# The Limits of Financing for Energy Efficiency

*Merrian Borgeson, Mark Zimring, Charles Goldman*
*Lawrence Berkeley National Laboratory*

## ABSTRACT

Financing is an appealing concept when efficiency program budgets are a small fraction of the overall level of efficiency investment needed to achieve our public policy goals – but that does not mean financing is always the solution, and it is certainly not the *only* solution. We show that financing can, in some cases, increase the leverage of public dollars. In most cases, however, it is not able to drive demand to the same degree as direct incentives like rebates and so cannot be expected to replace other incentives in the current marketplace. We also show that subsidized financing for those who already have access to capital may be a poor use of public funds, and that increasing access for those who are currently underserved will likely require ongoing subsidy. This is not to say that financing is unimportant – financing is one of many important tools for scaling efficiency and should be employed thoughtfully with the questions outlined in this paper in mind.

**Key words:** Energy Efficiency Financing, Energy Efficiency Programs, Financial Incentives for Energy Efficiency, Retrofits, Efficiency Programs, Incentives

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## Introduction

States and utility regulators are increasingly adopting aggressive energy efficiency targets for existing buildings. To achieve those goals, utilities and governments are increasing their reliance on programs that improve the energy efficiency of the entire building, instead of focusing on single measures or end uses (e.g., lighting). These more comprehensive programs typically require customers to pay a significant portion of the improvement costs. In this environment, financing has been put forward as a tool that can drive investment in comprehensive improvements where the energy savings yield cash flows in excess of loan interest and principal payments.

This "financing is the solution" view is reinforced by the negative cost bars for many efficiency improvements on the McKinsey cost of carbon abatement curve, and the refrain that efficiency is the "low hanging fruit" or even the "fruit on the ground". The narrative is attractive to program administrators and state regulators concerned about the potential short-term impact

on utility rates of meeting aggressive energy efficiency targets. It is also attractive to policymakers struggling with the reality that program budgets are a small fraction of the overall efficiency investment needed to achieve our public policy goals (e.g. reducing the cost of serving energy consumers, easing congestion on the grid, minimzing environmental impacts, equitable access to efficiency opportunities). While this idea – that financing can deliver the long-heralded low hanging fruit of energy efficiency in buildings – is intellectually appealing, financing as the most important element of program design strategy has not been widely substantiated in over 25 years of experience with financing programs.

The reality is far more complex. There are individuals who are debt averse, or can't (and often shouldn't) qualify for credit, or would rather spend available capital on more compelling investments. There are businesses, governments, and institutions that have no debt capacity, or that have replaced their lighting already and aren't interested in efficiency investments with more than a two or three year payback, or that don't have staff available to manage the work. In some regions of the country the lowest hanging fruit has already been plucked. In other regions the climate or low energy prices make the case for aggressive efficiency more challenging without a long-term view that considers efficiency's overall benefits, public and private. This challenge is magnified in some regions where there isn't a trained workforce and a developed energy efficiency services sector to provide an attractive package of measures. Even for those motivated to invest in efficiency, the transaction costs of making these improvements can be high.

While energy efficiency is often the lowest-cost energy resource, and financing is an important tool for enabling efficiency, the focus on financing by policy makers, program administrators, and advocates is often out of scale with what financing can be expected to accomplish – and certainly out of scale with what financing has accomplished to date (Bell, Nadel & Hayes 2011; Brown & Conover 2009; Fuller 2009; Palmer, Walls & Gerarden 2012). While there is evidence to support the notion that rebates can be reduced over time (or phased out) as a market is transformed for *certain products*,[1] there is little evidence to support the notion that in most markets for comprehensive energy efficiency in buildings, "financing only" programs can successfully replace broader approaches that combine attractive financing with incentives (e.g. rebates), technical assistance to customers, marketing/education, trade ally partnerships and complementary policies.

