Developing Effective and Sustainable Financing Approaches

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Scaling Up Building Energy Retrofitting in U.S. Cities
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for more information on the Green Boot Camp
and the full Resource Guide see:
http://greenbootcamp.livingcities.org/
The Challenge

The magnitude of capital investment necessary to retrofit buildings at the scale and depth necessary to meet climate imperatives, and to achieve potential benefits to the economy, are enormous—on the order of several trillion dollars nationally. Estimates for Chicago alone (Chicago Climate Action Plan) are approximately $2 billion to retrofit 400,000 buildings if carbon reduction goals are to be met.

How can cities pay for all these building retrofits? American Recovery and Reinvestment Act (ARRA) funds and philanthropy have a role to play, but they can cover only a small portion of this need. But there is hope. Energy efficiency retrofits can generate reliable, substantial savings, year after year, that can “pay for” the retrofit cost—if the payment of costs can be spread over a period of time aligned with the period of benefits. There are many ways to do this, and in theory many of them should work, but there are many barriers to be overcome. A study conducted by the Vermont Energy Investment Corporation on barriers to first cost investment in energy efficiency found that participation in most finance programs has been extremely low. There are no proven models that can simply be adopted. In fact, the study found that the most promising options were emerging models that have no track...

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27. Fuller, supra note ix.
record and are not very well developed.

However, many approaches have been tried over the last 20 or more years, and many lessons have been learned. These lessons will serve as building blocks for new systems that will be part of new solutions. But while we recognize the value of this prior experience, we need to be cognizant of the particular challenge that forward-going solutions present if they are to be implemented at an unprecedented scale. Given the scale of retrofit ramp-up required to meet climate imperatives, programs that work only for early adopters, those that are easy to lend to, or other niche-market programs are not sufficient and may even be a distraction from other large-scale initiatives that would be more cost-effective. Aggressive pursuit of financing strategies is not only worth doing, it is likely to be necessary. There is program success in limited markets, as well as proven elements of earlier programs that should be scalable. Developing models that minimize ongoing subsidy should be possible, but it will be challenging.

No matter how compelling the case that savings from retrofits will pay for themselves over time, experience to date shows that first cost investment barriers are deep, pervasive, and difficult to overcome. Building owners, to varying degrees, tend to have implicitly high discount rates (short planning and investment horizons); tend to be skeptical of savings projections; assign a high cost to the “hassle” factor of getting involved with a retrofit project; and, in the case of rental or leased properties, may be in a “split incentive” situation, in which the party incurring the cost might not also receive the benefit. And even if all these decision-to-invest barriers are overcome, many have neither the required cash nor the creditworthiness to qualify for financing.

In this context, experience suggests that paying for retrofits at the scale required in the future will involve different mechanisms for different types of projects and in different markets (residential single-detached homes, multi-family, small business, large commercial, industrial). Combinations of: (a) incentives that buy down the first cost of qualifying retrofits, and (b) building owner investment, either as cash or financed over terms adequate for the investment to produce a net positive cash flow, will be needed.

**Important Elements of Financing to Understand in Financing Building Retrofits**

**Term**—Most energy loan programs have been limited to terms of less than 10 years, with the majority in the 3- to 7-year range. Generally, extending the term of available financing is more important than interest rate reductions or subsidies in affecting the number of retrofits and the magnitude of savings. Deep savings retrofits consistent with climate goals are likely to require terms of 15 to 20 years to result in positive cash flow.

**Interest**—Most energy loan programs feature below-market rate interest, usually funded as part of utility efficiency programs or through a lower-interest source of capital—for example, through bonding—that borrowers do not have access to outside the program. Some mechanisms, such as home equity loans, mortgage financing, and property tax assessments, also give participants tax benefits for interest payments. The programmatic cost of providing these interest subsidies must be accurately estimated.
Security—Loans can be secured by a lien on the property or on specific equipment. The existence of a lien reduces risk to the lender, but it also increases transaction costs for a program. From a borrower’s perspective, a secured loan will tend to have a lower interest rate, but typically will affect borrower credit requirements. A “mechanic’s lien” is a security interest in the property title to secure the claim of those who have supplied labor or materials to improve the property. Some creative programs have also secured retrofit loans with a lien placed on other valuable assets such as a car or boat. In addition to these traditional methods of acquiring a security interest, some programs propose using the ability to disconnect power for nonpayment as added security. That said, most programs find secured loans to be much harder to market, and therefore opt for unsecured loans. These either have relatively high interest rates or subsidies to buy down interest rates.

Credit—Most building retrofit financing mechanisms rely on the expected ability of the individual building owner to pay back a loan. For homeowners, lenders have threshold values that must be met for personal debt-to-income ratio and/or FICO score (a system used by the credit rating industry based on bill payment histories, current debt, and other criteria). The underwriting process for commercial properties is more complex. While these methods are reasonable from a lender perspective, their effect can be to exclude from eligibility the very property owners who need financial assistance the most. New mechanisms that use utility bills or tax assessments for repayment may rely less on traditional credit underwriting and more on payment history as a proxy for credit.

