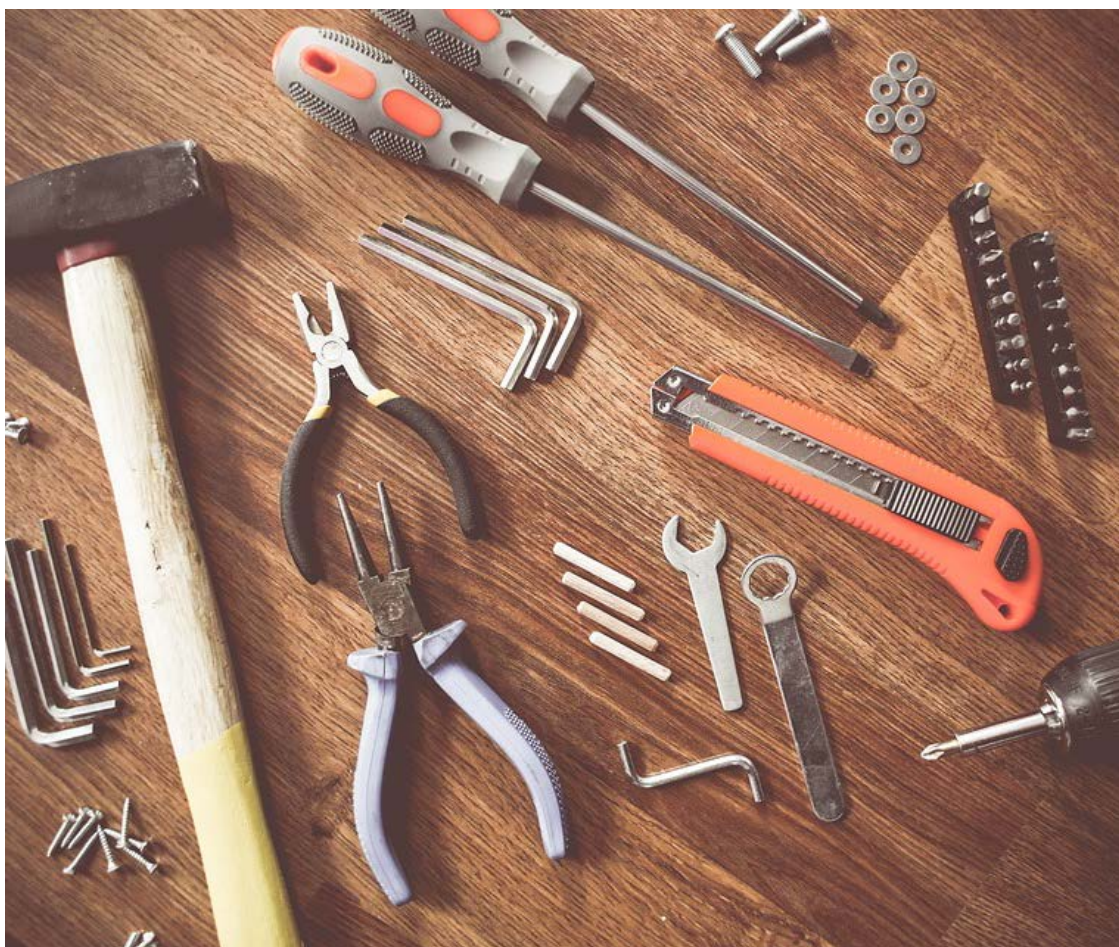


A TAF Technical Guidance Note

Energy Efficiency Financing Tools for the Canadian Context



March 2017

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INTRODUCTION

In Canada, total energy consumption from homes and buildings is the third largest source of greenhouse gas (GHG) emissions. There is growing recognition of the significance of homes and buildings—and the value of energy efficiency—to meeting climate goals and stimulating economic growth, at all levels of government.

In this context, **financing** tools designed to help home and building owners and occupants overcome the upfront cost of energy efficiency upgrades are critical to help accelerate energy efficiency across market segments.

Government leadership on energy efficiency financing is worthwhile for a number of reasons. First, government participation in the financing sphere fills the need for a first mover to demonstrate and de-risk energy efficiency investments, in a bid to significantly increase the volume of private sector capital flowing in. Second, deploying public funds through financing mechanisms presents a sustainable, fiscally-responsible complement to traditional deployment mechanisms like grants, rebates, and tax credits. Finally, financing programs offered by government can be structured around the goal of achieving GHG emission reductions and other public policy goals.

Purpose of this Note

This guidance note is intended to provide readers with a practical overview of the range of energy efficiency financing tools currently in use in North America, with a focus on mechanisms that require or can be enhanced by government leadership. The content of this note includes:

- Categorizing and providing a comparative analysis of financing tools
- Key considerations for government when deciding to use or support specific tools, including factors like capital requirements, administrative costs, and risks to government
- How the financing strategies provided by these tools can lower market barriers to greater energy efficiency investment
- Tying the tools discussed with the broader conversation on mobilizing private capital

This note offers a first glance at the topic, and does not deeply examine any particular financing tool. Further information on each tool can be made available upon request. It is hoped that this note will support informed dialogue and decision making on the role of all levels of government in supporting financing for energy efficiency.

