and more specifically for serving the financing needs of residential building owners for green retrofits in Mexico.

Mexico’s green mortgage program provides financing to homeowners to purchase eco-homes. Different green mortgage products also exist in Canada and the US. An analysis of these mortgage programs is provided in the following pages; it highlights the strengths and weaknesses of mortgage financing, using examples, and it analyzes whether slight variations in funding sources, security arrangements, and measurement, verification, monitoring and reporting could help to overcome obstacles to market uptake and greening (see Figure 4).

Figure 4: Description of green mortgage financing model (model #3) in support of green retrofits in residential buildings in Mexico, and two possible slight variations for improving market uptake



Description of green mortgage

Owners of residential buildings who wish to green their investments have a variety of financing options, starting with mortgages and other kinds of loans or lines of credit. The costs of green improvements to existing buildings or the additional cost of purchasing a new green building can sometimes be rolled into traditional mortgages.

There are also variations on traditional mortgage financing which are specific to green-building investments and provide owners additional borrowing capacity and/or better borrowing terms: for example, mortgages with interest-rate buy-down options, mortgage refinancing programs, and subsidized mortgage insurance. For instance, in the US, energy-efficient mortgages (EEMs) cannot exceed five percent of home value, and the costs and associated savings of energy efficiency improvements must be determined by a home energy rating system or an energy consultant (Kats et al. 2012).

The advantages of mortgage financing for green buildings are the long repayment periods provided to building owners (between 10 and 30 years, depending on the jurisdiction), the relatively simple and well-understood financing terms, and the security for investors of the lien on property.

In Mexico, the market for green investments in residential buildings has taken off in the past six years, thanks to public mortgage financing through the government-backed *Hipoteca Verde* program. This program provides additional capital to eligible households for the purchase of a new home with eco-technologies—such as solar heaters, thermal insulation, and water-saving valves—pre-approved by the Mexican government. In addition, low-income households can have access to additional subsidized loans under the *Ésta es tu casa* program.

Between 2007 and 2012, over 900,000 green mortgages were granted by the Institute of the National Workers' Housing Fund (Infonavit) to homeowners investing in new eco-homes (*El Economista* 2012). However, despite this success, financing innovation is needed to incentivize low- and middle-income families to invest in green retrofits. The Mexican government, in partnership with international donor agencies such as the Interamerican Development Bank and Germany's GIZ and KfW, is looking into extending the number of beneficiaries of *Hipoteca Verde* and *Ésta es tu casa* subsidies, as well as the scope of the subsidies, so as to promote green retrofits on existing buildings.



Market performance

In Mexico, it is estimated that to date, *Hipoteca Verde* has supported the construction of over 900,000 sustainable houses and contributed to the avoidance of over 700,000 tonnes of carbon dioxide (CO₂) emissions (World Habitat Awards 2013). The *Ésta es tu Casa* program for low-income families provided government subsidies to over 240,000 households in Mexico since its creation (SHF, Infonavit, Conavi, undated). Overall, 95 percent of the beneficiaries of a Mexican green mortgage were satisfied with the program (Alide 2013).

Across North America, other green-mortgage financing programs have achieved considerable participation from building owners. For instance, Colorado's Energy Star mortgage program, launched in 2007, has since been exported to five other US states (EPA, undated (a)), and studies have shown that homes that benefited from the program sold for an additional US\$8.66 per square foot, compared with other homes in the same area (Bloom et al. 2011).

Green performance

By providing over 146,000 loans in 2010, *Hipoteca Verde* contributed to a total reduction in greenhouse gas emissions of 277,000 tonnes and to energy-use savings exceeding 154 million kilowatt-hours (Alide 2013). On average, a building supported by Mexico's green-mortgage program sees an improvement in its carbon performance of 0.8 tonnes of CO₂ yearly.

In 2011, there were 1.3 million Energy Star–certified homes in the US, which have prevented 210 million tonnes of greenhouse gas emissions and contributed to energy savings worth US\$23 billion (DOE 2013, EPA, undated (b)), though there is limited information on the number of buildings that benefited from a green-mortgage product.