Underwriting—Underwriting is the process of determining the creditworthiness of a prospective borrower. One enhancement, with a history of use in certain energy mortgage programs, is for lenders to account for energy cost savings on the income side when they are evaluating a borrower’s debt-to-income ratio.

Servicing—Collection of payments can be done through separate billing, through utility on-bill financing programs, or property tax payments. The transaction cost of servicing loans is a cost that needs to be covered.

Default Guarantees and Reserves—Guaranteeing loans or making deposits into a loan loss reserve fund (funds set aside to cover defaults) enable energy loan programs to offer loans to a group of borrowers with a wider range of financial resources and credit histories. This is a particularly valuable use of funds in that it can expand program applicability and participation at a lower cost than other subsidy options. The reason for this is that typically the committed funds are only a fraction of the value of the loans being covered.

**Common Myths**

- *Information is sufficient.* If building owners have enough information on the costs and benefits of efficiency retrofits, they will make rational investment decisions that benefit them. A common misconception is that knowledge of available options by consumers leads to implementation of recommendations. In fact, despite the 150+ loan programs for residential energy efficiency in the United States, only a tiny fraction of the population has been reached. In fact, most of the programs reached well under 1% of their potential customers. Lack of information is an important barrier to consider when designing a financing product. Many customers neither know
how to implement energy efficiency measures nor understand and have confidence in the benefits of a project. In many cases, a customer needs to do a complicated calculation to understand the financial benefit of a measure, or a client must experience a well-insulated house to understand the value of nearly invisible retrofit work. However, lack of information cannot fully explain the “gap”—a significant amount of literature shows that simply providing information is often not enough to change behavior; government standards and incentives would not be needed if lack of information was the only barrier. There is reason to believe that much more underlies consumer decision-making.

The way information is communicated and by whom is extremely important. In one study, community groups outperformed both private subcontractors and utilities in implementing energy efficiency programs when performance was measured by cost, energy savings, and response rate, perhaps because of the level of mutual trust and familiarity homeowners had with the community groups. Choosing partners and crafting an appropriate marketing strategy when launching a new energy efficiency product are extremely important.

- **An adequately attractive financing program is sufficient:** Initial cost is one of the most important barriers to investing in energy efficiency in existing homes. Once an individual is interested in making cost-effective energy improvements, appropriate financing can make the investment possible and affordable. Conventional loan programs are not by themselves able to meet this need; they typically require additional sources of funding, such as interest rate subsidies or buy-downs.

The initial cost is the barrier that is most directly addressed by financing. A project may be a great long-term investment for a homeowner, but the individual might not have sufficient cash available to invest in the project. Research suggests that financing does make a difference. Only 29% of those using zero interest financing in a Pacific Gas & Electric program said they would have made changes without the program. The comparable figure in a Bonneville Power Administration program was 45%, and 29% for a Northern States Power loan program.

- **Philanthropic sources are a good source to pursue for the costs of retrofits:** With increasing awareness of climate change and the direct link to energy use in buildings, many foundations are expanding or starting new initiatives focused on energy and climate. While philanthropic sources have a very valuable role to play, providing direct funding for energy retrofits will not be seen as a replicable strategy, nor can it be scaled up.

- **This can all pay for itself out of savings. We just need to get it started and/or remove a few market barriers with bright new ideas and access to capital:** While this has been posited, and is certainly possible in theory, there is no example to show that it is possible, in the foreseeable future, for more than relatively small niche markets. The market barriers are many, complex, deep, and difficult to overcome. Indeed, the existing retrofit programs that have the highest levels of both participation and savings have administration, technical assistance, market development,

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customer service, and financial incentive costs that are close to half of total program expenditures, typically provided by utility ratepayers or taxpayers. Programs that try to pay for all costs out of savings have had very limited applicability and impact. Most higher-volume existing loan programs tend to serve participants who have higher incomes, good credit, and access to other (albeit often less attractive) sources of funding.

Financing alone is particularly not applicable for reaching low- and moderate-income households. Most existing retrofit financing programs, especially those with wider participation, offer subsidies in the form of free or low-cost “handholding,” cash rebates, interest rate buy-downs, and/or loan guarantees to attract and qualify participants. All of these are costs that need to be covered by the program.

- **The energy savings are compelling enough that people will want to do them**: The cost of energy has historically been low on many individuals’ list of priorities, with the exception of lower-income households. Energy expenses tend to be small relative to other expenses such as housing, transportation, clothing, food, etc. As a result, energy costs are often not a primary concern. The cost of the information needed to make a decision, or the time and effort required to apply for a loan to cover retrofit expenses, may simply not be perceived as worth the return in energy savings. An example of this is that, despite the impressive rates of returns that are often available from efficient appliances, it is frequently the case that the relatively small total amount of return (versus the rate of return) makes the cost of not choosing the “economically optimal” product relatively insignificant. There is extensive experience and literature identifying barriers to consumer investment in energy efficiency associated with utility energy efficiency programs.