ENERGY EFFICIENCY FINANCING TOOLS

Categorization of Financing Tools

Repayment mechanisms

There are a range of repayment mechanisms that help to address the specific challenges associated with energy efficiency investments. These include tools that encourage long-term lending such as increasing the repayment security and tying the financing to the property rather than the owner, or approaches that allow efficiency improvements to be integrated into operational expenses, rather than capital budgets. In this note, we explore the following repayment mechanisms:

- Local Improvement Charges (LIC);
- Utility On-Bill Financing / On-Bill Repayment (OBF/OBR);
- Energy Service Agreements (ESA);
- Equipment leases; and
- Soft loans.

Credit enhancements

Credit enhancements are tools offered by a third party (typically government) to encourage lenders to offer longer term financing and/or lower interest rates than they otherwise would have, or to offer financing to customers who would not have been otherwise considered credit-worthy. Credit enhancements can be combined with many of the financing repayment mechanisms (e.g. LIC) to further encourage private sector investment in energy efficiency. In this note, we explore the following credit enhancements:

- Loan loss reserves (LLR);
- Loan guarantees; and
- Interest rate buy-downs (IRB).

These two categories can be complementary and each exhibit their own set of strengths and weaknesses. **Repayment mechanisms** offer governments more control and influence over the types of projects and/or programs that are financed, and do not necessarily require buy-in from private investors. In this context, projects in need of financing are not bottle-necked by a lack of capacity or interest from private investors. However, mobilizing private capital is critical to funding the full range of energy efficiency activities needed to achieve our climate and energy goals; repayment mechanisms need to be deliberately structured to encourage private capital in-flows. **Credit enhancements** are especially well-suited to leveraging public dollars to mobilize private capital by de-risking the investment. However, the actual provision of energy efficiency financing is still subject to the capacity and interest of private sector investors/lenders. The table below summarizes the general trade-offs and should be kept in mind as the reader explores individual financings tools.

Repayment Mechanisms:

- + More control and influence over projects invested in
- + Does not require private investor buy-in
- Higher capital requirements

Credit Enhancements:

- + De-risk investments for private capital
- + Lower capital requirements
- Reliant on private investor capacity & interest to see end-user uptake

ANALYSIS OF FINANCING TOOLS

Table 1: Key benefits of financing tools

Legend: Y – benefit provided
 (Y) – benefit possible, read footnote for explanation
 [blank cell] – benefit not applicable

FINANCING TOOLS		KEY BENEFITS					
		Reducing cost of capital	Increasing access to capital	Potential for non-debt/OPEX accounting treatment	Allowing financing at point of sale	Increasing access to longer-term financing	Transferability
REPAYMENT TOOLS	Local Improvement Charges (LICs)	Y	(Y) ¹	Y	(Y) ²	Y	Y
	On-bill programs	(Y) ³	Y	Y	Y	(Y) ⁴	Y
	Energy Service Agreements (ESAs)		Y	Y			
	Leases			(Y) ⁵		Y	Y
	Soft loans	Y	Y			Y	
CREDIT ENHANCEMENTS	Loan Loss Reserves (LLR)	Y	Y				
	Loan guarantees	Y	Y				
	Interest rate buy-downs (IRBs)	Y					

¹ This is one of the tool’s primary intentions. However, challenges have arisen in realizing this benefit due to mortgage lender issues.

² Depends on the model chosen. LIC or PACE financing may be offered in conjunction with other services (utility efficiency programs, energy audits, etc.)

³ OBF does not explicitly lower interest rates, but lends itself to lowering default rates for two reasons: 1) it is integrated into an existing bill payment that the customer is making regularly; and 2) it can be tied to service cut off. Together, these lower the risk, and as a result may lower the cost of financing.

⁴ OBF, with capital provided by utilities, typically offers short-term financing—utilities are not banks, and are not in a position to underwrite long-term loans. On-bill repayment (OBR), whereby the utility billing system is only used as a repayment mechanism while the capital is provided by a third party, can offer a variety of financing products, including long-term financing.

⁵ Operating leases will continue to fall under the “non-debt” category until 2018. Capital leases are considered debt under current accounting principles.

Table 2: Applicability of financing tools by market segment

Description: An assessment of how well individual tools fit with specific markets and to what degree these tools are appropriate as government mechanisms. The scale denotes the level of maturity of different tools in these market segments. Please note: this table is not a ranking of financing tools.

Legend:

- theoretically possible
- ◐ theoretically possible with a few examples and/or pilots
- theoretically possible with many examples of active/established programs

FINANCING TOOLS		NOTES	APPLICABILITY IN EACH MARKET SEGMENT						
			HOUSING Residential	BUILDINGS Residential			BUILDINGS Non-residential		OTHER
			Single family	Multi-Family (condo)	Multi-Family (rental)	Multi-Family (social housing)	Commercial	Public & Institutional Buildings	Energy Service Providers ⁶
REPAYMENT TOOLS	Local Improvement Charges (LICs)	Public financing tool at the municipal level. However, for greater success, collaboration between levels of gov't is recommended (see Table 3).	●	○ ⁷	◐	◐	●	◐	○
	On-bill programs	Financing can be from gov't or from a third-party. Key gov't role for success is its authority over regulated utilities.	●	◐	◐	○	●	○	◐
	Energy Service Agreements (ESAs)⁸	ESAs are a third-party financing offering. Gov't involvement would be to support through broadening the base of eligible markets.	○	◐	◐	●	●	●	●
	Leases	Leases are a third-party financing offering. Government can encourage uptake with credit enhancements.	●	●	●	●	●	●	◐
	Soft loans	Government can seed capital (e.g. GMF) or offer loans themselves, with underwriting capability.	◐	○	○	●	○	●	◐
CREDIT EN.	LLRs, loan guarantees, IRBs	The suitability of credit enhancements can be best assessed by the nature of the financing objective, which can vary significantly within segments. LLRs and loan guarantees are well suited to promoting third party investment and broadening accessibility/affordability. IRBs are best suited towards encouraging participation, but do not broaden accessibility (best suited to shorter-term loans).	●	◐	◐	◐	●	●	◐