Overview of strengths, challenges, trends, and possible variations in mortgage financing

The following table summarizes the key strengths, challenges and trends of mortgage financing for green buildings, together with potential variations in mortgage financing models that could help overcome barriers to investment in Mexico.



Table 3: Summary of strengths, challenges and trends associated with mortgage financing, and descriptions of possible variations in green mortgage financing to increase market uptake

	Strengths, challenges and trends*	Possible variations in mortgage financing
Sources of capital, amounts raised, cost and repayment terms	<ul style="list-style-type: none"> ↗ Mortgage financing for green buildings is moving toward models whereby government funds are used to provide additional incentives for greening homes. ● Low interest rates make mortgage financing very attractive for building owners. 	<ul style="list-style-type: none"> → Leveraging new sources of private capital for mortgage financing can support green-building scale-up in Mexico’s low- and middle-income residential building markets.
Transaction costs for building owners/occupiers and operation costs for program managers	<ul style="list-style-type: none"> ● Transaction costs to building owners are minimal. ● Operation costs can be non-negligible, because of the need to educate, build capacity and, in some cases, train lenders and contractors. 	
Security to building owners/occupiers	<ul style="list-style-type: none"> ● Amortization over long repayment periods ensures that the impact of green-building investments remains cash-flow positive. 	
Security to private capital investors	<ul style="list-style-type: none"> ● Security to lenders and capital investors rests with the lien on property and with confidence in the eligible criteria for green-mortgage financing. 	<ul style="list-style-type: none"> → Mortgage loan insurance and/or securities are some of the ways government can support green mortgage financing programs, especially to facilitate green retrofit investments by low-income homeowners.
Measurement, verification, monitoring and reporting of green benefits	<ul style="list-style-type: none"> ● Green mortgage programs minimize MVMR requirements and costs for building owners by relying on existing MVMR systems and/or giving an active role to contractors. 	<ul style="list-style-type: none"> → Promotion of a whole-house approach can improve the cost-effectiveness of green-building investments.

*Legend: ● indicates strengths, ● indicates challenges, ↗ indicates trends and → indicates suggested variations in financing to achieve greater market penetration



Sources of capital, amounts raised, cost, and repayment terms

Mortgage financing for green buildings is moving towards models whereby government funds are used to provide additional incentives for greening homes.

Mexico's *Hipoteca Verde* program uses capital from Infonavit; Infonavit raises capital from private-sector employees through a 5 percent deduction on payrolls (World Habitat Awards 2013). For low-income families, the *Ésta es tu casa* program offers government subsidies, in addition to Infonavit's mortgage financing.

A number of private banks in Canada and the US also offer green-mortgage products. For instance, in the US the Colorado Energy Star mortgage provides up to a one-discount-point reduction in mortgage cost to owners of an Energy Star home; this discount can be used to buy down mortgage interest rates by 0.25 to 0.5 percent, depending on market conditions (Brown and Conover 2009). The program is built on a match-funding agreement between Colorado's Energy Office and private lenders Bank of Colorado or Wells Fargo (Brown and Conover 2009). In Canada, TD Canada Trust and BMO are among a number of banks that offer green-mortgage products to residential owners who wish to invest in new green buildings or green-building improvements.

In Canada, incentives for green buildings are also provided in the form of price reductions on required mortgage insurance. For instance, the Canadian Mortgage Housing Corporation's (CMHC's) Eligible Energy-efficient Building Program offers homeowners who purchase an energy-efficient home or renovate an existing home to a number of recognized green standards, such as Energy Star, LEED Canada for Homes, and Natural Resources Canada's EnerGuide, a refund equivalent to 10 percent of their mortgage insurance premium. While this program alone is not enough to incentivize owners to green their buildings, CMHC has started to consider developing a new green-building offering that would cover a larger portion of green-building investments, for instance via interest rate buy-downs (P. Harvey interview 2013).

Leveraging new sources of private capital for mortgage financing can support green-building investment scale-up in low- and middle-income residential building markets.

