

Impact Evaluation of Financing Programs

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ABSTRACT

Utility customer-funded energy efficiency financing programs that attract private sector capital may enable access to greater amounts of cost-effective energy efficiency savings. These financing programs are sometimes advanced as a “substitute” for traditional energy efficiency programs, including rebates. Given this perspective and the level of utility customer funds that have or could be re-directed into financing programs, we argue for development of robust impact evaluation methodologies to fully understand the effects of these strategies. We discuss how the existence of a mature private market for financing makes it difficult to attribute savings to program-supported financing and offer a framework for adjusting for these contextual factors. We also consider an early framework for market transformation-focused impact evaluation and discuss the importance of interim metrics. We conclude with thoughts on the relative costs, benefits, and risks involved in developing or not developing robust impact evaluation methodologies for financing programs.

Financing as a Primary Energy Efficiency Strategy

Empirical studies demonstrate that investments in energy efficiency acquisition are often less expensive than investments in supply-side alternatives (Billingsley, et al. 2014). However, the level of public and utility customer (ratepayer) funding currently collected for energy efficiency investments in most jurisdictions is insufficient to access all cost-effective energy efficiency opportunities (Navigant 2014). Recognizing this limitation, the number and budgets of efficiency financing programs is changing as some jurisdictions are considering or launching large-scale financing programs in hopes of attracting significant amounts of private capital to leverage energy efficiency program dollars. This attention and increasing level of activity is also due to financing programs’ perceived ability to address the barrier of efficiency’s upfront costs, stretch the impact of limited program dollars, and/or transform efficiency and financing markets.

Typically financing products are tailored to encourage energy efficiency by making loans directly with public or utility consumer (ratepayer) funds or by using these funds to offer credit enhancements (e.g., loan loss reserves) to attract private capital providers. The newer, large-scale programs also re-envision the role of financing in supporting energy efficiency in a number of ways. Some seek to increase the prominence and availability of financing products and potentially to replace traditional energy efficiency programs (e.g., rebates) over time. Other program administrators are focused on attracting private capital to financing programs, but do not, at least in the near term, see financing as a substitute for existing energy efficiency acquisition efforts. We use the construct of “financing as a complement”—using financing as an enhancement to existing

programs that are built on direct incentive strategies—and “financing as a substitute”—transitioning away from traditional rebate programs and toward financing as a primary strategy to achieve energy efficiency goals—to differentiate between these two approaches. Table 1 summarizes how financing is characterized with the “substitute” or “complement” framework in several prominent jurisdictions. A description of financing programs in these jurisdictions and early experiences with financing evaluation are provided in Appendix A.

Table 1. Summary of Large-Scale Energy Efficiency Financing Programs

Financing Program (State)	Complement or Substitute?	Ratepayer Funds Utilized
Statewide Financing Pilots (CA)	Both. Financing pilots are currently operating as resource programs alongside other portfolio resource programs. Over time, “The [California Public Utility] Commission’s goals include developing scalable and leveraged financing products to stimulate deeper EE projects than previously achieved through traditional program approaches (e.g., audits, rebates, and information).” (California Public Utilities Commission 2013)	\$65.9 M (additional \$9M in reserve)
New York Green Bank (NY)	Both. NYSERDA notes that “the Green Bank is a cost-effective, powerful and complementary addition to New York’s existing portfolio of clean energy support programs.” (NYSERDA 2013) The New York Public Service Commission also notes that “the effect of the Green Bank on reducing the cost of capital can also enable the potential reduction or even the possible elimination of incentives in some sectors over time.” (New York Public Service Commission 2013)	\$165M initial request
Connecticut Green Bank (CT)	Both. Connecticut’s Comprehensive Energy Strategy notes a “goal of transitioning programs away from government-funded grants, rebates, and other subsidies, and towards deploying private capital to finance energy efficiency.” (Connecticut Department of Energy and Environmental Protection 2013)	\$39.6M (2014)
HEAT Loan (MA)	Complement. The most recent energy efficiency program plan describes the HEAT Loan as a complement to other energy efficiency programs: “to the extent that access to low-cost capital is a barrier for certain customers, financing can alleviate that and encourage energy efficiency investments.” (MassSave 2012)	Approx. \$15M (2013)
On Bill Repayment Programs (IL)	Complement. Utilities are directed to ensure that on-bill lenders explain both financing offerings and incentives that may also be available. (Commonwealth Edison Company 2010)	Up to \$12.5M ¹