⁶ Refers to those who could use financing but are not property owners, per se (e.g. district energy, developers).

⁷ Theoretically possible in existing condominiums but may require every owner to opt-in. Townhome condos and new construction condominiums would find it easier to use.

⁸ The cost of the retrofit projects usually must meet a minimum amount (\$1M). This is possible but not always the case.

Table 3: Roles for key actors

Description: A brief explanation of the different roles that the federal, provincial, and municipal governments can play in establishing or strengthening financing tools. Other key actors are also listed, along with a brief explanation of how they would contribute to successful financing programs. Information about how credit enhancements can be used to complement repayment tools is also briefly illustrated.

FINANCING TOOLS		KEY ACTORS – POTENTIAL ROLE			
		Federal government	Provincial governments	Municipal governments	Other actors
REPAYMENT TOOLS	Local Improvement Charges (LICs)	<p>Support – extend mortgage insurance to cover eligible LICs OR Create a LLR/loan guarantee to lower risk for mortgage lenders</p> <p>Support – capitalize programs with low-cost capital (e.g. through federal bonds) OR Purchase first-loss position bonds that allow programs to issue low risk, low cost bonds to capitalize programs</p>	<p>Support – establishing enabling legislation.</p> <p>Support – Create a LLR/loan guarantee to lower risk for mortgage lenders</p> <p>Support – capitalize programs with low-cost capital (e.g. through provincial bonds)</p> <p>Co-Lead – can act as Program Administrators and may be capital provider for province-wide programs</p>	<p>Lead – create repayment mechanism through special property tax assessments</p> <p>Lead – can act as Program Administrators and may be capital provider</p>	<p>Key collaborators: 3rd party LIC providers and lenders (esp. for commercial LIC), local contractors, manufacturers for the work and as marketing channels, utilities as marketing partners and for incentive integration.</p>
	On-bill programs (OBF/OBR)	<p>Support – guidelines, initial capital</p> <p>Support – offering credit enhancements. An IRB is perhaps especially well-suited to the structure/loan term of an OBF/OBR</p>	<p>Co-lead – coordinator, if utility is provincially-owned</p> <p>Support – establishing enabling legislation, particularly with regards to requiring regulated utilities to provide access to their billing mechanisms for OBR</p> <p>Support – capitalize programs with low-cost capital (e.g. through provincial bonds)</p> <p>Support – offering credit enhancements. An IRB is perhaps especially well-suited to the structure/loan term of an OBF/OBR</p>	<p>Lead – Program Administrator, if utility is municipally-owned</p>	<p>Utilities – as repayment collector (OBR) or program administrator/capital provider (OBF)</p>

FINANCING TOOLS		KEY ACTORS – POTENTIAL ROLE			
		Federal government	Provincial governments	Municipal governments	Other actors
	Energy Service Agreements (ESAs)	Support – guidelines (e.g. see Federal Buildings Initiative) Support – funding support to set up projects Support – use of credit enhancements to broaden access and reduce cost of ESA financing in underserved markets (Class B/C commercial, MURBs) Lead – use in own facilities	Support – guidelines Support – funding support to set up projects Lead - use in own facilities	Lead - use in own facilities	ESCOs: offering these products Utilities: ESAs may be combined with OBR repayment mechanism
	Leases	Support - Maintain tax-free status for municipal lease interest returns Support – set up LLR to improve terms	Support - Maintain tax-free status for municipal lease interest returns Support – set up LLR to improve terms	Support - Maintain tax-free status for municipal lease interest returns Support – set up LLR to improve terms	Third party: act as lessor
	Soft loans	Lead - Provide capital Support - can create an LLR/guarantee to lower risk of default for external loans	Lead - Provide capital Support - can also create an LLR/guarantee to lower risk of default	Lead - provide capital	Financial institutions can be encouraged to step in to cover partial financing, especially with an LLR/loan guarantee
CREDIT ENHANCEMENTS	Loan Loss Reserves (LLR)	Lead - fund creator and administrator	Lead - fund creator and administrator	Lead - fund creator and administrator	Financial institutions – conduit to provide financing
	Loan guarantees	Lead - fund creator and administrator	Lead - fund creator and administrator	Lead - fund creator and administrator	Financial institutions – conduit to provide financing
	Interest rate buy-downs (IRB)	Lead - Provide capital Manage program	Lead - Provide capital Manage program	Lead - Provide capital Manage program	Financial institutions – conduit to provide financing

Repayment Mechanisms

Local Improvement Charges (LIC)