Mexico intends to raise over US\$15.6 million from international carbon markets and international donors between 2012 and 2016, under a Nationally Appropriate Mitigation Actions (NAMA) program for sustainable housing. This program, which is under development, will extend the scope of *Hipoteca Verde* and *Ésta es tu casa* to green-building retrofits, but it will also go beyond supporting individual eco-technologies by taking a whole-house approach. Under the whole-house approach, efficiency performance benchmarks are set for each building type and take account of bio-climatic variables; building owners have the choice of undertaking a combination of different interventions, rather than relying on one single eco-technology, to achieve these standards.



Low interest rates make mortgage financing very attractive for building owners.

Mexico's Infonavit mortgages have interest rates ranging from 4 to 10 percent, depending on salary levels of building owners. *Hipoteca Verde* loans are granted in addition to Infonavit mortgages in order to cover the incremental cost of green equipment and appliances. Loan amounts range between US\$1,380 and US\$2,765, with associated projected utility bill savings of US\$16 to US\$30 per month, respectively (SHF, Infonavit, Conavi, undated).⁷

Green mortgages from private banks in Canada and the US have interest rates close to those of standard home mortgages, albeit with additional incentives. For instance, TD Canada Trust Green mortgage offers 1 percent off the posted rate on its five-year fixed mortgages and allows customers to receive an additional rebate of up to 1 percent of the total amount of mortgage financing for those purchasing Energy Star-qualified appliances, or solar panels approved by the Canadian Standards Association (Ratehub 2013). BMO's Eco Smart mortgage offers a five-year fixed interest rate of 3.3 percent for homes that meet a number of requirements, as confirmed by a third-party appraiser arranged by BMO (BMO 2013).

Transaction costs for building owners/occupiers, and operation costs for program managers**Transaction costs to building owners are minimal.**

The cost of green-building measures can be combined with existing-home refinancing or new-home purchase. As such, applications for green mortgage benefits are "bundled" with standard mortgage applications and underwriting requirements, and the additional transaction costs to building owners remain minimal. Furthermore, interest on loans is often tax-deductible to the borrower (Kats and Menkin 2012).

In some cases, homeowners are required to undergo a third-party evaluation of the green features of their home investment; however, rebates are often offered by government to cover the cost of these audits.

⁷ Converted from Mexican pesos, based on the official 2012 average exchange rate of US\$1 = P\$13.154. Available at <www.federalreserve.gov/releases/g5a/current/>. Accessed 24 June 2013.



Operation costs are incurred because of the need to educate, build capacity and, in some cases, train lenders, contractors and building owners.

A number of mortgage lenders remain unconvinced and/or unaware of the positive net-cash flow impact of green improvements, improving borrowers' ability to repay their loans, and are therefore reluctant to provide mortgage financing for green-building investment (Kats and Menkin 2012). Development and provision of data and information on the risk profile of green-building retrofits, and the improved effect on borrowers' ability to repay mortgage loans, is important to attracting more lenders to offer mortgage-backed green-building financing. This is clearly a role that governments can take on.

The associated operational costs are not negligible. For instance, under Mexico's Sustainable Housing NAMA program, it is estimated that around US\$12 million in grant financing will be needed between 2012 and 2016 to fund operational costs such as capacity building, professional training, and establishing and maintaining a robust verification and monitoring system (Conavi, Semarnat 2012).

Security to lenders and capital investors

Mortgage loan insurance and/or securities are some of the ways government can support green-mortgage financing programs, especially in order to facilitate green-retrofit investments by low-income homeowners.

Mortgage loan insurance provides a guarantee to lenders and investors against default on loan repayments by building owners. The cost of such insurance products to building owners varies, depending on credit scores and whether government subsidies are provided. For instance, Canada's CMHC provides mortgage loans to homeowners who cannot make a down payment of 20 percent of purchase price (CMHC 2013a). Insurance premiums vary based on loan values and amounts of down payment made; they usually correspond to an additional 0.5 to 2.9 percent charge added to mortgage interest rates (CMHC 2013b).