¹ Ratepayer funds are a backstop for any loan defaults, thus total cost will only be known after all loans have matured but is anticipated to be much less than the \$12.5M cap. Ratepayer funds cover administrative costs.

The Importance of Evaluating Financing Programs

Evaluation, measurement, and verification (EM&V), and particularly impact evaluation, is the primary tool that program administrators and policymakers have used for the past several decades to assess savings created by these programs. EM&V serves a number of important functions, such as providing feedback for program improvements and quantifying observed, versus predicted or claimed, savings and cost-effectiveness of a given program. In some jurisdictions, evaluation results also impact the awarding of program administrator performance incentives, which may be based on evaluated savings values.

To date, there are no established protocols for evaluating financing programs, and there have only been a limited number of evaluations to assess the program theories associated with the range of financing products being offered or considered. Those that have been conducted have been of limited scope; see Appendix A for a description of some existing and ongoing evaluation efforts. If the trend towards significant investments in efficiency financing programs gains momentum, it will become essential to understand what additional energy efficiency activity financing programs provide. More specifically, there is a growing need to document whether financing programs, alone or in combination with traditional programs, can generate savings above and beyond traditional efficiency program strategies, existing financing products (e.g., lines of credit, credit cards, vendor loans), and naturally occurring efficiency. This calls for the development of adequate impact evaluation methods that will credibly document and attribute energy savings that various financing strategies produce across different market sectors. Otherwise, as financing program budgets grow, sometimes at the expense of traditional programs, ratepayer and public dollars are at risk of being invested in strategies that do not produce cost-effective incremental savings or public benefits.

Themes and Considerations

Evaluations may be focused on documenting either or both directly achieved energy savings (which some refer to as resource acquisition) or market transformation. These approaches are not mutually exclusive, as programs often are designed with both goals in mind. Indeed, evaluations focused on resource acquisition may help shed light on future prospects for using financing to effect market transformation. In either context, an evaluation goal should be to determine the outcomes that are specifically attributable to the financing products or program. This means that the energy savings or market transformation metrics should indicate incremental impacts compared to what would have occurred in the absence of the financing product or program.

Resource Acquisition Impact Evaluation

In assessing the impacts of a financing program, a standard approach would include an assessment of what would have occurred in the absence of the financing product assuming no program (e.g., baseline is a “no program” counterfactual scenario). However, when constructing baselines for financing programs, two other counterfactuals should also be explicitly considered – existing financing products and existing efficiency programs. The following evaluation questions illustrate these considerations:

- Did consumers save more energy² because of the availability of the new financing products as compared to what they would have saved using other financing options that were available to them?
- Did consumers save more energy because of the availability of the financing component of a comprehensive efficiency program compared to what they would have saved without the financing component?
- Did consumers save more energy because of participation in a stand-alone financing program as compared to what they would have saved participating in a stand-alone conventional efficiency program?

These attribution-related questions that arise in assessing the impact of financing may be more complex compared to other types of efficiency programs for at least two reasons. First, program financing is often offered in markets in which private financing is also readily available. Thus, it may be more difficult to determine whether the project would have moved forward in the absence of a program offering. This fact makes financing somewhat unique from other types of program offerings. For example, in the case of rebates, there is typically only one counterfactual to consider: in the absence of a program rebate, a customer would generally pay more for the high-efficiency product. By contrast, in the case of program financing, there are often a wide variety of choices available to customers in the private market (e.g., using cash, credit cards, vendor financing, and home equity loans), and often these options are more widely used than program financing products. As such, determining whether private financing would have worked equally well in generating the same level of savings is important.

