Residential Financing on the Ground: Lessons Learned from Programmatic Examples

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ABSTRACT

In recent years, ACEEE, LBNL and others have helped temper expectations that financing can singlehandedly transform the market for energy efficiency investments. Yet efforts to dispel the notion of financing as a panacea have mostly been theoretical thus far. What can be learned from an on-the-ground examination of financing's role in driving demand within actual programmatic contexts? While controlled experiments may not exist in the complex world of program implementation, useful lessons can still be gleaned from examining programs in which financing has played a different role at different times, or in which incentive levels have varied while financing terms have remained the same. This paper summarizes those lessons from several jurisdictions, including the following:

- United Kingdom (the trouble with high expectations)
- New York (what financing can actually do)
- Pennsylvania (why financing may be a limited strategy)
- Michigan (there's no free lunch)
- Austin (the best solution is to do it all)

By reviewing these examples, the paper attempts to place financing into proper perspective, citing evidence showing that a combination of financing and other strategies is likely needed to achieve long-term energy efficiency goals.

Introduction

In recent years, expectations for the transformational possibilities of energy efficiency financing have continued to grow, particularly in the residential sector. Countries like the United Kingdom have introduced national financing strategies as a way to meet carbon reduction targets.[1] Green banks have begun to develop in the United States, with high expectations for their potential to accelerate the deployment of clean energy technologies.[2] Leading states like California have approved large new financing programs, characterizing them as resource acquisition programs in their own right.

While expectations about the potential of financing to support energy efficiency improvements may run high, it is important to remain realistic about what financing can actually achieve. The purpose of this paper is to examine several case studies that help identify the role of financing in energy efficiency market transformation, based on the actual experience of several programs on the ground. The paper examines the trouble with placing very high expectations on

[1] More information is available at https://www.gov.uk/green-deal-energy-saving-measures/overview.

[2] The Coalition for Green Capital lists 17 states that have established a Green Bank, taken steps in this direction, or expressed interest in this type of endeavor. More information is available at: http://www.coalitionforgreencapital.com/state-campaigns.html.

what financing can do, looks at what role financing can actually play, explores why financing may be a more limited strategy than is sometimes acknowledged, compares the effectiveness of financing to other strategies, and concludes with an example showing that combining financing and other strategies together may provide the best chance of boosting participation rates to levels that are actually needed to meet long-term policy goals.

United Kingdom: A Warning from Across the Pond

The United Kingdom's financing program to promote energy efficiency, known as the Green Deal, provides one of the clearest examples to date of **"the trouble with high expectations"** around financing.[3] Along with an overall Energy Company Obligation (ECO), which places carbon emissions obligations on UK energy suppliers, the Green Deal serves as the nation's primary strategy for encouraging home energy upgrades. Goals and rhetoric for the program have run high since the beginning. As the UK's Secretary of State for Climate and Energy Edward Davey put it, "The green deal has been designed to open up and transform the energy efficiency market in the UK" (Davey 2013).

The Green Deal and ECO replace a previous set of programs that incorporated only an emission reduction target, without a specific financing component. Under the previous strategy, energy suppliers had flexibility to pursue their own strategies to meet their reduction targets. Typically this meant subsidizing the direct installation of attic and cavity-wall insulation. Over time, concerns were raised that ratepayers were paying too heavily for these direct-install subsidies, which frequently went toward measures that were arguably economically attractive enough for participating customers to shoulder on their own. In order to meet their EU carbon reduction obligations, some argued that subsidies would be better spent on measures less able to pay for themselves.

The Green Deal and ECO were designed in part to address these concerns. Under the new program, installers offer unsubsidized financing for measures that are projected to generate enough savings to make them "bill neutral" when paid for with a loan. Subsidies are targeted at measures that generally are not "bill neutral" on their own. These "harder" measures may include things like solid-wall insulation and cavity-wall insulation that is defined as "hard to treat" (e.g., narrow cavities or cavities in concrete or metal frame construction).

The new scheme continues to give energy companies flexibility in how they meet their obligations. Companies may still directly subsidize the costs of measure installations, as under the previous program, but target only "harder" measures. Alternatively, they may provide buy-downs for these harder measures and encourage customers to cost share, which Green Deal financing is intended to facilitate. Energy suppliers get equal credit for installations either way. Historically, direct-install subsidies have often covered all or a large percentage of the measure cost, so providing buy-downs to the point of bill neutrality and letting financing do the rest is intended to reduce the amount of subsidy needed per installation.