The financing gap, to many, seems like a "solvable problem" that can be addressed with politically attractive ideas like public-private partnerships and private sector innovation. The literature on energy efficiency often lists "high first costs" as a key barrier to investment (IEA 2008; Jaffe & Stavins 1994). In our experience examining efficiency programs across the country, lack of financing is seldom the primary reason that efficiency projects do not happen. Financing is only useful once the "product" has been sold to the customer, just as a car loan can only be appealing once you want a car (and then only if there are no better payment options available). Financing cannot address the range of challenges to scaling energy efficiency investment – barriers which include information and hassle costs, split incentives, performance uncertainty, and lack of monetization of public benefits (Golove & Eto 1996, Blumstein et al. 1980). In a world of limited program budgets, program administrators sometimes face a zero-sum choice between allocating funds to supporting financing and allocating funds to approaches

[1] See, for example, the work of the Northwest Energy Efficiency Alliance (http://neea.org) and proceedings of ACEEE's National Symposium on Market Transformation (http://www.aceee.org/conferences/mt/past).

designed to overcome a broader set of efficiency barriers. In this paper we explore a set of questions to tease out when financing can be a useful tool, and attempt to highlight some of the limitations of financing to help policy makers and program administrators decide how to allocate resources. These questions are:

- Can financing **increase the leverage** of public funds?
- Can financing **motivate demand** for energy efficiency?
- Can financing **expand access** to energy efficiency?

These questions reflect many of the assumptions made by those promoting energy efficiency financing. We show that in some ways financing ***can*** do all of these things, but only in certain situations and not always more effectively than alternative uses of public funds. This paper does not provide a prescriptive path for program administrators. Approaches to addressing these complex challenges will vary by market segment and region – and there is a need for innovation in both the public and private sectors. This innovation is likely to change the market dynamics beyond what we describe in this paper. The questions we raise are simply a place to start to consider what financing might offer – and where the limits of financing may lie.

## Can Financing Increase the Leverage of Public Funds?

Current public funding levels are simply not sufficient to pay for a substantial portion of the energy efficiency upgrades necessary to achieve our public policy objectives or capture achievable potential for energy efficiency (Goldman et al. 2010; McKinsey 2009). Financing has been advanced as a tool that can increase the leverage of public monies – that is, increase the level of private investment for each public dollar spent – and potentially lead to energy improvements at a much larger scale than today's activity. Program monies typically support third-party financing in one of two ways[2]:

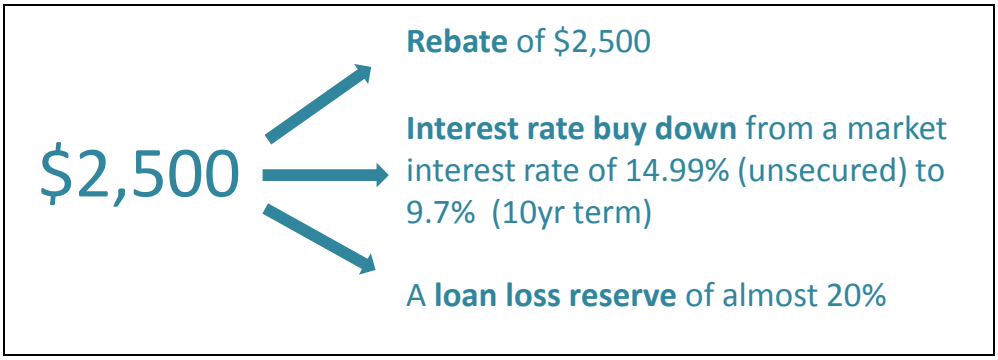
- **Interest rate buy downs** (IRB) reduce the rate of interest a customer pays below the market rate.
- **Credit enhancements**, typically in the form of loan loss reserves, that reduce a lender's risk in the event of a customer loan default and, in so doing, incentivize lenders to offer more attractive financing products to customers.

We use an example from the residential sector to explore whether financing can increase the leverage of public funds in practice, but the lessons learned apply to the building stock more broadly. Early results from the Energy Upgrade California program show average project costs of about $13,000 for single-family residential energy upgrades and rebates of approximately $2,500 in the San Francisco Bay Area. What would it look like if these rebate funds were transitioned to support financing – and could the level of per-project public funding be ***decreased*** if it was targeted at supporting financing?

[2] Direct program lending with public funds does not "leverage public monies" and is not addressed in this paper.