Second, program financing is often promoted as an element or option in a broader program offering in a market segment (e.g. technical information and assistance, rebates). Typical program evaluations generally do not parse out the specific impacts of particular program elements, focusing instead on the overall effectiveness of the program. As the role of financing becomes more prominent, however, evaluations may help provide better information on its effectiveness and impacts, as well as the ways in which it can best be used. Moreover, in jurisdictions that are exploring the possibility of using financing as a substitute for traditional rebate programs, it may be important to evaluate the level of savings that program financing would likely have generated in the absence of other offerings, as those offerings could potentially be reduced in the future. In exploring this question, it is important to assess not only the relative impacts of particular program offerings in isolation, but also the ways in which combining them may produce results that are

² Whether consumers saved energy sooner because they invested in a project earlier than they would have is also implicit in this question and the following two questions.

potentially greater than the sum of their parts. In some cases, combining financing, incentives and other program elements may produce impacts that are disproportionately larger than might be expected by simply observing the effects of individual strategies (Kramer, 2014).

Figure 1 illustrates the multi-layered nature of the savings attribution question for energy efficiency programs that include and offer financing as part of the program. In Figure 1, Adjustment 1 can be thought of as analogous to a traditional counterfactual for efficiency programs in that it focuses on whether the financing program generated more savings than would have occurred otherwise (e.g., the project would not have moved forward or the customer would not have invested in a more comprehensive project without financing). In this case, the question is framed as whether financing in general (of any type—program or private) helped generate additional savings relative to a baseline with no financing available.

The next two adjustments relate to the specific contextual factors noted above that are unique to financing as a particular type of program offering. Adjustment 2 is based upon the question of whether financing offered through a given program generated additional savings that would not have occurred if only private financing (or other payment options) were available to the customer outside of the program. Adjustment 3 accounts for the impact of other program offerings offered alongside financing, to help estimate what level of savings realized would have occurred in the absence of these other offerings. As noted, this last adjustment may be particularly important in jurisdictions that are contemplating the reduction or removal of these other offerings.