- **The retrofits we want to do have short “paybacks”**: While some simple weatherization and lighting might save 5% to 15% of energy use, the level of savings necessary to achieve climate goals, as well as to capture the economic and job creation benefits, is on the order of 25% to 50%. These “deep” energy retrofits go beyond the fast payback measures such as lighting, appliances, caulking, and weather-stripping to major measures of attic and wall insulation, new duct work, overhauling or replacing the heating or cooling systems, and instrumented air leakage reduction. These major measures result in retrofit packages that are likely to cost $6,000 to $20,000 per home and require longer financing in order to maintain positive cash flow. This can imply terms of 10 to 20 years, longer than are available through most conventional financing programs.

- **“Revolving” loan programs need to be capitalized only once, up-front, and can then keep making loans indefinitely**: It is a common misconception that revolving loan facilities pay for themselves. While most such programs include reduced interest rates (to attract participation), the costs of such interest rate subsidies must be fully considered at the time this approach is adopted. For example, the present-value cost of providing an interest write down from 6% to 0% for a 10-year, $15,000 comprehensive home energy retrofit loan is $3,740, which would come out of the loan fund. Together with a 5% administrative cost and a 5% provision against default loss, the loan

fund could have costs of approximately $5,200 for each $15,000 loan. At this rate, the loan fund’s assets would be reduced by 50% in 14 years. It should also be noted that most retrofit loans that are for deep savings (consistent with climate goals) will have terms of 10 to 20 years, meaning that the annual repayment stream available to finance additional projects will be an order of magnitude less than the initial capitalization.

- **ESCOs can do it all; if there’s money to be made, the market will step up and provide a service:** Most Energy Service Companies (ESCOs) operate on a regional or national level, and can choose the markets and types of projects they wish to engage in. Because there is so much opportunity, they will tend to pursue larger projects that have the largest savings potential. This minimizes the fixed costs per project that have to be supported by completed projects and lowers their performance risk. They are most interested in very large institutional, government, or commercial customers, and are generally reluctant to become engaged in projects that are smaller, economically marginal, or complicated for their size. Many have minimum project threshold costs on the order of $500,000. While this is hard to meet with most individual buildings, aggregation (e.g., all of a city’s public housing) can create a larger project that will be of interest to some ESCOs. The other challenge is that most ESCOs are looking for financial arrangements that will generate a significant level of profit for their owners. This can place financial burdens on projects that render them infeasible from the ESCOs perspective, even if they make economic sense from the building owner’s perspective. It will also tend to result in building retrofit packages that do not go as deep in their savings. When it comes to smaller buildings, while there has been much desire, speculation, and even offers, there is no success to date in bringing the ESCO model to individual homes or small businesses.

- **A simple, low-cost analysis tool can be used to identify retrofit measures that can pay for themselves out of savings when financed:** There are existing analysis tools of varying sophistication that can be used to identify retrofit measures savings, but they are necessarily simplifications of complex building energy systems and conditions. And while the savings from efficiency measures, on average, may be predicted to acceptable tolerances with some simpler tools, savings estimates for individual homes are less likely to be accurate. Deviation from the expected level of savings might not be an issue for those with higher incomes, but if expected cost savings levels are not met for households of modest means (that are relying on savings to cover loan payments), it is a major problem. Houses are complex systems and it takes a certain level of expertise and an understanding of site-specific situations to make reasonably accurate estimates of energy savings. Accordingly, if simpler tools are used, the tendency will be to recommend only a limited package of measures with very high benefit / cost ratios. The cost of a reasonably accurate analysis (on the order of $200 to $400 for single homes), while almost always worthwhile if substantial improvements are made, is a major barrier when it needs to be paid at the outset of the process. Various schemes have been proposed to address this problem, but none has been shown to be a clear solution.

**Recurring Themes**

Across a wide range of financing programs, the limitations that are both most common and most problematic are: (a) limited applicability for households most in need, and (b) difficulty assuring that savings will exceed payments.
There has been little success in addressing the financial barriers faced by those most in need of financing, including those with the highest energy cost burdens (energy cost as a percentage of income), those with poor credit, and renters. Most existing programs have very limited success in making financing work for low- and moderate-income families, in underwriting criteria, in the repayment term length, and in considering the increased ability to make payments due to the energy savings.

If relatively short-term conventional financing (less than 7 years) is to be used, achieving desirable levels of energy savings for most low- and moderate-income households requires significant subsidies.