Description

LIC financing programs are analogous to Property Assessed Clean Energy (PACE) financing in the US, wherein energy efficiency, renewable energy and/or water improvement loans are repaid through a special assessment applied to the municipal property tax bill. Property tax-based repayments tend to be extremely secure, enjoying a priority lien over outstanding mortgage balances. Failure to pay municipal tax assessments can trigger a tax impact resulting in seizure and sale of the property. Given low rates of delinquency on property tax bills, risk premiums and interest rates can be lowered as compared to conventional financing products. Moreover, because the financing is attached to the property rather than the owner, the remaining repayment obligation can be transferred to a new owner at the time of sale. In the US, a variety of PACE models exist, ranging from government administered to open market, third-party administered programs. While US programs typically use private third-party lenders, Canadian LIC programs to date (e.g. Toronto HELP and Halifax Solar City) have used municipal government funds.

Capital requirements

Two approaches can be employed:

1. Publicly funded: government loan capital
2. Privately funded: third party loan capital

Administrative costs and approaches

Initial upfront investment to set up the repayment mechanism via property tax assessment. Otherwise, costs depend on source of capital:

1. **Publicly funded:** program management (underwriting, capital utilization), marketing, repayment mechanism
2. **Privately funded:** repayment mechanism, selection and oversight of third party partners

Risks to government and mitigation approaches

LIC programs may carry some risk for municipalities who choose to finance the project through their own capital or debt. This can be mitigated by higher levels of government (provincial or federal) offering guarantees on LIC programs or by adopting third-party lending models similar to those used in many US PACE programs.

CASE STUDY

Toronto Home Energy Loan Program (HELP)

HELP is a financing option offered by the City of Toronto to residents for energy efficiency improvements to their homes. A low interest loan is provided to eligible homeowners for up to 100% of the retrofit cost and is paid back using the Local Improvement Charge (LIC) mechanism. The loan is transferrable as it is tied to the property, not the owner. Toronto also offers a similar program for multi-residential buildings called Hi-RIS.

Other examples:

- Sonoma County
- California (multiple 3rd party providers)
- Boulder County
- Montgomery County
- New York State
- Connecticut
- Vermont

On-bill Financing/On-bill Repayment

Description

Utility on-bill repayment programs offer another highly secure repayment mechanism, whereby loans or leases are repaid through an additional line item on the utility bill. The repayment obligation can remain with the property at the time of sale, and be transferred to a new owner; in some cases, failure to make repayments can result in utility service interruption. On-bill financing (OBF) typically refers to programs where the utility itself sources the capital and administers the program, underwriting the loans based largely on the customer's bill payment history. On-bill repayment (OBR) programs are a more generic term, and often refer to programs where a third-party lender (private or public) provides the capital and underwrites the financing themselves, but utilizes the utility bill repayment mechanism instead of its own collection mechanism.

Capital requirements

OBF: provided by utility

OBR: provided by third party (public or private)

Administrative costs and approaches

Repayment mechanism (OBF and OBR): initial upfront investment to set up the on-bill repayment mechanism

OBF: utility pays for program management (underwriting, capital utilization), marketing, repayment mechanism

OBR: utility pays for repayment mechanism, selection and oversight of third party partners

Creating OBR mechanisms often requires the provincial energy regulator to compel or allow the utilities to invest in creating a new line item option in their billing system.

Risks to government and mitigation approaches

Push-back from utilities who are reluctant to update their billing systems can strain relations with governments.

For multiple-lender OBR programs, a master servicer may be needed to be established to track and disburse repayments, especially if there are multiple utilities offering the program. The responsibility to establish and support this master servicer would likely fall on the government.

CASE STUDY

Manitoba Hydro On-Bill Financing

Manitoba Hydro offers its residential customers Pay-As-You-Save (PAYS) financing for eligible energy efficiency upgrades, notably space heating, insulation, and water heating equipment. Monthly payments are added to the utility bill, and are transferable to the next homeowner.

Energy Service Agreements (ESA)

Description

An ESA is a private sector financing tool wherein the financing repayments are set as a portion of the demonstrated energy and operational savings resulting from the financed efficiency measures. This financing tool is currently offered as an option primarily to larger buildings and public sector buildings. Under an ESA, the provider develops, finances, and owns the energy efficiency equipment installed in the customer's facilities during the contracted period. The customer then makes savings-based payments until the outstanding balance is cleared, or can buy out the contract for the outstanding market value of the equipment. The structure of an ESA can allow repayments to be considered an operating expense, rather than debt, and thus it does not necessarily impact the customers' capital balance sheet. There are many different types of ESA contracts (the two key models being *guaranteed savings* and *shared savings*), with notable differences on the apportionment of risk. Canadian governments are no strangers to ESAs, making use of this type of arrangement to refurbish various facilities, from office buildings to military bases.

Capital requirements

ESA capital is provided by the private sector, either the energy service company (ESCO) or a private financial institution

Administrative costs and approaches

N/A – ESAs are offered by private entities.

However, governments can facilitate the uptake of ESAs for their broader public sector buildings, similar to NRCan's Federal Buildings Initiative.

Risks to government and mitigation approaches

N/A in the provision of ESAs.

As a client of an ESA, key risks include performance risks (savings not materializing) and price risk (drastic change in price of avoided energy). Agreement terms can be devised to mitigate these risks.