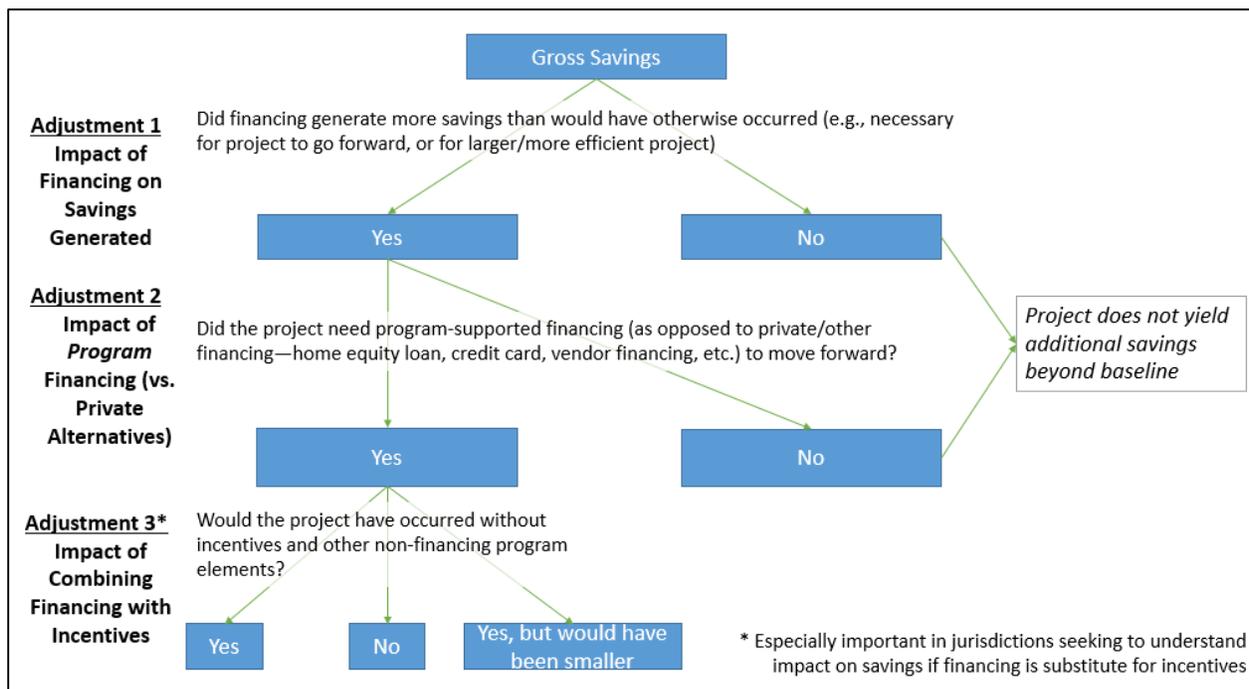


Figure 1. Savings Attribution in the Context of Energy Efficiency Financing

By incorporating these elements into the evaluation process, evaluators will be able to provide stakeholders with a more complete picture of the incremental savings that program financing has added to baseline or naturally occurring energy efficiency, existing programs and traditional financing products. This information may be important in helping jurisdictions

determine how best to allocate resources among financing and other strategies, as well as to assess the prospects for using financing as a primary program design strategy in the future.

Market Transformation Evaluation

Some proponents of efficiency financing have asserted that large-scale financing programs will fundamentally transform the energy efficiency marketplace away from ratepayer-supported incentives and towards a partially or fully privately funded model. Other analysts see financing as a market transformation effort, but suggest that financing programs will transform the market not through replacement of existing programs, but by encouraging larger projects that generate more savings per project than currently achieved. One example of this latter theory of market transformation, which has been discussed (but not adopted) in Connecticut and California, is the model presented in Figure 2. The logic model outlines the steps through which financing could increase savings from energy efficiency:

1. Programs provide rebates, incentives, and training to drive demand for energy efficiency projects.
2. Programs also provide credit enhancements to lower investors' perceived risks in energy efficiency projects. Over the longer term, as demand for financing increases, programs track loan performance data to increase investor confidence in energy efficiency investments and reduce the need for credit enhancements.
3. As the perceived risk of energy efficiency investments decreases, capital becomes more widely accessible with lower interest rates, more favorable terms, and/or more flexible underwriting criteria. Marketing by financing partners may also increase with the growth of energy efficiency lending as a line of business.
4. Attractive and available capital further increases demand for energy efficiency projects and the number and size of projects completed, leading to an increase in energy savings.