In practice, however, measures installed through Green Deal financing represent only a tiny fraction of installations under the new program, with subsidized direct installations still making up the vast majority. Between the launch of the program in late January 2013 and April

[3] For more information, see the case study by Lawrence Berkeley National Lab on the Green Deal in the appendices to their recent on-bill financing report, "Financing Energy Efficiency Improvements on Utility Bills, Technical Appendix—Case Studies," May 2014, pp. 60 – 70, available at http://www1.eere.energy.gov/seeaction/pdfs/onbill_financing_appendix.pdf.

2014, only 2,439 Green Deal financing arrangements were in process, and only 2,500 measures had been installed using Green Deal financing. By contrast, 335,647 non-low-income measures were directly installed with ECO subsidies (DECC 2014a).

One reason for this continued reliance on direct-install subsidies may be the pressure that energy suppliers are under to reach their carbon savings targets by driving sufficient demand. The penalties for failing to meet these obligations are potentially massive, up to 10 percent of annual revenues (Duxbury 2013). As such, it may be more rational for company to rely upon more expensive but well-established strategies, such as heavily subsidized direct installations, than to risk relying on Green Deal financing to deliver a sufficient number of projects to avoid these penalties. In other words, the parties with the most to lose may have looked at the prospects for financing strategies and decided they were better off simply paying out of pocket.

There are certain reasons to keep tabs on Green Deal participation going forward, but if these new factors lead to success, they will be just as revealing as to what it may take to bring energy efficiency financing to scale. Two major recent changes are the introduction of very large incentives that can be combined with financing, and the expansion of eligibility to rental properties, which face an approaching mandate to upgrade to a minimum efficiency level. To increase participation in Green Deal financing, the UK government has been offering limited-time "cashback" incentives to early adopters of Green Deal financing. In February 2014, the government increased these incentives dramatically (e.g., to as high as £4,000—about $6,800—for solid wall insulation) to try to spur greater participation in the financing scheme (DECC 2014b). In June, the government announced a new "Home Improvement Fund," under which the amount available for solid wall insulation went up to £6,000 (over $10,000), with total available incentives up to £7,600 (DECC 2014c). These incentives were also extended to rental properties, which became eligible for Green Deal financing in May 2014.

The eligibility of rental properties is potentially an important factor for the Green Deal, as the government has mandated a minimum energy efficiency standard for rental properties of at least an "E" (on an A to G scale) by 2018. A recent government housing survey estimated that there were approximately 390,000 private rental units in the "F" or "G" band in England (DCLG 2014). Given requirement to comply with the upgrade mandate, landlords of these units may be more willing to cost share by taking advantage of available incentives and financing the rest of the work.

It remains very much an open question whether these developments will dramatically increase participation in Green Deal financing. Even if they do lead to success, however, they may suggest that the way to scale up energy efficiency financing is 1) to combine it with very large incentives and 2) to layer on mandated upgrades.

In the meantime, measures that were expected to be economically attractive enough to be financed by customers on their own, such as regular cavity-wall insulation, have dropped off dramatically. Soon after the shift to the Green Deal financing strategy, results showed installation rates of this cavity wall insulation had dropped as much as 97% year-on-year from April 2012 to April 2013 (Guardian 2013). These early results were likely affected by administrative issues involved in the transition to a new strategy, such as a lack of qualified Green Deal providers. Still, a year later the total number of cavity-wall insulation measures installed using Green Deal financing remained at a grand total of 79, nationwide (DECC 2014a). Such figures suggest that just because measures may be highly cost-effective from a participant standpoint, customers may not jump to install them, even if they are offered financing to help them overcome any first-cost barrier.

New York: Holding the Line with Financing

In New York, the Green Jobs - Green New York (GJGNY) program provides a good example of **"what financing can actually do,"** within limits. Figure 1 shows the number of NYSERDA Home Performance with ENERGY STAR (HPwES) projects by year from 2009 – 2013. The chart indicates that the number of projects was roughly in the same range during this period, though production was slightly lower in the two most recent years. This period saw the introduction of NYSERDA's Green Jobs Green New York program, with a significant financing component, in 2010, followed by the introduction of on-bill financing in 2012. Despite these important developments, production remained relatively steady and even declined slightly.