CASE STUDY

TAF Energy Savings Performance Agreement (ESPA)

The ESPA is a non-debt financing product. TAF, the financier, works with a building owner-approved engineering firm to purchase and install the equipment. TAF is repaid via the verified energy savings for a term length of up to 10 years. After the contract period, the client receives 100% of the energy savings for the life of the equipment. The projects are covered by a specialized insurance policy that is incorporated into the ESPA.

TAF has successfully pioneered the ESPA with local institutional and social housing sector buildings.

Equipment Leases

Description

Equipment leases are commonly used to finance energy efficient equipment and improvements. Leases are typically provided by a third party lessor, from specialized outfits to banks. Government can support greater uptake of leases by establishing credit enhancements to generate more favourable terms. In this note, leases refer to two key types of equipment lease concepts: (1) operating leases; and (2) capital leases:

- Under an **operating lease**, the lessor remains the owner of the leased equipment until the end of the lease period. At that time the lessee can either purchase the equipment for the remaining value, or return it to the lessor.
- Under a **capital lease**, the equipment is treated as being owned by the lessee during the contract period. Since January 2016, all capital leases with terms longer than 12 months are considered on-balance sheet obligations.

Capital requirements

N/A – capital is provided by the private sector

Administrative costs and approaches

Governments can enter into equipment leases (municipalities have access to tax-exempt leases, for instance), and must thus cover the limited administration costs.

Risks to government and mitigation approaches

N/A in the provision of leases.

The primary risk of using leases for public buildings is that leased efficiency equipment has potential to underperform

CASE STUDY

Equipment leasing programs

Various organizations offer equipment leasing programs with favourable terms, from specialized outfits (e.g. Equilease) to established financial institutions (e.g. Scotiabank Equipment Leasing program).

Soft Loans

Description

Also known as preferential loans, soft loans are provided by governments or quasi-public institutions (e.g. Green Banks) with preferential terms. This could include lower interest rates, longer loan terms, etc. Soft loans can be combined with other financing delivery tools like on-bill repayment.

Capital requirements

Seed capital (up to 100% of project costs) + cost of preferential terms (e.g. buying down the interest rate)

Administrative costs and approaches

Administration, underwriting, marketing.

There is flexibility in terms of administrative approaches. For example, governments could provide funds and work with a 3rd party to provide administration, underwriting, and marketing. An example of this would be FCM's GMF (see case study).

Risks to government and mitigation approaches

The government is taking on the role of the lender, which would require underwriting criteria.

Can mitigate by: being strict about who they're lending to and for what (e.g. FCM Green Municipal Fund to municipalities).

CASE STUDY

FCM's Green Municipal Fund (GMF)

FCM offers funding and knowledge services to municipalities and their partners for sustainability projects. Benefits of applying for a GMF loan include integration of grants to cover some of the project costs; below market, long-term, fixed interest rates; possibility of multiple loan disbursements; etc.

Toronto's Sustainable Energy Plan Financing Program

As part of the Better Buildings Partnership, low interest financing is provided to municipal divisions, agencies, and community-based entities including social housing providers to support conservation, energy efficiency, and renewable energy projects. The interest rate provided is the City's cost of borrowing and is a fixed rate for the length of the funding agreement (up to 20 years).

Credit Enhancements

Loan Loss Reserves (LLR)

Description

An LLR is a credit enhancement tool wherein a reserve fund is established to cover a **portion** of losses incurred by lenders due to borrower defaults. As eligible loans or leases are provided to borrowers, a sum in proportion to the overall loan value is placed in the LLR escrow fund, and held until the loan is repaid by the borrower. The LLR can be rebalanced periodically to maintain a consistent ratio with the overall loan portfolio's outstanding balance. In the case of a default, lenders can apply to the LLR fund to be made whole for a portion of their demonstrable losses.

Capital requirements

Funds set aside are based on the risk profile of the loan portfolio, and selected ratio. LLRs typically represent 10%-20% of the outstanding program loan balance. However, the larger the number of loans in the portfolio, the smaller percentage of the loan balance is typically needed. Governments are particularly well-suited to offering an LLR given their ability to aggregate large loan portfolios.

Administrative costs and approaches

Administrative costs are required to manage fund management and rebalancing. This may require establishing service contracts with financial institutions.

Risks to government and mitigation approaches

During periods of high default rates, LLRs can be drawn down significantly, even to the point that claims from lenders exceed the fund balance.

Governments should be obligated only to maintain the LLR balance up to a portion of the initial loan values, and should not be obligated to rebalance the funds after drawdowns are made.

CASE STUDY

CHEEF Pilots: OBR + LLR (California)

The California Public Utilities Commission (CPUC) set up a suite of financing pilots under the administration of the California Hub for Energy Efficiency Financing (CHEEF). Features include an on-bill repayment (OBR) mechanism, and the authorized use of limited utility ratepayer energy efficiency funds for the creation of a loan loss reserve (LLR), in a bid to encourage lenders to extend or improve credit terms for energy efficiency projects.