Assuring that the measures financed will save more than the financed cost (e.g., positive project cash flow): (a) is desirable to achieve political support, (b) will reduce the perceived risk of loans on the part of lenders (e.g., it will encourage lower interest rates and/or less loan-loss coverage), and (c) is essential if financing is to be provided to those who would be judged unable to meet debt obligations without the promised savings. Wealthier participants can afford to pay more if necessary (whether due to choosing pricier improvements or taking on a shorter loan term), but it is essential that energy efficiency not become an additional burden for lower-income people.

To the extent that customers are counting on savings to pay off a loan, there needs to be high confidence that promised savings will actually occur. An initial screening can be beneficial, using simplified tools. But once a program is recommending that building owners spend their own money, perhaps a lot of it, there needs to be an “investment grade” analysis of costs and savings, which in turn requires qualified auditors or contractors using high-quality calculation methods and diagnostic methods.

Financing program designs most likely to support wide participation and deep savings should focus on long terms (10 to 30 years), securing repayment through dedicated, structural revenue streams (utility bills, tax assessments, mortgages), rather than personal credit, and place more emphasis on broadening the pool of potential participants.

To the extent possible, public subsidies should focus on loan guarantees or other loan loss reduction mechanisms and partial cash financial incentives, and focus less on reducing interest rates. This will support both wider participation and deeper energy savings, and overall more savings per dollar invested.

Financing Examples and Models for Cities

Many cities are using various funding and financing sources and mechanisms for building retrofits, but none can be turned to as having demonstrated a superior approach that can be seen as clearly able to be replicated and scaled up to meet all the needs for massive retrofit. Instead, cities need to consider the range of mechanisms and sources, identified and listed below, with references to selected examples.
A. CONVENTIONAL FINANCING OPTIONS

- **Consumer loans from banks and credit unions:** Many utility efficiency programs have developed with conventional lenders' energy loan programs that are similar to other consumer loan products. These can be secured or unsecured (typically reflected in interest rate and/or underwriting criteria) and typically have a term not to exceed five years. The term limits the depth of savings that can be supported and underwriting typically limits participation.

- **Home equity loans:** In theory, home equity loans should be a reasonably good match for making deep retrofits in the single-family residential market. The term is typically longer than consumer loans and could be up to 15 years, and the interest rate should be relatively attractive. But to date, very few such loans have occurred and there appears to be little interest on the part of lenders in building a program around them, although this might change with increased attention to “green” initiatives. The applicability of such loans would appear to be limited to single-family homeowners with a certain minimum equity in their homes.

- **Mortgage financing:** Again, in theory, this would appear to be a great option for financing energy retrofits. Mortgages have long terms, up to 30 years, and relatively low interest rates. Under these terms and rates, high levels of energy efficiency retrofit save more than the incremental monthly payments for high levels of savings. Mortgages are also familiar instruments with an established infrastructure. There are two opportunities to use mortgage financing for energy building retrofit—at the time of property transfer and as discretionary refinance of the property.

  - **Energy efficiency refinancing**—An energy efficiency refinancing program would promote refinancing of homes with new mortgages specifically designed to include major energy improvements. While this mechanism has not yet been implemented as a program, it has been proposed by Vermont Energy Investment Corporation (VEIC) and the Energy Programs Consortium (EPC). The EPC model would make lower-cost mortgages available to homeowners who implement approved efficiency measures as part of the refinancing. This might allow low- and moderate-income households with a heavy debt burden to consolidate their debt at lower rates and at the same time make energy saving improvements to their homes that further reduce their bills.

  - **Energy Improvement Mortgage (EIM)**—An EIM at time of property sale allows a new home buyer to get additional financing rolled into the mortgage to cover the cost of energy improvements. VEIC conducted a pilot of this type of product a decade ago that found the mechanism to be workable, but had costs that were a barrier to participation.39 HUD, FHA, VA, Fannie Mae, and Freddie Mac all support Energy Efficient Mortgages, but their use has tended to be for new homes. With higher energy prices and the potential development of time-of-sale energy rating disclosure or requirements, such a product may merit reconsideration.

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• **Business Loans**: Most building retrofit financing program experience to date has been focused on the residential sector. While many residential financing mechanisms can and have been applied to the business sector, there are also unique programs that have been established for this customer group, largely as part of utility efficiency programs or extensions of government economic development efforts. Any number of utilities have established short-term (3 to 5 years) business loan programs, typically offering reduced interest rates for measures recommended by the utility program. Municipal and state economic development programs often feature publicly subsidized loan programs to retain or attract business, and energy improvements are often an eligible use of these funds. In some cases, typically in cooperation with energy efficiency programs, economic development entities have developed stand-alone energy loan programs.