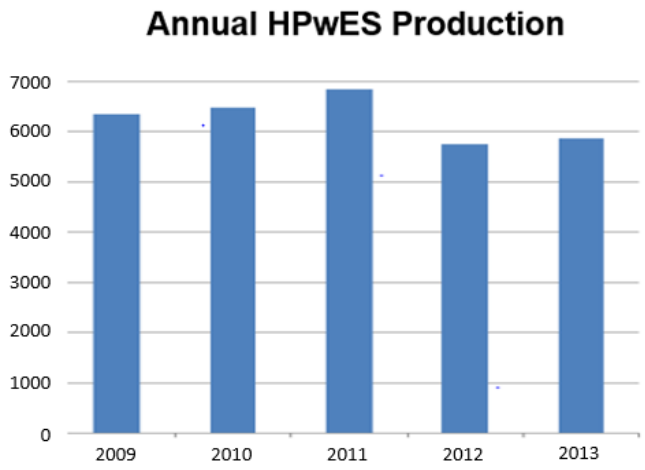

Figure 1. NYSERDA Annual Home Performance with ENERGY STAR (HPwES) Production, 2001 - 2013. *Source*: Ahearn 2014.

One explanation for the drop-off in 2012 and 2013 is the introduction of measure-level cost-effectiveness screening in July of 2011, when the HPwES program transitioned into the regulatory framework of the New York State Public Service Commission's Energy Efficiency Portfolio Standard (EEPS). The result of this transition was that each measure in each individual home was required to pass cost-effectiveness screening, which made it much more difficult for contractors to find projects that worked under the program. Effectively, the market of eligible projects shrank.

Under these circumstances, the ability to offer new flexible and attractive financing helped contractors and program administrators maintain production levels. NYSERDA offered low rates (3.5%) for up to 15 years, which lowered monthly payments often below projected savings levels. Alternative "Tier 2" underwriting standards were introduced to qualify customers who did not meet the program's "Tier 1" underwriting criteria, and an on-bill option was designed to allow the loan to stay with the meter.

While it is difficult to formally attribute incremental program participation to any particular program modification, NYSERDA program administrators believe that these financing innovations helped them "hold the line," or prevent a further drop-off in project numbers that might have otherwise resulted from changes in the regulatory framework and program cost-effectiveness requirements (J. Pitkin, Treasurer, and J. Ahearn, Program Manager, Building Performance Programs, NYSERDA, February 20, 2014).

It is quite possible that the drop in production in 2012 and 2013, as shown in the chart above, would have been more dramatic if not for the financing that contractors were able to offer to their customers. What the data do not show, however, is a dramatic leap in HPwES production since the introduction of NYSERDA's innovative financing program. This does not mean that financing has not been effective or that it has not played an important role in the program at the scale in which it now operates. What it does suggest, however, is that introducing financing was not in and of itself a means to drive the program to scale at a completely different order of magnitude.

Figure 1 shows that at its peak, the program reached nearly 7,000 home performance jobs. In a state with approximately 5,000,000 one-to-four unit homes (the target for GJGNY's residential programs), that equates to approximately a 0.1% annual participation rate. Other sources have placed the program's participation rate slightly higher, in the range of 0.25% annually, when counting homes eligible for low-income weatherization separately (Neme 2011).

Various studies have suggested that "the least-cost path to meeting climate goals requires averaging at least 5% annual market penetration of whole-house residential retrofits" (Neme, Gottstein, and Hamilton 2011). Assuming that target is reasonable for New York State[4] and that 0.25% reasonably reflects current participation levels, then program participation would need to increase by something on the order of 20 times current rates, depending on the share of the market covered by low income weatherization and other programs. As effective as financing may have been for the NYSERDA program at its current scale, there is no data to suggest that the introduction of innovative financing is likely to drive the state toward those kind of participation rates.

New York is one location where officials have expressed a sense of realism even as the state strives to expand its financing efforts. The recent launch of the NY Green Bank demonstrates a commitment to deploying financing strategies as effectively as possible to overcome challenges in the clean energy space. Yet officials also recognize that financing can only go so far. In a recent interview, New York's Chairman of Energy and Finance, Richard Kauffman, was asked how the Green Bank fits into overall New York energy policy. He responded, "In New York, we put financing in the context of overall demand for energy efficiency and renewable energy. It is too often assumed that financing drives demand, but that isn't true. No one wakes up saying they want to borrow more money. We need to look at other policies that will stimulate market demand for energy efficiency and renewable energy" (Clark and Metz 2014).