Loan Guarantees

Description

Loan guarantees are a credit enhancement tool wherein a government body acts as the guarantor of loans to private citizens or companies, thereby improving the borrowing terms for energy efficiency financing in the private market. Governments with good credit can provide a loan guarantee which reduces the risk exposure of lenders, and allows them to offer longer term loans and/or lower interest rates than they otherwise would have, or to offer financing to customers who would have been considered un-credit-worthy in the absence of the guarantee. Loan guarantees can be either partial or full risk guarantees. As a credit enhancement, loan guarantees can be combined with other types of financing tools (e.g. LIC) to encourage private sector investment.

Capital requirements

Unlike LLRs, loan guarantees do not require governments to establish a fund in escrow to cover potential losses.

Administrative costs and approaches

Administrative costs required to cover program management, rebalancing, e.g. CMHC Mortgage Guarantee program

Risks to government and mitigation approaches

Loan guarantees during economic downturns can become expensive for governments. To mitigate this risk, guarantees should be limited by loan and institution, with clauses that allow the government to cancel the guarantee if the lending institution itself becomes insolvent (i.e. the obligations are non-transferable).

In general, guarantees should cover only a portion of the loans, to ensure the lender has an interest in screening out borrowers who are least likely to repay and pursuing delinquent accounts.

CASE STUDY

US DOE Loan Guarantee Program

The US Department of Energy offers up to \$4.5 billion in loan guarantees in support of projects in renewable energy, energy efficiency, and efficient generation, transmission and distribution technologies.

Interest Rate Buy-Downs (IRB)

Description

Governments can subsidize the interest rate on private loans to encourage uptake of energy efficiency loans, thus making the loan more affordable and improving the business case for the home or building owner. Typically, IRBs are paid to the lender in a single upfront sum equal to the present value of the covered interest rate spread over the loan value and period. Because interest charges accrue significantly over time, IRBs tend to be an expensive option for longer term lending, and are thus more commonly applied to short or medium term loans and leases (e.g. five to seven years maximum).

Capital requirements

Cost of the preferential term.

The cost is much smaller compared to providing a soft loan (seed capital *and* preferential interest rate) where the government is providing both financing and a credit guarantee.

Administrative costs and approaches

Administrative costs are required to manage the program, assess loan eligibility and recruit third party lenders as partners.

Risks to government and mitigation approaches

High demand for IRB programs can lead to higher than expected costs. Total program investments should be capped to avoid program cost over-runs if uptake exceeds the planned program volume.

CASE STUDY

Mass Save HEAT Loan

In Massachusetts, participating banks and credit unions offer unsecured 0% loans of up to \$25,000, with terms up to 7 years. Utilities provide customer acquisition, monitoring and verification, and capital to buy down the interest to 0%.

MARKET BARRIERS AND FINANCING STRATEGIES

The following section demonstrates how the financing tools outlined above can **assist in lowering specific market barriers and encourage greater uptake of energy efficiency activities**. These barriers are often common across a number of market segments, but how they manifest themselves within each market segment can vary.

In this section, we provide an **expanded list** of market barriers that can be addressed to some degree by innovative financing tools:

- Extended paybacks
- Uncertainty
- Split incentives
- Limited access to capital
- Competing capital priorities
- Limited understanding of business case for energy efficiency
- Structural decision-making barriers
- Limited capacity to plan and manage retrofits
- Limited capacity and/or interest from industry

In each case, we offer a description of the barrier and its impacts on various market segments, and outline potential financing and non-financing strategies to overcome these barriers.

Extended paybacks

At current energy prices, deep energy efficiency improvements (including many big-ticket items such as boiler replacement, envelope upgrades, distributed generation, etc.) often deliver long paybacks with a relatively low rate of return when judged against alternative investments. Compounding this, the project risks are often overestimated, uncertain or unknown (see below). As a result, deep energy retrofits tend not to be well-suited to conventional, short to medium term financing, suffering from a mismatch between the short debt repayment terms (typically 10 years or less) and the extended payback from the project which can exceed twenty years.

Financing strategies

- Providing longer-term (10+ years) financing through secure repayment mechanisms (e.g. LIC)
- Reducing the cost of capital
- Attaching the repayment to the property (e.g. LIC, OBF/OBR)

Other strategies

- Grants and incentives to reduce upfront costs and improve the business case;
- Carbon pricing to increase the value of energy savings.

Uncertainty

Efficiency improvements are subject to a number of risks, both real and perceived, notably: (1) the actual benefits may not meet the estimated benefits (*performance risk*); (2) the project risks associated with potential budget and/or timeline overruns; and (3) uncertainty with regards to the length of ownership (e.g. a small business owner going out of business in the medium term).

Financing strategies

- Energy Service Agreements where repayment is linked to verified energy savings (transferring performance risks from the building owners to another party)
- Financing mechanisms with transferability (e.g. leases, LIC, OBF) can mitigate ownership uncertainty

Other strategies

- Savings insurance to cover potential losses when projects do not deliver planned savings
- Design-build efficiency contracting to limit installation cost overruns
- Demonstration projects and case studies to build market confidence in energy efficiency, particularly for building operators
- Establishing data sharing platforms among programs so that the industry can track and better understand the risks, realized returns and default rates associated with efficiency financing (see the [European Union's De-Risking Energy Efficiency Platform](#))

Split incentives

In some cases, the benefits of energy bill savings may not accrue to the party who paid for the energy efficiency retrofit improvements, such as when a landlord upgrades a suite-metered rental apartment. This disincentive to efficiency investments can take on various forms within each market segment.