Transitioning the $2,500 in current per project public incentives to support financing would yield an IRB of approximately 5 percent below the market interest rate on a 10 year unsecured term loan. For the Fannie Mae Energy Loan, this implies a post-buy down customer interest rate of approximately 9.7 percent (see Figure 1).[3] Some experts[4] believe that double digit interest rate loans are significant demotivators for households, that very low interest rate loans (e.g. heavily subsidized) can help to sell energy improvements, and that interest rates in the five to nine percent range are enablers rather than drivers of efficiency investment, i.e. if a customer already wants to do efficiency work and doesn't have other financing options, they may take a loan at this rate if they qualify.[5] This suggests that while this offer may allow some customers to do efficiency work when they wouldn't otherwise have had access to attractive capital, it is not likely to increase the demand for efficiency – and it will be difficult to reduce the public cost per project by simply transitioning funds currently spent on rebates to IRBs on loan products at the current market rates offered by capital sources such as Fannie Mae, though there may be cheaper locally-available capital that can be subsidized to much lower rates.

**Figure 1. Transitioning From Rebates to Financing**




Alternatively, this $2,500 could be channeled into a 19% loan loss reserve,[6] which implies that it is through credit enhancements that financing may be effective at increasing leverage. Across the country, there are numerous examples of local lending institutions, typically credit unions, community development financial institutions (CDFIs), and local banks offering single digit interest rate loan products with loan loss reserves of just 5 to 10 percent,[7]

[3] All IRB calculations in this report are from the Department of Energy's LLR and IRB Allocation and Expenditure calculator. The base interest rate on the Fannie Mae Loan ranges from 14.99 to15.99 percent.

[4] Based on the authors' conversations with a wide range of contacts from the financing industry and current EE financing program administrators.

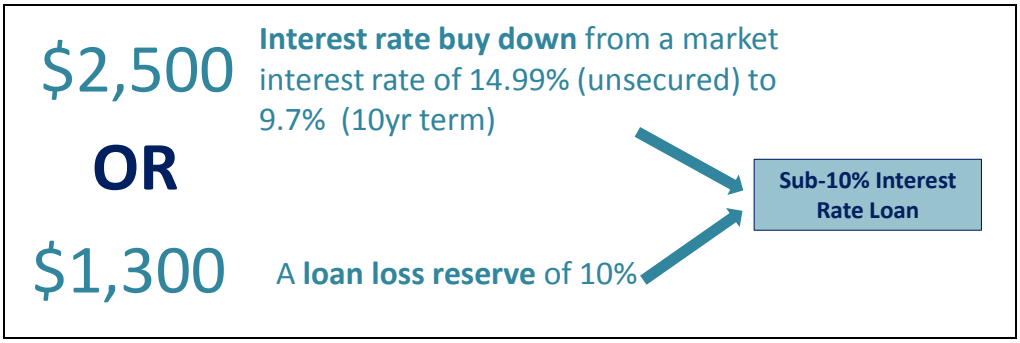
[5] In this section, we take demand as constant – the question of how financing impacts demand is explicitly addressed in the next section.

[6] LLRs reduce lender risk by providing first loss protection in the event of loan defaults. For example, a 5 percent LLR allows a private lender to recover up to 5 percent of its portfolio of loans from the LLR. A $20 million fund of private capital would need a $1 million public LLR (5 percent coverage), leveraging each public dollar 20 to 1. On any single loan default, the LLR typically pays only a percent of the loss (often 80 percent) to ensure the lender is incentivized to originate loans responsibly.

[7] Examples include programs in Michigan (MichiganSaves), Oregon (Clean Energy Works), California (EmpowerSBC), and others.

well below the 19 percent LLR that $2,500 could achieve. It is possible that a 10 percent loss reserve (costing $1,300 – see Figure 2) plus a rebate of $500 to $1000 would drive customer demand, and have a lower per-project cost than the $2,500 rebate scenario. It is unclear whether this offer would be as or more attractive than the rebate scenario, but it is at least an example where financing can potentially offer some leverage.