The US Federal Housing Agency (FHA) PowerSaver loan program provides a good example of how governments, through subsidized insurance, can incentivize lenders and investors to invest in green retrofits. It provides loan insurance to eligible lenders of financing for green home improvements, which covers up to 90 percent of loan amounts in the event of default. Lenders retain the remaining risk on mortgage loans, which incentivizes responsible underwriting and lending standards. To keep servicing costs down, FHA provides streamlined insurance claims payment procedures on PowerSaver loans.

Other innovative security arrangements have the potential of reducing risk for lenders and investors. For instance, the US Department of Housing and Urban Development has developed a green-mortgage security product, the Green Ginnie Mortgage Backed Security, whereby it guarantees the principal and interest payments on mortgages through mortgage-backed securities issued by approved private mortgage lenders (Kats et al. 2012).



Security to lenders and capital investors rests with the lien on property and with confidence in the eligible criteria for green-mortgage financing.

Mortgage financing uses property as collateral; thus, provided no other senior lien on property exists, mortgage lenders are guaranteed against repayment default. However, in the absence of loan loss reserve funds and/or mortgage loan insurance, confidence that the underwriting criteria of green mortgage programs are robust enough to screen out non-financially-viable green retrofit projects remains what determines lender and investor support.

Mexico's *Hipoteca Verde* is built on a government-backed standard for green buildings named *Eco Casa*, which certifies eco-technologies that are eligible for funding and estimates the expected positive cash-flow impact of the investment. Many green-mortgage programs in Canada and the US consider as eligible investments those candidates that meet the requirements of well-established green-building standards.

Security to building owners/occupiers

Amortization over long repayment periods ensures that the impact of green-building investments remains cash-flow positive.

Green-mortgage products benefit from long repayment periods, usually between 10 and 30 years, depending on the jurisdiction. Underwriting of green-mortgage loan financing incorporates the positive cash-flow impact of green buildings, so that borrowing capacity is improved over the useful life of green-building features (EPA, undated (c)). For instance, the *Hipoteca Verde* program estimates the economic savings associated with green buildings (compared with standard buildings), using modeled bio-climatic and building-energy data from the Electric Power Savings Trust Fund (FIDE) (Alide 2013).

Measurement, verification, monitoring and reporting (MVMR) of green benefits

Green mortgage programs minimize MVMR requirements and costs for building owners by relying on existing MVMR systems and/or giving an active role to contractors.

Funding for *Hipoteca Verde* is provided for the installation of pre-qualified eco-technologies for new homes, which vary based on the bio-climatic region concerned. Mexico's agencies *Instituto Nacional de Ecología y Cambio Climático* (INECC), *Comisión Nacional del Agua* (Conagua), *Fideicomiso para el Ahorro de la Energía Eléctrica* (Fide) and *Comisión Nacional para el Ahorro de la Energía* (Conae) provide support in measuring expected green benefits and associated savings, and product certification agencies are responsible for issuing eco-technology certificates to qualified products (Infonavit 2008). It is on the basis of this information that Infonavit decides what eco-technologies to incorporate in the *Hipoteca Verde* program. A study is currently ongoing to calculate expected savings for all eligible eco-technologies under the *Hipoteca Verde* program, based on what bio-climatic region of Mexico they are



located in (SHF, Infonavit, Conavi, undated). To benefit from the *Ésta es tu casa* government subsidy, a minimum amount of economic savings created by given eco-technologies is required.

The success of *Hipoteca Verde* is partly attributed to how the Mexican government ensured that the program had collateral benefits for Mexican housing developers as well as the community of manufacturers and installers of eco-technologies (SHF, Infonavit, Conavi, undated). In other green-building financing programs across North America, the enabling role of developers and installers has also been recognized: for instance, Manitoba Hydro credits the role of provincial contractors in turning the on-bill financing program into a success (see Chapter 1) and contractors are trained to prepare financing applications for PACE under the Ygrene Energy Fund PACE program (see Chapter 2).