In the residential and commercial markets: the split occurs between the landlord and tenant. If the tenant is responsible for paying some or all of the utilities, the landlord bears none (or just a portion) of the energy costs and therefore has limited incentive to invest. If the landlord pays the utility bills and has an incentive to lower those costs, the tenant has no incentive to modify their behaviour, thus cutting into the potential energy savings.

In public/institutional buildings: implementation of major energy retrofits often requires cooperation from multiple departments/divisions within a public organization. Different departments may have different priorities and incentives, which may conflict (e.g. minimize capital expenditures and improve energy efficiency). Utility cost savings may not flow to the division which occupies or operates the building(s), limiting the incentive to support a retrofit.

In new construction: The builder/developer generally will pay the incremental cost of energy efficiency beyond code, but a different party (future owners) will receive the benefit of lower utility costs.

Financing strategies

- Financing options that allow financing costs to be transferred from landlord to tenant or from builders to future owners (new construction)
- On-bill financing for renters
- Extended debt to income or debt to value mortgage ratios for high-efficiency new homes.

Other strategies

- Green leases that address split incentive issues (commercial sector)
- Enabling rent/fee increases equivalent to utility savings (for suite metered residential buildings)
- Energy codes that require high-efficiency new construction.

Competing capital priorities

Even if a building or home owner has access to available capital, they still must choose among competing capital-intensive priorities that often cannot be pursued at the same time. For example, homeowners may prioritize cosmetic renovations over efficiency, and building operators may prioritize investments in cosmetic upgrades, deferred maintenance or acquiring new buildings.

Financing strategies

- Reducing the cost of capital (making efficiency investments more attractive)
- Increasing access to capital by offering non-debt/OPEX financing options⁹
- Offering packaged financing for deferred maintenance and efficiency upgrades

Other strategies

- Grants and incentives to reduce upfront costs
- Carbon pricing to increase value of energy savings

⁹ Non-debt/OPEX financing options put the decision at the facility manager level and tend to streamline project development, compared to financing decisions related to the capital budget, which are typically made off-site. Proximity to the daily operations also tend to strengthen the motivation to acquire financing for operational improvement.

Limited understanding of the business case for energy efficiency

Homeowners and building operators often lack awareness of the potential energy cost savings from energy efficiency investments. The non-energy benefits (health and comfort, employee productivity, impact on home/building value, etc.) are difficult to monetize, and as a result are often overlooked or undervalued across all market segments. This barrier is particularly prevalent in non-premium commercial real-estate.

Financing strategies

- Tools (e.g. ESA) that allow a third party to take on the risks¹⁰
- Combining incentives for energy audits with financing

Other strategies

- Education and promotion of business case for EE
- Research to document and assist in quantifying non-energy benefits from EE
- Energy benchmarking, Green Button standards

Structural decision-making barriers

Building management structures that require high-level sign off on efficiency investments create a particularly difficult barrier. Examples include cooperatives and condominiums that require a vote of the members to approve taking new debt; institutional or government buildings that must appeal to capital budgeting processes to obtain funds to support efficiency investments; and commercial building portfolios that require CFO sign-off on capital investments in each building. In each case these structures require that the efficiency investment opportunity be communicated to and understood by parties who are typically not familiar with the building's energy management challenges or are balancing competing capital needs.

Financing strategies

- Financing options that can be incorporated into operating budgets may, in many cases, allow the building operator to make the efficiency investment decision, rather than require high-level approvals
- Packaging other measures with EE measures can make the overall investment more attractive to building owners and managers.

Other strategies

- Incentives that improve the business case for efficiency investments
- Education and capacity building at management level

¹⁰ Building owner understanding of the business case is not necessary if the risk can be assumed by a third party that can then focus on pitching the benefits.

Limited capacity to plan and manage retrofits

Implementing efficiency improvement projects can be a daunting challenge to home and building owners. It can be difficult to obtain reliable information on equipment options and performance, incentive programs often involve complex application processes, and obtaining conventional financing typically introduces extra steps and delays to the process. Moreover, coordinating a diverse team of contractors to execute even a mid-level retrofit can be overwhelming. Together these challenges present a critical barrier for many would-be efficiency projects.

Financing strategies

- Offering financing at point of sale can shorten the long approval times of financing applications
- Energy Service Agreements are generally packaged with “turnkey” project delivery (i.e. financing, design, construction, and monitoring all provided by one entity or consortium), which greatly reduces complexity/workload for building operators
- Elements of turnkey project delivery can be packaged with other financing tools

Other strategies

- Simplified design of EE incentive programs
- Provision of unbiased advisory services as part of EE programs (e.g. Roving Energy Manager program offered in Ontario by LDCs)
- Capacity building for building operators (e.g. NRCan’s “Dollars to \$ense” workshops)
- Design-build energy performance contracting

Limited capacity and/or interest from industry

Energy efficiency is often poorly understood among key market actors such as contractors, engineers and equipment suppliers due to a deficit in knowledge, training, certification, and buy-in from various industry sectors. These limitations can further contribute to other barriers leading to higher prices for efficiency equipment options and/or increased uncertainty over energy performance. As a result, homeowners and building operators who are interested in installing high efficiency equipment can be actively discouraged by contractors or other professionals who are unfamiliar with efficient equipment and/or the benefits offered.