**Figure 2. Increasing Leverage with Credit Enhancements**




However, the question then arises whether credit enhancements can actually deliver this enhanced leverage at scale. In many cases, these local lenders are mission-oriented and see energy efficiency financing as a way to serve their core missions. Some lenders also see energy efficiency financing as a low-cost customer acquisition tool. Compared to their standard product offerings, these lenders approve energy efficiency loan applicants at higher rates, approved loans are funded at higher rates, and borrowers are being cross-sold into other financial product offerings (Zimring 2011b). In other words, local lenders are often subsidizing the interest rate on these loan products as a marketing tool or because it serves their mission.

As this market grows, credit enhancements of three times the expected default level on a loan portfolio may be necessary to reach secondary markets,[8] a step seen by many as a key element of unlocking the billions of dollars of low-cost capital necessary to fund a large scale national investment in efficiency. While it is difficult to use historic default rates on unsecured loans as a guide given recent economic uncertainty, it is reasonable to assume that these non-payment rates may range from the mid single digits to 15 percent for creditworthy consumers, suggesting that credit enhancements of 15 to 45 percent may be necessary to access secondary markets at single digit interest rates. If this is the case, financing is likely to offer similar (or perhaps even less) leverage, at least in the short term, and drive less demand than rebate-driven programs which often cover between a tenth and a third of project costs.[9]

There is often a misperception that, unlike rebates, credit enhancements will last indefinitely and be revolved to support many projects through time. In some instances this may be the case. Whether credit enhancements need to be replenished or not is a function of how large they are relative to loan default rates. Some suggest that loan default rates will be much lower than 5 to 15 percent (Bell, Nadel & Hayes 2011), as energy efficiency lending is fundamentally more secure than lending for other purposes because energy upgrades improve a borrower's cash flow, leaving them with more money to pay back their loans. However, there is reason to doubt, at least with existing programs, that efficiency lending is meaningfully more secure – there is significant variance across the country in actual customer savings and even if savings are realized, there are no promises that borrowers will allocate these funds to repaying the loans. But, to the extent that efficiency lending proves to be more secure (perhaps because it

[8] Alfred Griffin, Citigroup, CPUC Financing Workshop Panel Discussion. February 9, 2012.
[9] Default rates vary dramatically across market segments and financial product types – for some markets, LLRs may be the lowest-cost tool available to program implementers.

is attached to one's property or utility meter), strong loan performance today may reduce the need for ongoing investment in publicly-funded credit enhancements, and catalyze more attractive and accessible financing products in the future.

Ultimately, it is clear that financing *can* increase program leverage, but whether it *will* increase program leverage remains a complex and open question that is partly a function of whether energy efficiency financing products outperform other lending tools and partly a function of how customer demand might change with a transition from rebate-driven programs to financing, an issue which we discuss in the next section.

## Can Financing Motivate Demand for Energy Efficiency?

Energy efficiency programs that have been successful in reaching significant portions of their target markets have typically offered large financial incentives that covered 50 percent or more of the project cost (Fuller et al. 2010). With limited public funding, efficiency programs are tasked with motivating millions of households and businesses to spend thousands of dollars on unfamiliar investments. There are good reasons that people aren't making these improvements, and overcoming these investment barriers is a difficult task at anytime, and even more daunting in an bad economy.

While financing can increase program leverage, the previous section took customer demand as a given. In certain markets, like affordable multifamily housing, financing may indeed be the largest barrier to investment in energy efficiency and affordable financing options can trigger large efficiency investments. In institutional markets, financial innovations such as energy savings performance contracts and performance guarantees have been an important driver of efficiency demand (Satchwell et al. 2010). However, the ESCO business model based on performance contracting (e.g. performance guarantees that savings will be sufficient to pay debt service obligation and third party financing) has had the most success in the institutional sector (e.g., state/local/federal governments, K-12 schools, universities/colleges, and hospitals), which are often the largest, highest credit quality buildings.[10]

However, in most markets, demand – not access to affordable capital – has been the primary barrier to market growth. There is reason for skepticism that most households and businesses considering energy efficiency improvements will be equally or more motivated by attractive financing as they are by today's rebate-driven programs. Even where more affordable financing options are important to overcoming the upfront costs of energy upgrades, low-cost financing, alone, has failed to push people over the edge and motivate wide-scale efficiency investment (Fuller 2009).[11]

In addition, many individuals and institutions already have access to relatively low-cost capital in the form of savings, capital and operating budgets, bonding, home equity lines of credit (HELOCs) or other sources. For these building owners, rebates improve the economics of

[10]Several companies are now offering energy efficiency as a service in the investment grade commercial sector in which building owners pay for energy improvements through time with the savings through time without taking on debt.