• **Leasing**: Whereas cities are familiar with tax-exempt leasing as a financial mechanism, many do not realize that leasing can be used to finance a wide range of efficiency measures, from individual pieces of equipment to comprehensive building retrofits. In certain situations, leasing can provide attractive tax or depreciation benefits, compared to ownership. For municipalities, it can be an attractive off-balance sheet financing option that can be viewed as an ongoing operating expense (lease payments) with a dedicated revenue stream (utility bill savings).

• **Power Purchase Agreements (PPAs)**: This mechanism, where another party owns the improvements, has been used to finance solar electric systems and has the potential to be applied to large building retrofits. A third party owns the improvements and the building owner purchases the electricity produced (or saved) over terms of 5 to 15 years.

• **Performance Contracting**: A performance contract, in which an ESCO guarantees a level of savings or agrees to share savings, is commonly used for large-scale efficiency projects. To date, there has been little success making this work on a residential level. An ESCO is a business that develops, installs, and arranges and/or provides financing for energy efficiency projects. ESCOs use energy performance contracts (EPCs) to make building retrofits. When an ESCO undertakes a project with an EPC, the company is financially at risk for the actual energy performance of the retrofit. While most performance contracting has been for large commercial, industrial, and institutional projects, there is also a long history of using performance contracting in schools and public housing.

**B. DEVELOPMENTAL FINANCING OPTIONS**

• **On-bill financing from utilities for comprehensive retrofits**:
  - **Short-term customer loans with on-bill repayment**: Utilities offer an existing monthly payment instrument that is generally well suited to collect repayment for financed energy retrofits. It is also notable that several utilities have canceled on-bill financing programs after trial implementation. For several reasons, these programs are generally limited to short terms (3 to 5 years), which limits their applicability to finance deep retrofits. A challenge faced by this mechanism is repayment allocation when customers partially pay their bills. Another policy challenge is whether customers will face disconnection if they do not make their loan payments. Finally, utilities have generally been reluctant to use their billing to collect...
repayment for efficiency measures that save fuels other than the one they provide, which discourages comprehensive retrofits.

- **Tariffed Installment Payment (TIP)**—This variant of on-bill financing ties the repayment obligation not to the customer, but rather to the meter. It requires the establishment of a new utility tariff that passes the obligation to repay energy efficiency improvements to subsequent customers at the same location until the loan is paid off. Because eligibility is determined by the customer's utility bill payment history rather than personal credit, a major barrier to widespread participation is addressed. The State of New York recently called on its utilities to pursue development of TIPs. There are several potential regulatory and consumer protection issues that have been raised regarding this mechanism that have not been resolved, but advocates feel can be overcome. A proprietary version of TIPs, referred to as “Pay as You Save (PAYS®)” has been considered for more than a decade by numerous utilities and has limited pilot experience. It required an independent estimate to assure savings, a requirement that expected payments be no more than 75% of the anticipated savings, a term of repayment of 75% or less of the life of the measures, and utility service disconnection in the event of nonpayment.

**C. CLEAN ENERGY ASSESSMENT DISTRICTS**

This is a relatively new and innovative approach to financing energy efficiency and renewable energy building retrofits that was developed and first implemented in Berkeley, California. With this mechanism, a municipality creates a special tax assessment district, composed of property owners who wish to finance building retrofits. The city (or an entity serving the city) provides the funds for the retrofit, and repayment is made as a special assessment on property tax bills. The financing is secured by the property (not the individual) and may be collected across 20 years, with the repayment obligation passing from one owner to the next upon property transfer. The initial implementation of the program in Berkeley, in late 2008, was used entirely for solar installations, but is equally applicable to efficiency retrofits. This mechanism has also been implemented in the California jurisdictions of Palm Desert and Sonoma County, with programs soon to come in several other cities in California, including San Francisco and San Diego. Colorado passed a version of the law, and Boulder implemented a first round of solar financing earlier this year. Annapolis, Maryland, is similarly using this mechanism on a pilot basis for solar financing. In Babylon, New York, this mechanism is being used to finance comprehensive retrofits as part of a broad, municipally sponsored green homes program. Enabling legislation has been enacted in New Mexico and Virginia, and is under consideration in Oregon, Vermont, Nevada, Arizona, Texas, New York, Maryland, Wisconsin, and Montana.

**D. CAPITAL SOURCES**

There are many possible sources of capital that can be applied to the cost of retrofits and / or used to support financing programs. For most existing energy efficiency financing programs, capital has been provided by banks or utility ratepayer funds. Other sources include manufacturers who help finance their own equipment, leasing companies, municipal bonds, state treasuries and pension funds, and housing and economic development agencies. ARRA funds now offer a significant new source, though only for a few years.
- **Banks, Credit Unions and Community Lending Organizations:** There is a long history of energy programs working with conventional, local lenders to offer financing products specifically for energy efficiency investments. Most of these are extensions of the types of financial products already offered by these lenders, with specific marketing, terms, rates or underwriting that sometimes reflect subsidies, community re-investment obligations, and/or the unique ability of energy loans to generate a repayment stream.