In the US and Canada, green mortgages rely on existing green-building standards. The Colorado Energy Star mortgage uses the Home Energy Rating System (HERS) to measure the performance of green improvements. Measurement and verification are carried out by certified contractors, and new homes are required to be at least 15 percent more energy-efficient than homes built according to the 2004 International Residential Code, while existing homes need to comply with the “Home Performance with Energy Star” program conditions (Moisan-Plate 2010).

Promotion of a whole-house approach can improve the cost effectiveness of green-building investments.

Infonavit is currently developing a new MVMR system titled “Energy and Environment Rating System for Housing,” which it plans to roll out in 2013. Based on the whole-house approach, the NAMA MVMR system will be simpler and more cost-effective than the existing MVMR system for *Hipoteca Verde*, which is based on individual eco-technologies, since it leaves housing developers and owners to choose the most cost-effective solutions to improve building green performance. The whole-house approach sets green benchmarks for different types of buildings, based on occupancy/use and bio-climatic conditions, and does not prescribe which single and/or suite of green improvements should be undertaken to achieve these standards.



Chapter 4: Lessons Learned

From this analysis and the two expert focus group discussions in Ottawa and Mexico City (see Appendix 2) a number of recommendations emerged about the ways existing financing models can be leveraged to increase green-building investment in North America and about the commitments needed from governments and the financing community to overcome current obstacles to market uptake.

Promoting green commercial retrofits in Canada and the US

Leveraging private capital markets is critical to expanding available green-building financing but it demands government “seeding” support.

Finding ways to leverage private capital is essential to scaling up the amounts of financing available for green retrofits in commercial buildings and ensuring long-term continuity through government re-elections. However, to attract private investors, practical commitments from government in the form of pledges and/or “seeding” funds to buy green-building assets and/or create strong backstop guarantees against default risk are needed. Without such commitments, market illiquidity and uncertainty will remain obstacles to investment.

Bringing down transaction costs for building owners will determine participation rates in green-building financing programs; this can be done by offering turnkey solutions, reducing waiting times, and streamlining application processes.

Pay-As-You-Save and PACE can involve complex financing underwriting criteria and MVMR, as well as some waiting periods. These transaction costs for commercial building owners can constitute an obstacle to applying for green-retrofit financing. Providing turnkey solutions, reducing wait times and streamlining application processes are important drivers for participation rates in green-building financing programs. In this respect, training a network of qualified contractors in not only retrofit technologies and installations but also project management and financing-application processing can be instrumental in reducing transaction costs.

Information-sharing, awareness-raising, and education remain important considerations for overcoming negative perceptions from building owners about the benefit-to-cost ratio of green-retrofit financing.

To increase the overall level of knowledge and confidence of commercial building owners in the benefits of green retrofits, it is important to make robust data and information available that demonstrate the positive cash-flow impact of such investments and build on well-recognized and “trusted” MVMR processes.



Promoting green residential retrofits in Mexico

Leveraging new sources of private capital can scale up green retrofit investments in Mexico's low- and middle-income residential building markets.

The Mexican NAMA program for housing intends to raise over US\$15.6 million in capital between 2012 and 2016 to support green-building investments. Potential avenues for funding that are being considered include: international carbon markets and international financial agencies. Mortgage loan insurance and/or securities are some of the ways government can support green-mortgage financing programs, especially to facilitate green-retrofit investments by low-income homeowners.

A whole-house approach to MVMR can improve the cost effectiveness of green-building retrofits.

The whole-house approach goes beyond supporting individual eco-technologies, by giving building owners the choice of selecting the most cost-effective "package" of green retrofit solutions. This can actually improve the business case for green retrofits, as it takes into account the synergies between individual green-building improvements and/or technologies.



Appendix 1 – List of Experts Consulted in This Project

The project team would like to acknowledge and thank the following individuals for their contributions to this work, through interviews, exchange of information, and participation in focus group meetings. Names are provided in alphabetical order.