[11]Though, contractors and program managers do suggest that when low-cost financing is available, it often encourages larger projects (and deeper energy savings) for customers planning to make improvements.

projects whereas additional financing options – unless heavily subsidized (e.g. zero percent interest rates) – are unlikely to offer substantial value. A homeowner who has access to a five percent home equity line and a 8.99 percent unsecured loan from their credit union will likely take a zero percent interest loan to save money, but what is the public benefit derived from the interest rate subsidy? Would the customer have used their other options and gone through with an energy upgrade in the absence of the zero percent financing? Financing subsidies are often extremely expensive – we need to be open about how much these subsidies cost and what they are achieving relative to alternative uses of scarce public funds. Table 1 shows the typical cost of reducing the market interest rate of an unsecured term loan by 5 percent for a range of loan amounts and terms.

**Table 1. Cost of an Interest Rate Buydown of 5%**

| **Cost of Interest Rate Buydown (14.99% to 9.99%)** | | | | | |
|---|---|---|---|---|---|
| Loan term = | 3 years | 5 years | 7 years | 10 years | 15 years |
| Project cost of $3000 | **$208** | **$321** | **$419** | **$543** | **$697** |
| Project cost of $6000 | **$415** | **$641** | **$838** | **$1,086** | **$1,394** |
| Project cost of $9000 | **$623** | **$962** | **$1,257** | **$1,628** | **$2,090** |
| Project cost of $12000 | **$830** | **$1,283** | **$1,677** | **$2,171** | **$2,787** |
| Project cost of $15000 | **$1,038** | **$1,603** | **$2,096** | **$2,714** | **$3,484** |
| **Equivalent rebate level as precent of project cost =** | 7% | 11% | 14% | 18% | 23% |

Programs that have successfully achieved relatively high levels of participation by offering financing in lieu of rebates have largely funded improvements like new equipment (e.g. boilers, HVAC systems) in situations where old equipment has failed or needs replacement. Even these programs, which have the advantage of funding improvements familiar and vital to most customers (as opposed to air sealing, insulation, duct sealing, etc), are struggling to achieve scale above one percent of the population annually, and there is an open question about both the additionality of the investments being made and whether the implicit subsidies being allocated to reduce interest rates might be better spent on different types of customer incentives. For example, in Pennsylvania, the Keystone HELP program offers 2.99 percent to 8.99 percent financing to residential customers depending on the comprehensiveness of energy improvements. The program has averaged several thousand projects per year, with loans funded by the state treasury. The PA Treasurer is now struggling to sell this loan pool to investors without offering an enhanced interest rate (e.g. a rate higher than that being paid by program participants) or overcollateralizing the loan pool,[12] both of which increase the cost of offering the program.

In the short term, it is likely that without policies compelling properties to enhance their energy performance, both rebates and financing (and other market development initiatives) will be necessary to scale energy efficiency investment in the building stock. And this seems

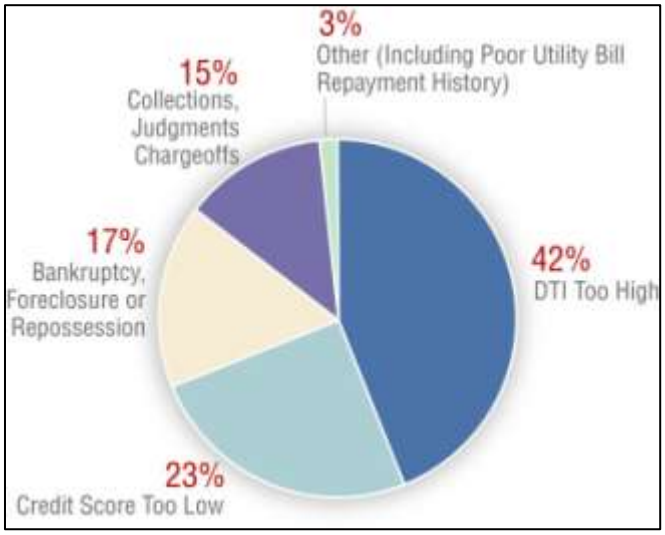
[12] Overcollateraliztion involves offering investors a pool of loans with total value greater than the value which they are being asked to pay.