- **Municipal Bonding:** Cities make use of municipal bonding for many purposes, and raising capital for energy efficiency is certainly an option. This can be a relatively low-interest option, whether for taxable or tax-exempt uses. There is typically a minimum threshold for this to be an attractive option, given the transaction costs. For the tax assessment district financing model, municipal bonding is a logical source, and it has certainly been used in other models. Bonding has been used in municipalities to support renewable energy investments, but it could similarly be used for building efficiency retrofits. About 20 years ago, the City of Burlington, Vermont, bonded for $10 million to support incentives, technical assistance, and loans through the municipal utility. In 2001, voters in San Francisco authorized a $100 million municipal bond for renewable energy and efficiency investments. The flagship project supported by this bond was an $8 million installation of a photovoltaic system and efficient lighting in the Moscone Civic Center, where savings from the efficiency measures “paid for” the above-market costs of the photovoltaic system, allowing the bond to be repaid out of savings over a 10-year term.

- **Private Capital Markets:** A relatively recent development has been to pursue relatively complex private sector investment, from a range of investors, to provide capital for community and state efficiency programs. Both the Cambridge Energy Alliance and the Delaware Sustainable Energy Utility models are built around the provision of capital from markets, with repayment out of energy savings.

- **Utilities:** Utility energy efficiency programs spent over $3.7 billion nationally in 2008. They are certainly one of the most significant potential resources to support cities’ building retrofit efforts. At a minimum, cities can make use of utilities’ existing programs, from prescriptive rebates to comprehensive retrofit programs. Beyond this, there is also the opportunity to propose new programs with utility funding. In considering the role of utility support for the retrofit efforts of cities, it is important to understand the basis of utility investment in energy efficiency. They need to meet cost-effectiveness requirements that are typically established by utility regulators and will generally focus on measures where savings are measurable and verifiable. While it varies considerably, utility programs often provide financial incentives in the range of 20% to 40% of measure costs. Cities with municipal utilities have unique and large opportunities to partner in the delivery of building retrofit programs. Among the leading programs where there is a higher-participation municipal utility financing program is the example of Sacramento, California. A national database on rebates and incentives from utilities and government sources is maintained by the North Carolina Solar Center.31

31. See in particular the NCSC’s Database of State Incentives for Renewables and Efficiency at http://www.dsireusa.org/
ARRA: The availability of ARRA funds represents an unprecedented opportunity for cities. Several of ARRA’s funding streams are dedicated to energy, and for others it is an allowable use. A first reaction to the availability of energy-related ARRA funds might be for cities to use them to pay for expenditures that they had already planned for municipal facilities, especially if these expenses had been deferred from prior periods due to lack of funding. However, a more financially effective way to leverage ARRA funds might be to enter into leasing agreements for these upgrades instead. Available space here constrains a full discussion of ARRA, but some suggested high-level considerations for use of ARRA funds are offered, as well as links to sources for more information:

- **Use financing to get more bang for your Recovery buck**—By stretching limited Recovery resources through financing, cities can accomplish more and/or bigger projects that will result in higher levels of energy savings.
- **Fill the gaps to get more savings**—Recovery funds can be used to leverage other resources (e.g., electric efficiency funds, capital budget resources) to achieve deeper, more comprehensive savings.
- **Expect to be held accountable**—All Recovery-related funding includes extensive reporting and accountability requirements. Cities must undertake projects that will achieve measurable, high levels of money and energy, and must be prepared to document their results.

Key funding channels that may be used to support building retrofits include:

- **Energy Efficiency and Conservation Block Grants (EECBG)**
  - Large cities are all receiving direct grants from DOE.
  - Federal guideline priorities: reducing fossil fuel emissions; reducing total energy use; improving energy efficiency (in transportation, building, and “other appropriate” sectors).

- **State Energy Program (SEP) grants**
  - Distributed to state energy offices on a formula basis.
  - Distribution procedures and eligible uses vary by state. Overall federal guidance specifies four goals: (1) increasing energy efficiency; (2) reducing reliance on imported energy; (3) improving reliability of supply; and (4) reducing impacts of energy use on the environment.

- **Public Housing Capital Funds (HUD)**
  - $4 billion is being distributed (both competitively and through formula grants) to Public Housing Authorities to improve low-income housing in efforts such as “creation of energy efficient, green communities.”
  - Federal guidelines: Increasing energy efficiency and environmental performance to reduce energy costs for PHA’s and residents and reduce associated greenhouse gas emissions.

- **Clean energy workforce development (U.S. Department of Labor - DOL)**
  - $500 million in competitive grants to prepare workers for careers in the energy efficiency and renewable energy industries.
  - Detailed program information not yet available from DOL.
- U.S. Department of Energy (DOE) Competitive Solicitation
  - DOE will be issuing a national competitive solicitation or additional ARRA funding.
  - Updates will be provided on the DOE website as they become available.