Bernal Álvarez, Jesús – Department Chief, *Valoración Económica e Indicadores*, INECC

Chien, Richard – Program Manager, GreenFinanceSF

Diez de Bonilla, Jorge – Civil Engineer, VIVESI

Galaftion, Nathalie – Senior Analyst, International Relations, Canada Mortgage and Housing Corporation

García, María Estela – Coordinator, *Vivienda Sustentable e Hipoteca Verde*, Infonavit

Garrigan, Curt – Coordinator, United Nations Environment Programme, Sustainable Building Initiative

Gómez-Portugal, Iván Quiroz – Director, *Esquemas Financieros*, National Housing Commission

Green, Thomas – Senior Researcher, Sustainable Housing, Canada Mortgage and Housing Corporation–International

Gruner, Andrea – Technical Adviser, German Bureau of International Assistance, Mexico (GIZ)

Heisterkamp, Marc – Manager, Corporate & Investment Real Estate, US Green Building Council

Hartke, Jason – Vice-president, National Policy, US Green Building Council

Harvey, Pascale – Manager, Green Buildings, Canada Mortgage and Housing Corporation

Hill, Duncan – Manager, Sustainable Housing, Canada Mortgage and Housing Corporation

Johnston, Bill – Director, Canadian Real Estate Association

Kelly, Christopher – Conservation and Demand Management, Hydro Ottawa

Kaye, Erik – Manager, Energy Efficiency, British Columbia Ministry of Energy, Mines and Natural Gas

Kotecki Golasinska, Tomasz – Manager, Sustainability, National Housing Commission

Kuruluk, Colleen – Manager, Power Smart Marketing, Manitoba Hydro

Lawson, Stacey – CEO, Ygrene Energy Fund

León Sánchez, Hebert – Director, *Asesoría Técnica*, National Energy Efficiency Commission

Montaña Novoa, Beatriz Rocío – Technical Adviser, German Bureau of International Assistance, Mexico (GIZ)

Mueller, Thomas – President and CEO, Canada Green Building Council

Pérez Vértiz, Gloria Angélica – Asesora, German Bureau of International Assistance, Mexico (GIZ)

Saheb, Yamina – Senior Energy Analyst, International Energy Agency (IEA)

Schaeffer, Dan – Senior Vice-president, Ygrene Energy Fund

Smith, Robert – Director, Innovation, The Minto Group

Stoate, Tim – Vice-president, Impact Investing, Toronto Atmospheric Fund

Strindberg, Nils – Manager, Energy Division, California Public Utilities Commission

Tremblay, Marie Lyne – Deputy Director, Natural Resources Canada

Treviño, César Ulises – Mexico Green Building Council

Westeinder, Jonathan – Managing Partner, Windmill Development Group, Ltd.



Appendix 2 – Summary of Focus Group Meetings

Two focus group meetings with green-building experts from Canada, Mexico and the US were held on 21 and 22 May 2013 (the names of participants are listed in Appendix 1). The first meeting, in Ottawa, considered the potential of Pay-As-You-Save (PAYS) and Property Assessed Clean Energy (PACE) financing for greening existing commercial buildings in Canada and the US. The second meeting, in Mexico City, focused on the potential of green mortgages and other forms of financing for promoting green-building retrofits in the residential sector.

During these meetings, participants were asked to provide feedback on the analysis presented in this report. More specifically, the following questions were discussed during the meetings of these focus groups:

- How could existing financing models be adapted to achieve higher market uptake for green-building investment?
- What are possible areas of commitment from the financing community and governments, that would further incentivize greening- of new and existing buildings?

The following paragraphs summarize the key points of these meetings.

Green-building financing: Opportunities and conditions for investment scale-up in commercial-building retrofit, Ottawa, Canada, 21 May 2013

Canada and the US have seen a lot of financial innovations for green buildings in recent years; however, this has not yet translated into increased market, especially in the case of commercial buildings.

Risk-sharing between governments and the private sector appears to play an important role in influencing market responses to green-building financing. For instance, a number of examples in the US of successful PAYS and PACE financing benefited from government-funded backstop guarantees, such as loan loss reserves, among which examples are the New York State Energy Research and Development Authority (NYSERDA) on-bill recovery program and Colorado's Boulder County Climate Smart Loan Program (CSLP).