Financing strategies

- Financing at point of sale encourages industry to become proponents and “on the ground” marketers

Other strategies

- Education and capacity building for various industry sectors
- EE incentives which provide part of the incentive directly to contractors or other professionals

CAPITAL MOBILIZATION FOR EFFICIENCY FINANCING

Capital mobilization mechanisms serve a distinctly different purpose than the financing tools described above. The financing tools generally aim to create an advantageous match between the returns from energy efficiency improvements and the financing terms (such as offering long term repayment at low interest rates). Capital mobilization refers to mechanisms that programs can apply to access the funds needed to capitalise their loans. For example, municipal bonds (a capital mobilization mechanism) may be used to raise funds for an LIC program that lends to building owners and is repaid through a property tax assessment (financing tool).

In this context, **mobilizing private capital** is a critical consideration in the design of financing programs for energy efficiency. It allows governments to magnify their impact, and mitigates the risk that public investment will crowd-out private investment that may have otherwise flowed into the market.

Some key elements should be kept in mind, notably:

- **Credit enhancement tools are specifically designed to leverage private capital**
These tools de-risk investments and/or close the gap between the terms on which private investors would be willing to lend, and those on which building owners would be willing to borrow. Government is particularly well-suited to providing credit enhancements because of its ability to absorb risk and set mandates supportive of investments in energy efficiency.
- **Repayment tools can be designed to leverage private capital**
Private capital can be leveraged at either the project/program level or subsequent to project completion by mobilizing private capital on the secondary market. For example:
 - *Soft loans*: a public loan program could simply cap the loan at a percentage of project costs, requiring the building owner to source the remaining capital from their own savings or another lender. However, this may deter participation and increase transaction costs and complexity for borrowers. Alternatively, a lending program can be designed in partnership with one or more private lenders, where public capital is blended with private capital in an integrated financing product with a blended interest rate. This has the benefit of building capacity and comfort of the private investor(s), which may subsequently be willing to make the same types of investments with less, or no, public capital.
 - *Local improvement charges and on-bill repayment programs*: while the government may play a role in setting up legislation and/or the infrastructure for LIC or OBR programs, the capital may come from private lenders. PACE programs in the US typically follow this successful model.

Similarly, governments can **raise private capital from the bond market to capitalize an EE financing program**, e.g. using green bonds to capitalize a loan program or a LIC program. This mobilizes low-cost capital from institutional investors, though it does not build momentum/capacity for the private sector to take a more direct role in EE financing.

Alternatively, private capital can be mobilized on secondary markets, either on a project-by-project basis or via the aggregation of multiple projects. In this case, governments may act as the

transaction originators, or as intermediaries between the small and medium enterprises that originate the transactions and larger institutional investors that purchase them at scale (warehousing). The associated revenue can then recapitalize the financing program.

Governments aiming to mobilize capital on secondary markets, or to blend public capital with private capital in integrated financing products, often find it advantageous to do so through **a specialized, arms-length institution** such as a green bank or revolving fund. These types of institutions are often able to operate in a more entrepreneurial manner, with higher risk tolerance, faster decision making, and reduced political interference compared to traditional government departments. We offer some notable examples below:

Green Banks (or Infrastructure Banks)

Green Banks combine a mission to provide energy efficiency and renewable energy financing with financial expertise in areas such as underwriting loans, assessing risk, issuing bonds and securitizing investments. Through this model, they can be an effective tool to demonstrate new energy efficiency markets and financing approaches. A key aspect of a Green Bank is its powers to raise capital through a range of mechanisms, such as project aggregation, warehousing and securitization (whereby individual EE projects are packaged into a security that may be sold to institutional investors), bond issuances, and more. They can be a public or quasi-public financial institution, and they typically aim to leverage limited public funds with greater private investment. In general, Green Bank program design should seek to complement, rather than duplicate, other government and utility financing programs.

First-loss position bonds via an Infrastructure Bank

Establishing a stratified set of bonds to capitalize a pool of securitized loans can be an effective mechanism to reduce borrowing costs on the majority portion of the capital. By issuing a set of stratified bonds, with the first 10-20% of bonds carrying all or most of the credit risk associated with defaulted loans, allows the remaining 80-90% can be sold as low-risk (possibly AAA rated) bonds at a low interest rate. Governments (or other institutions, such as Green Banks) buy the first-loss bonds, while the private sector purchase the remaining low-risk bonds.

Revolving funds and trusts

By capitalizing a revolving fund or trust, governments can ensure a steady and continuous source of capital for projects or programs. Revolving funds can be capitalized as a one-time investment or over several installments, by the government and private sources. Note that rules may prevent further leveraging of the fund to encourage private investments, limiting the fund's impact.

Connecticut Green Bank

The CT Green Bank partners with lenders to offer a suite of financing programs, from C-PACE to low-interest loans. The institution warehoused and executed the first securitization of commercial efficiency assets, a portfolio of PACE loans, in 2014. It no longer needs to perform this function, as private investors now make direct investments.

Rhode Island Infrastructure Bank

RIIB used first-loss position bonds to capitalize the Efficient Building Fund, a revolving loan fund that finances EE/RE projects in public buildings.

The Atmospheric Fund

TAF was created by a one-time endowment from the City of Toronto, which is invested in energy efficiency investments. Revenue is used to fund TAF's operations.