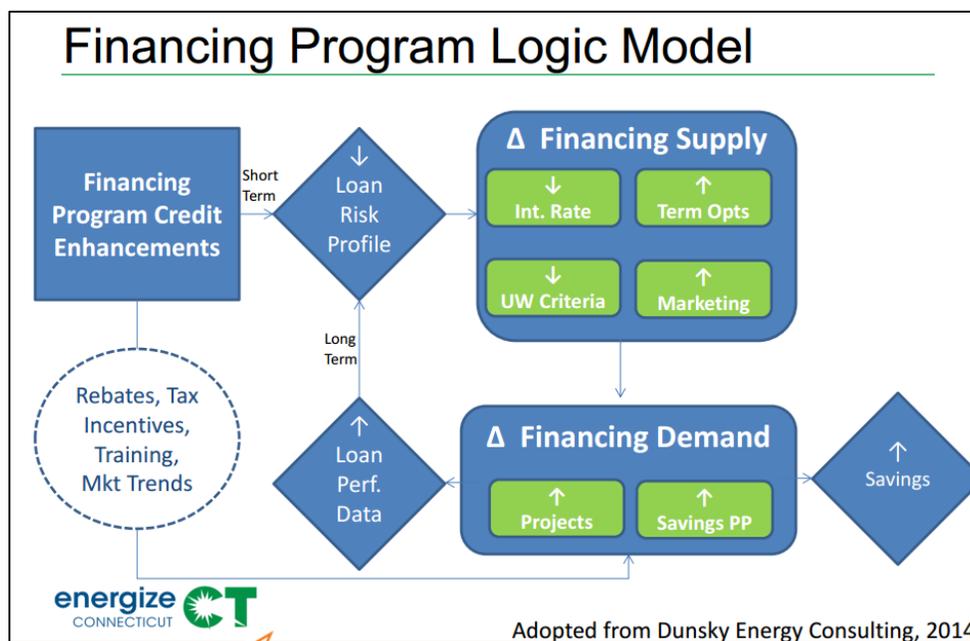


Figure 2. Potential Connecticut Green Bank Program Logic Model (Not Currently Adopted)

As in the resource acquisition context, evaluation can play an important role in helping determine whether and how financing has helped transform the market in the manner that is intended. Regulators and program administrators may wish to establish clear directions regarding evaluation of financing programs that are focused on market transformation with metrics that go beyond short-term energy savings.

Establishing and tracking interim metrics is critical in understanding whether progress is being made toward achieving market transformation goals. Examples of interim metrics for conventional efficiency programs with market transformation objectives include market share or saturation levels of a particular type of technology. Data indicating changes in these metrics may be drawn from self-report surveys of customers or upstream groups, saturation surveys, periodic market baseline studies, and shipment or sales data (Peters 2014). Other indicators of market effects (e.g., changes in awareness, attitudes, and product availability) may also be tracked, particularly in the initial stages of a proposed market transformation effort. In the case of a financing-focused market transformation evaluation, data sources and types may need to be adapted. Most significantly, the goal of a market transformation effort focused on increasing the use of energy efficiency financing is not necessarily to promote any particular product or technology, but rather to increase savings overall. With this in mind, potential indicators of market effects might include:

- Early Indicators:
 - Availability and accessibility of financing options to customers
 - Customer awareness of and attitudes toward financing options
- Mid-Stage Indicators
 - Changes in interest rates, terms, and underwriting criteria offered for energy efficiency financing
 - Changes in levels of credit enhancement needed to achieve given rates and terms
 - Changes in incentive levels and other supports needed to drive financing participation
 - Number of financial institutions that see EE financing as a viable business and begin offering efficiency-oriented loan products without assistance from utilities or government agencies
- Ultimate indicators:
 - Increased use of financing for energy efficiency investments
 - Increased savings attributable to energy efficiency financing

Determining the extent to which market effects are attributable to programmatic efforts is critical for market transformation initiatives. This principle has been recognized by both regulators and evaluators over the course of many years of market effects evaluations. For example, the “Market Effects Evaluation Protocol” within the California Energy Efficiency Evaluation Protocols states, “Causality should be examined to estimate net market effects. The goal of the

activity is to estimate the proportion of market changes that can be attributed to program interventions” (California Public Utilities Commission 2006).

Aside from a direct comparison of market conditions to an established baseline, a number of other methods have been used to assess the impact of market effects. One of the most common is self-reporting, in which data is gathered through surveys of program participants, non-participants, and potentially other market actors. Self-reporting methods may be less expensive than direct observational comparisons, although they can also be subject to various biases among survey participants and other issues related to the reliability of participant recall.

Conclusion: Is All of This Worth It?

Evaluation can be challenging and potentially expensive. This may be especially true in the context of energy efficiency financing, where evaluation techniques may need to be adapted to an area that has not been a traditional focus of EM&V activities. Financing presents unique challenges for evaluators, such as the existence of multiple private financing offerings, which may raise thorny questions regarding the importance of program financing versus alternative financing, a scenario that is generally not encountered when evaluating other types of program incentives. Separating out the influence of financing from other incentives that are offered along with it may also create added complexities.

However, in jurisdictions that may be considering large-scale shifts toward the use of financing as a substitute for traditional strategies, the costs of evaluation should be considered in the context of benefits that may be in question. For example, in New York, analysts have suggested that the achievable energy efficiency potential for the state over a 20-year period is approximately \$29.3 billion (NYSERDA 2014). While a large-scale strategic shift towards financing could result in greater energy savings, the downside risk is also worth contemplating. In light of this concern, allocating sufficient resources to evaluation activities that can help inform policy makers as to the likelihood of success of such a strategic shift may be prudent.