Gaps and/or flexibility in legislative and regulatory frameworks can sometimes lead to uncertainty and/or large transaction costs. In the case of PACE financing, there is no prescription for how to raise funding and how to measure and/or verify green-building benefits. In turn, some PACE programs suffer from high transaction costs by choosing complex and/or uncertain funding and/or measurement/verification mechanisms.

There are a number of interesting financing examples outside of the green-building field where government has successfully stepped up to share part of the risk of default; this is the case with



Canada's Small Business Financing program. The program supports each year around US\$1 billion⁸ in loans for small businesses by guaranteeing 85 percent of loan amounts against default (partly funded by registration and administration fees).

Government intervention remains critical to removing barriers to green-building investment and incentivizing commercial building owners. For instance, dissemination of data and information about green building benefits and the expected impact on cash flows is essential, in order to increase market traction and influence strategic asset allocation decisions.

Proposals in Canada to institute Property Assessed Payment for Energy Retrofit (PAPER) constitute a promising avenue to leverage private financing for building retrofits in Canada.

In Canada and the US there are unexploited opportunities to leverage funds from public agencies in support of green retrofits. Examples of such possible opportunities include the Ontario Power Authority, CMHC and the Green Municipal Fund.

PACE and PAYS financing for green building improvements is less prevalent in Canada than it is in the US; however, a number of Canadian organizations are interested in building their understanding of and capacity in those forms of finance, including NRCan and CMHC.

It is important to consider the differences in financing requirements between large and small commercial building owners.

Measurement and verification of green benefits is a technical but essential issue of green-building finance. It requires robust and uniform approaches to build the confidence of building owners, lenders and investors, and keep transaction costs down through standardization. Going forward, it is important that measurement/verification becomes an integral part of green building financing programs, rather than an "add-on." This will ensure that there is a strong business case for making green improvements in existing buildings. Some feel that it is important to not only consider cash flow impacts, as part of it, but also more intangible benefits, such as improved indoor health, increased morale of workers and higher tenant retention rates.

⁸ Converted from Canadian dollars at the official exchange rate for 2012 of US\$1 = C\$0.9995 (see <www.federalreserve.gov/releases/g5a/current/>) (consulted 24 June 2013).



Green-building financing: Opportunities and conditions for investment scale-up in residential-building retrofit, Mexico City, Mexico, 22 May 2013

Much progress has been achieved in Mexico in promoting green homes. Efforts started with the *Hipoteca Verde* and *Ésta Es Tu Casa* programs, which have targeted low-income housing.

Proposals for Nationally Appropriate Mitigation Actions (NAMA) programs on sustainable new housing and green-building retrofits have been developed by the Mexican government and German donor agencies (GIZ and KfW). They aim to revamp Mexico's green-building financing programs to increase market uptake. One of these programs' characteristics is that they embed the whole-house approach, whereby sustainability performance is evaluated at the building level rather than at the level of each individual green feature/improvement.

Despite much progress on green homes, Mexico continues to face challenges. For instance, the rate of penetration of eco-technologies in the building sector remains much lower than expected, because of policy distortions that create disincentives to green-building investments (e.g., government subsidies on utility costs reduce amortization of green-building investments). Without the integrated involvement of Mexico's federal government, specifically through the removal of investment disincentives and the creation of effective financial incentives, increased greening of new and existing buildings will remain difficult. Secondly, a lot remains to be done toward building knowledge and capacity in Mexico on the use of bio-climatic data for building design, the costs and benefits of green buildings, and maintenance/recycling of eco-technologies (e.g., solar heaters and photovoltaics).

Many Mexican government agencies recognize the importance of leveraging the private sector for green-building financing, more specifically by including private lenders and investors in financing programs. For example, government securitization holds potential for increasing private finance in market segments that have not benefited from past and/or existing green-building financing programs.



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Commission for Environmental Cooperation

393, rue St-Jacques Ouest, bureau 200

Montréal (Québec) Canada H2Y 1N9

t 514 350-4300 f 514 350-4314

info@cec.org / www.cec.org