- Other Federal Funding: Major provisions that would provide resources for building retrofits have been introduced in both the U.S. House and the U.S. Senate as part of energy and climate bills, including direct grants, loans funds, loan guarantees, and time-of-sale building rating and labeling. If any of these is both authorized and appropriated, enormous impacts on the building retrofit efforts of cities are possible.

Recommended Resources: Overview on Financing

ENABLING INVESTMENTS IN ENERGY EFFICIENCY: A STUDY OF ENERGY EFFICIENCY PROGRAMS THAT REDUCE FIRST-COST BARRIERS IN THE RESIDENTIAL SECTOR.
This report comprehensively surveys existing residential energy efficiency programs at the local level, and discusses trends, impacts, and financing.

FINANCING RETROFITS FOR ALL, II
This article discusses how to create a program for deep energy retrofits using on-bill financing.
By Alan Durning, Sightline, 2008
Available at • http://daily.sightline.org/daily_score/archive/2008/12/18/financing-retrofits-for-all-ii

GUIDEBOOK OF FINANCIAL TOOLS: PAYING FOR ENVIRONMENTAL SYSTEMS
This reference document aids local officials in developing tailored financing for their environmental protection initiatives.
U.S. Environmental Protection Agency, 238 pages

RAPID DEPLOYMENT ENERGY EFFICIENCY (RDEE) PLANNING GUIDE
This EPA guidance document related to federal funding helps state and local authorities and energy efficiency program administrators choose successful programs as they advance energy efficiency program funding opportunities through the American Recovery and Reinvestment Act of 2009.
By Peter Lemoine, Tyler Huebner, David Pickett, and Bill Prindle, EPA/DOE, 2009
Download • www.epa.gov/solar/documents/rdee_planning_guide.pdf

THOSE ARE INCENTIVES, NOT REBATES: USING DSM FUNDS TO LEVERAGE INVESTMENT IN LOW-INCOME MULTIFAMILY HOUSING
This paper describes the Vermont approach to using demand side management resources to improve energy efficiency in low-income multifamily housing.
By Elizabeth Chant, Michael Sherman, and Jennifer Chiodo, Vermont Energy Investment Corporation, 12 pages
Download • http://www.yei.org/FileLib/Chant_paper.pdf
Recommended Resources: Specific Financing Mechanisms

FEDERAL SOURCES OF FINANCE
The following websites contain the most current information on ARRA-related program guidelines within each agency (as of May 2009):

CLEAN ENERGY WORKFORCE DEVELOPMENT (DEPT. OF LABOR)
  DOL site » [http://www.dol.gov/recovery/implement.htm](http://www.dol.gov/recovery/implement.htm)

DOE COMPETITIVE SOLICITATION
  DOE site » [http://www.energy.gov/recovery/index.htm](http://www.energy.gov/recovery/index.htm)

ENERGY EFFICIENCY AND CONSERVATION BLOCK GRANTS (ECEBG)
  DOE site » [http://www.eere.energy.gov/]

PUBLIC HOUSING CAPITAL FUNDS (HUD)
  General HUD recovery site » [http://www.hud.gov/recovery](http://www.hud.gov/recovery)

STATE ENERGY PROGRAM (SEP) GRANTS
  DOE site » [http://apps1.eere.energy.gov/state_energy_program/recovery_act.cfm](http://apps1.eere.energy.gov/state_energy_program/recovery_act.cfm)
  General DOE recovery site » [http://www.energy.gov/recovery/funding.htm](http://www.energy.gov/recovery/funding.htm)

TRAINING AND EMPLOYMENT NOTICE 44-08
This notice from DOL provides guidance on the Employment and Training Administration's initial plans for awarding the $500 million in green workforce development funds laid out in the American Recovery and Reinvestment Act of 2009 to help interested organizations plan for the application process.
By United States Department of Labor, 15 May 2009, 5 pages

MUNICIPAL BONDING

CITY SUCCESSES
This website provides an overview of the use of bonding by a number of municipalities to support renewable energy investments, with applicability for building efficiency retrofits.

THE MOSCONE CONVENTION CENTER: SAN FRANCISCO COMBINES SOLAR & ENERGY EFFICIENCY
This case study summarizes how a San Francisco project combined renewable energy and energy efficiency using municipal bonding.

CAPITAL MARKETS

CAMBRIDGE ENERGY ALLIANCE
This initiative is a developing local-level initiative built on utilizing capital from markets, with repayment out of energy savings.
Website » [http://www.cambridgeenergyalliance.org](http://www.cambridgeenergyalliance.org)

DELAWARE SUSTAINABLE ENERGY UTILITY
This initiative is a developing state-level initiative utilizing capital from markets, with repayment out of energy savings.
Website » [http://www.seu-de.org/](http://www.seu-de.org/)

Financing | 44
This paper reviews the obstacles surrounding the use of EIMs, identifies “problem solving” opportunities for these nationally-available but scarcely-used products, and provides a description of the successful implementation of EIM services.