If significant changes in program participation are immediately evident once new strategies are implemented, additional evaluation may not be necessary to assess results. Given the large amount of private financing that supports certain types of building improvements, however, there may be potential for high financing participation rates to reflect a shift away from private sector financing alternatives, as opposed to newly generated savings. Under these circumstances, robust evaluation focusing on key questions of attributable savings may be needed to understand how much the efficiency savings pie has grown.

Appendix A. Early Experience with Evaluation of Financing Programs

Traditionally, financing strategies have not been separately evaluated from other programmatic activities, largely because financing has been considered just one component of a comprehensive portfolio. This trend is beginning to change, especially for (1) financing programs that act as complements to existing energy efficiency strategies but have reached significant scale or (2) financing programs that are advanced as substitutes for existing ratepayer-funded energy efficiency programs. Despite increased attention, impact evaluation of financing programs is still

evolving. Few formal evaluations have been conducted that shed light on financing's incremental savings contribution or its potential to replace core programs. Early examples are described below.

Massachusetts

In Massachusetts, financing is seen as a complement to rebates and other traditional programs. The residential HEAT Loan program has grown to sufficient scale (roughly \$100 million of loans originated annually and approximately \$15 million in interest-rate buy-downs) that an evaluation was initiated to assess the cost-effectiveness of this program. The HEAT loan evaluation focused on the relative importance of these two strategies (i.e., rebates and financing) without attempting to parse their exact contribution to net savings achieved.

This study focused on 900 respondents who had recently received a recommendation to move forward with residential energy efficiency measures, some of whom completed the recommendations and some who did not. Evaluators followed up with respondents who moved forward and took a HEAT loan to determine its impact on their decision to move forward, as well as with those who did not use the financing to find out why not. For customers who did not move forward, evaluators solicited responses to gauge awareness of the HEAT Loan's 0% offering and to determine whether greater awareness would have potentially changed their minds. The survey also reached out to contractors and lenders to understand their perceptions of the HEAT Loan's influence on customer decisions, as well as more general reactions to the product itself.

Based on discussions with evaluation managers, this evaluation will assess the relative importance of incentives and financing as well as to assess "whether people are making larger investments because it is available" (Wirtshafter, 2014). Evaluators and program administrators hypothesize that the loan encourages participants to move forward with recommendations, and the evaluation is designed to test this hypothesis.

Illinois

The statute establishing Illinois' on-bill repayment programs also calls for an evaluation of these programs. After consultation with stakeholders, the evaluation has been designed to assess multiple issues, including cost-effectiveness of the on-bill program and financing's ability to enable installation of additional measures. The evaluation will utilize stakeholder interviews as well as participant, partial participant, contractor, and retailer surveys (Cadmus, 2013). The evaluation will assess free ridership rates through a battery of survey questions and will calculate a net-to-gross ratio for the program, which will offer policy makers a data point to understand financing's ability to attract additional net savings.

California

In California, the CPUC and financing program administrators are required to estimate the impacts of the state's new energy efficiency financing pilots. The California Legislative Analyst's Office noted "evaluation should include information that allows the Legislature to compare the cost and effectiveness of each approach, including information on... the costs of these projects compared to their benefits." (Taylor, 2014)

In light of this recommendation, analysts in California have begun to explore how to apply traditional EM&V methods to the financing pilot programs. Thus far, this work has centered on topics such as how to account for costs unique to financing programs (e.g., loan loss reserve funds), how to address the multi-year nature of the costs and benefits of financing, and which methodologies may help to disaggregate gross savings and attribute some portion of net savings to financing itself (Dunsky, 2014) (Opinion Dynamics, 2014). This evaluation will also focus on questions of attribution of savings to incentives versus financing and will hopefully offer additional insight on the potential of financing to augment or even substitute for traditional programs. These discussions are still in their early phases.