appropriate – we are not asking people to invest in energy efficiency solely because we want them to save money and be more comfortable. We are motivated to pursue energy upgrades by the range of public benefits that efficiency provides (e.g. reducing the cost of serving energy consumers, easing congestion on the grid, minimization of environmental impacts, equitable access to efficiency opportunities), and those public benefits should be recognized in the form of rebates and other financial incentives.

## Can Financing Expand Access to Energy Efficiency?

Once a customer *wants* to invest in efficiency, the question becomes whether they have access to capital. Access to capital varies dramatically across different market segments. In the public and institutional sectors, customers often (though not always) have access to low cost funds through bonding or other sources. If the project is large enough, these customers can work with an energy service company (ESCO) to secure debt with a performance guarantee. For large commercial building and industrial facility owners, access to capital varies widely based on the owner's credit – for example, Class A office buildings typically have access to cheap working capital and many have done basic energy improvements with quick paybacks such as lighting replacements with these funds. In contrast, lower-value commercial and multifamily properties often have little or no access to capital, or may have more urgent uses for their limited debt capacity.

**Figure 3. Reasons for application rejection in NYSERDA's residential loan program**

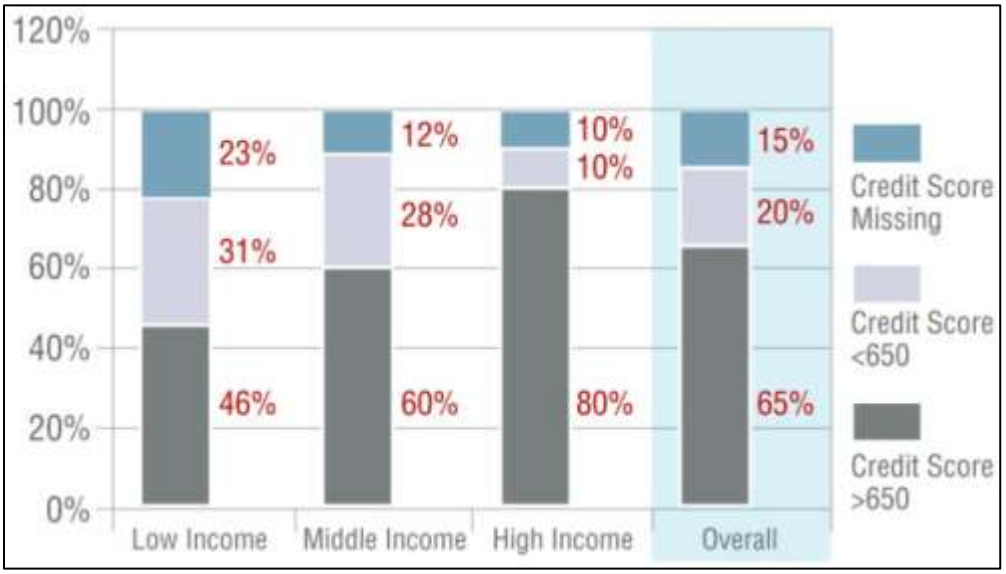



Source: NYSERDA Green Jobs-Green New York Program (November 2010 to October 2011); graphic from Zimring et al. 2011a[13]

[13] DTI is an acronym for Debt-To-Income ratio, a common underwriting metric designed to ensure that borrowers have sufficient cash flow to make principal and interest payments on loans. Typically, maximum DTI's are 40-50 percent (50 percent in NYSERDA's case).