By Richard Faesy, Vermont Energy Investment Corporation, 12 pages

LEASING
FINANCING ENERGY EFFICIENCY PROJECTS
This article provides a good description of leasing, with a comparison to other mechanisms.

ON-BILL FINANCING
HOME COMFORT & ENERGY SAVINGS PROGRAM
This website describes the Manitoba Hydro program using On-Bill Financing, which has the highest participation rates among many examples.
Website ▶ http://www.hydro.mb.ca/your_home/home_comfort/index.shtml

ON-BILL FINANCING (SAN DIEGO GAS AND ELECTRIC)
This website describes the San Diego Gas and Electric on-bill financing program for business customers.
Website ▶ http://www.sdge.com/business/esc/promo_obf.shtml

PERFORMANCE CONTRACTING
ENERGY PERFORMANCE CONTRACT SUCCESS STORIES
This collection describes a range of case studies for public housing energy performance contracting.

REVOLVING LOAN FUNDS
ANN ARBOR ENERGY FUND OVERVIEW
This website describes the Ann Arbor revolving loan fund for retrofits of city buildings.
By the City of Ann Arbor, Michigan
Website ▶ http://www.a2gov.org/government/publicservices/systems_planning/energy/Pages/EnergyFund.aspx

HARVARD GREEN LOAN FUND GENERATES GREATER RETURNS THAN ENDOWMENT
This article describes the Harvard University revolving loan fund for high performance campus capital projects, one of the most successful revolving loan programs for buildings in the country.

TARIFIED INSTALLMENT PAYMENT (TIPS)
HOWSMART™—THE WEBSITE FOR MIDWEST ENERGY INC./S PILOT TIP PROGRAM.
Website ▶ http://www.mwenergy.com/howsmart.aspx

PAYS AMERICA
This organization provides information on a proprietary version of TIPS (Pay-As-You-Save™) that has been considered for over a decade by a number of utilities and has limited pilot experience.
Website ▶ http://www.paysamerica.org/index.html
MUNICIPAL UTILITY FINANCING PROGRAM

SMUD REBATE PROGRAM FINANCING FACT SHEET
This fact sheet describes a leading municipal utility financing program with high participation rates.
Download • www.smud.org/rebates/images-rebates/finance_factsheet.pdf

CLEAN ENERGY ASSESSMENT DISTRICTS

BERKELEYFIRST
This initiative is the first Clean Energy Assessment District program to be developed and implemented.
Website • http://www.berkeleyfirst.renewfund.com/

CITYFIRST OVERVIEW
This website provides further useful information from a business that is assisting several cities and offering administrative and financial services to implement this mechanism.
Website • http://www.renewfund.com/cityfirst/cityfirst-overview

CLEAN ENERGY FINANCING
This collection provides general information, tools and background about clean energy financing districts.
Website • http://rael.berkeley.edu/financing

CLIMATESMART LOAN PROGRAM
This initiative by the Boulder County program uses the Clean Energy Assessment District mechanism for commercial and residential property owners to obtain financing for renewable energy and/or energy efficiency improvements.
Website • https://webpubapps.bouldercounty.org/BOCC/CSLPTINFO/Default.aspx

HARNESSING THE SUN, WITH HELP FROM CITIES
This article discusses the implementation of this mechanism in several cities in California
Available at • http://www.nytimes.com/2009/03/15/science/earth/15solar.html

LONG ISLAND GREEN HOMES
This website is for Babylon, NY’s program to finance comprehensive retrofits using this mechanism.
Website • http://ligreenhomes.com/page.php?Page=home

ENERGY EFFICIENT MORTGAGES (EEMS)

WHAT IS AN ENERGY EFFICIENT MORTGAGE (EEM)?
This website explains what an energy efficient mortgage is, and links to various EEM programs. HUD, FHA, VA, Fannie Mae and Freddie Mac all support Energy Efficient Mortgages, typically for new homes.
Website • http://www.energystar.gov/index.cfm?cbldrs_lenders_raters.energy_efficient_mortgage

THE ENERGY STAR MORTGAGE PROGRAM—A MULTI-STATE INITIATIVE
This fact sheet describes the Energy Star Mortgage Program for competitively priced, affordable financing for home improvements to cut energy use and save money.
By Energy Programs Consortium, 2 pages
Download • http://www.energyprograms.org/briefs/081121-ENERGY-STAR_Mortgage_Brief_Overview.pdf

UNDERSTANDING AND OVERCOMING THE ENERGY MORTGAGE BARRIER: PROCEEDINGS OF ACEEE SUMMER STUDY ON ENERGY EFFICIENCY IN BUILDINGS