The investor-owned utilities have also retained an evaluator who is evaluating the privately-administered Home Energy Renovate Opportunity (HERO) PACE program.³ This evaluation will explore the relative uptake of incentivized measures in the presence and absence of HERO financing and is attempting to address questions of attribution (e.g., which savings are due to rebates for measures offered by utilities and savings that are due to the HERO financing offer). The evaluation will use at least three approaches: an analytic hierarchy process based on self-reported data, quasi-experimental design, and discrete choice modeling (McGuckin, 2015).⁴ The HERO program was introduced in only certain geographic areas over a period of several years; thus, evaluators hope to assess rebate and financing uptake in similar populations, within the HERO territory and outside of it, to understand the program's incremental effects.

New York

In New York, financing is seen as a potential long-run substitute for traditional efficiency programs. NYSERDA and the New York Green Bank were directed by the NYPS&C to identify evaluation metrics in four main categories—operational, risk, financial, and environmental—to “help the Commission and the public evaluate how well the Green Bank is achieving our clean energy goals.” (New York Public Service Commission, 2013). NYSERDA has allocated up to \$4 million for future evaluation against these metrics (NYSERDA, 2014). An evaluation that assesses financing's ability to generate the same level of additional cost-effective net benefits as existing programs is of particular importance given the PSC's statement that Green Bank and other

³ The HERO program is not subject to PUC-oversight or cost-effectiveness requirements, although evaluation results may nevertheless shed light on attribution of savings to financing versus rebates.

⁴ Less emphasis will be placed on the question of whether the projects generated additional net savings, particularly where HERO financing was offered without rebates. Data from the evaluation period suggest a very high percentage of efficiency measures installed were ones that are often considered non-discretionary (HVAC) or have a natural market demand (windows) (Spoonhour, 2012). Thus, understanding whether financing alone drove installation decisions or choices of efficiency levels may be as important as understanding the impact of financing versus incentives. Without that information, evaluators may be left with results suggesting that high levels of energy savings can be generated in the absence of incentives, without a robust understanding of whether those results actually represent additional net savings.

NYSERDA activities will make up for the loss of net savings from previous NYSERDA activities that will be ramped down (with no corresponding ramp-up in utility targets).⁵

Stakeholders were also given the opportunity to comment on the plan through regulatory filings.⁶ In June 2014, NYSERDA responded with their Metrics, Reporting, and Evaluation plan, which suggested several options for assessing the Green Bank's impact, including: number and type of projects supported, return on investment, level of awareness of the Green Bank in the market, lifetime energy savings (generally based on full savings compared to existing conditions baseline), and clean energy generated, and lifetime greenhouse gas emissions reductions (NYSERDA, 2014).

Connecticut

In Connecticut, policy statements have been made in favor of transitioning to financing as a primary energy efficiency strategy. The Connecticut Green Bank (CGB) has not been required by legislation or regulation to conduct an evaluation of its financing programs, although some programs, such as its solar incentive program, have been evaluated. Evaluation of efficiency financing products is just beginning. The CGB has developed a voluntary "objective function" which is designed to measure energy savings generated per public dollar invested. An updated version of the objective function is under development. Moreover, the CGB recently engaged an evaluation contractor to explore other options for assessing CGB impacts and results. The extent to which evaluation will be used to address questions such as the potential of financing to achieve the same level of cost-effective net benefits remains to be seen.

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⁵ Green Bank officials have also suggested that the evaluation budget "could potentially be decreased somewhat from the current 5% [of total energy efficiency portfolio of nearly \$600M] budget."

⁶ Several stakeholders urged the Green Bank to place greater emphasis on addressing the issue of measuring *additional* savings. Green Bank officials have committed to addressing the issue of additionality, although they have also argued for a "shift... from net-to-gross evaluation activity within multiple programs" (NYSERDA, 2014) and noted that in some cases additionality "might only be capable of expression in qualitative terms." (NYSERDA, 2013).

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