In the residential sector, a significant portion of the population does not qualify for credit, or can only get access to high interest, short term products (Zimring et al. 2011a). Many of the largest energy efficiency loan programs have application decline rates in the 30 to 50 percent range (see Figure 3 for examples of reasons for declines). Household ability to obtain secured financing has declined as housing prices have eroded and lenders have tightened underwriting standards and credit limits. Similar tightening trends are occurring in unsecured lending as personal creditworthiness has weakened and lenders have responded by increasing the minimum credit scores required and reducing the amount of overall credit available to each qualified borrower (Zimring et al. 2011a). Access to capital can sometimes (but not always) be correlated, perhaps understandably, to income (see Figure 4).

**Figure 4. Homeowner credit scores by income in Q4 2010**




Source: Energy Programs Consortium provided data; graphic from Zimring et al. 2011a

In general, those individuals and organizations who most need access to external sources of capital to pay for energy improvements are more often rejected from financing programs because they are simply deemed less creditworthy by current underwriting metrics. If programs only offer financing to those who *already* have access to affordable capital, there may be minimal additional benefit from public support for these programs. Efficiency program administrators need to ask themselves if the products they create are filling an unmet need.

There are ways to make capital more accessible and affordable to underserved markets, with prudent safeguards. Alternative underwriting may be a way to expand access to credit, on the margins, to those who don't currently qualify for existing products – though we need more experimentation in this area. For example, the New York State Energy Research and Development Authority (NYSERDA) is using utility bill payment history to assess credit quality, which has led to the approvals of an additional 5 percent of applicants.[14] There is not enough

[14] Jeff Pitkin, NYSERDA Treasurer, email correspondence May 1, 2012.

history to adequately assess the performance of these loans, but the early results are encouraging. Expanding access to credit may also simply require more public investment – larger loan loss reserves and other credit enhancements may be necessary to serve many market segments, and this use of funds should be compared to other options in terms of impact. These programs may also require this investment on an ongoing basis – unless we can prove that lending for energy efficiency is fundamentally more secure than other financial tools, deserving lower rates and expanded access, that certain market segments are more creditworthy than current metrics imply, or that new products like on-bill finance will significantly improve repayment rates. Program administrators need to collect and analyze the data required over many years to make this case, and they need to be clear up front whether they are trying to prove that new or different products work better than conventional products or metrics of credit, or if they are simply aiming to subsidize access to credit for less creditworthy customers.

It is also important to note that underwriting criteria exist for a reason – to ensure that those that get access to financing are willing and able to make the payments. There can be negative consequences to promoting loans to particularly vulnerable segments of the population. Cae needs to taken with regard to who is given access to credit and what claims are being made about the benefits of energy improvements. It is likely that financing will never serve *all* customers, nor should it.

## Conclusions

Financing is an appealing concept when efficiency program budgets are a small fraction of the overall level of efficiency investment needed to achieve our public policy goals – but that does not mean financing is always the best solution for increasing the uptake of efficiency measures, and it is certainly not the *only* solution. We began this paper with three questions about financing: Can financing **increase the leverage** of public funds, **motivate demand** for energy efficiency, and **expand access** to efficiency? We have shown that financing can, in some cases, do all of these things. With a loss reserve, financing can increase the leverage of public dollars, but in most cases it is not able to drive demand to the same degree as direct incentives like rebates, and cannot be expected to replace other incentives in the current marketplace. We have also argued that subsidized financing for those who already have access to capital may be a poor use of public funds, and that increasing access for those who are underserved by existing financial products is possible and important, but will likely require ongoing subsidy.

This is not to say that financing is unimportant. Once a customer wants to invest in efficiency, financing must be available for those who don't have alternative affordable options for payment. We also should encourage participants to pay for as much of the efficiency investment as possible to avoid the political consequences of short term rate impacts and to help spread limited public dollars as far as possible. We just need to be clear about what financing can accomplish, and not assume that it is the single solution to the many challenges to scaling energy efficiency. Scaling efficiency requires selling the product much more effectively to customers – making it simple, seamless, attractive, and affordable – and perhaps more importantly, paying for efficiency – often the lowest cost energy resource – as a resource on par with other energy supply options to make sure we aren't spending more money than needed to meet energy demand.

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