Pennsylvania: Two Types of Borrowers

An important fact to note about the preceding examples of the United Kingdom and New York is that each one related to programs that tend to promote "discretionary" upgrades, such as building shell improvements (e.g., air sealing and insulation). Generally, building shell improvements require customers to be proactive, because they do not involve the breakdown of

[4] New York's Climate Action Plan does not set specific targets for actual residential upgrades, but it envisions that 50% of all homes sold will receive whole-house assessments through the Home Energy Rating System (HERS) by 2020 and that 100% of homes sold will be HERS-rated by 2030 (CAC 2010). Census data indicate that approximately 6.5% of existing single-family homes are sold in the state per year. An audit-to-upgrade conversion rate of about 40%, frequently seen in leading programs, would mean that about 2.5% of all existing homes would be improved every year as part of the sales process. A total participation rate of about 5% would mean another 2.5% from the remaining homes in a given year that were not transferred in sale.

essential equipment that must be replaced. By contrast, equipment replacement strategies can target customers who are essentially reactive to break-and-fix scenarios. It is likely that incentivizing customers to be proactive will take more effort than motivating reactive customers to make a slight shift in their decision-making process. As Neme, Gottstein, and Hamilton (2011) put it, in reactive markets, "the objective is simply to persuade or require (e.g., through codes or standards) these market actors to build or sell/buy something a little differently. In contrast, most retrofit decisions are discretionary. The fundamental objective and challenge is to *create* a market event."

This concept of proactive and reactive customers may help to partially explain **"why financing may be a limited strategy."** While financing can be attractive to reactive customers who already know they must make an improvement, it may be difficult for financing on its own to drive customers to proactively seek out discretionary upgrades. This distinction was recently summarized by Peter Krajsa, Chairman and CEO of AFC First, a nationally prominent energy efficiency lender. Krajsa's observations were documented in a recent report published by ACEEE (Bell, Hewitt, and Ferrante 2014) and are presented in Figure 2 below.

Factor	Reactive customers	Proactive customers
Customer characteristics	Characterized by an immediate need for ANY repair or installation	Characterized by project foresight, engagement, and a deeper dedication to efficiency
Cost of typical repairs or installations	$3,000-$15,000	Larger than $15,000 based on project. May be whole-home.
Size of EE improvement market	Vast majority	Small minority
Time sensitivity	Project must be completed ASAP.	Timelines individual to projects
Work plan developer	Contractor	Owner and contractor (potentially tenant, if applicable)
Financing needs	Longer-term, lower rates than what is available from banks	Lower rates can incentivize action.
Willingness to accept a lien	Customers are unwilling.	Borrower may or may not have adequate equity for a loan.
Potential best practice	Unsecured point of purchase loan program	Home/Building Performance with ENERGY STAR with an energy audit

Figure 2. Proactive vs. Reactive Energy Efficiency Customers. *Source*: Bell, Hewitt, and Ferrante 2014.

As Krajsa notes, the proactive energy efficiency improvement market constitutes a "small minority," whereas the reactive market constitutes the "vast majority." To some extent that is to be expected, as HVAC replacements represent a large-scale recurring need in the residential sector. Yet studies suggest that dramatically scaling up more discretionary building shell improvements is also a key piece of the puzzle with regard to achieving big-picture policy objectives. For example, researchers from Lawrence Berkeley National Lab recently estimated that upgrading all homes to be as airtight as the top 10 percent of similar homes would decrease energy demand by 2.6 quads annually—out of the total 22 quads of source energy used by the residential housing sector—leading to roughly $22 billion in savings in energy bills. Upgrading

to the airtightness standards of the International Energy Conservation Code (IECC) would yield savings of 3.83 quads in annual source energy, yielding $33 billion in savings (Logue et al. 2013).

One place in which the limitations of financing on driving demand for comprehensive projects can be seen is in programs the offer tiered interest rates to drive whole-house improvements. AFC First's flagship lending program, Keystone HELP in Pennsylvania, provides one such example. Figure 3 below shows how the Keystone program presents its tiered interest rate structure. As the heading states, customer offerings are presented such that "the deeper the retrofit, the lower the rate."

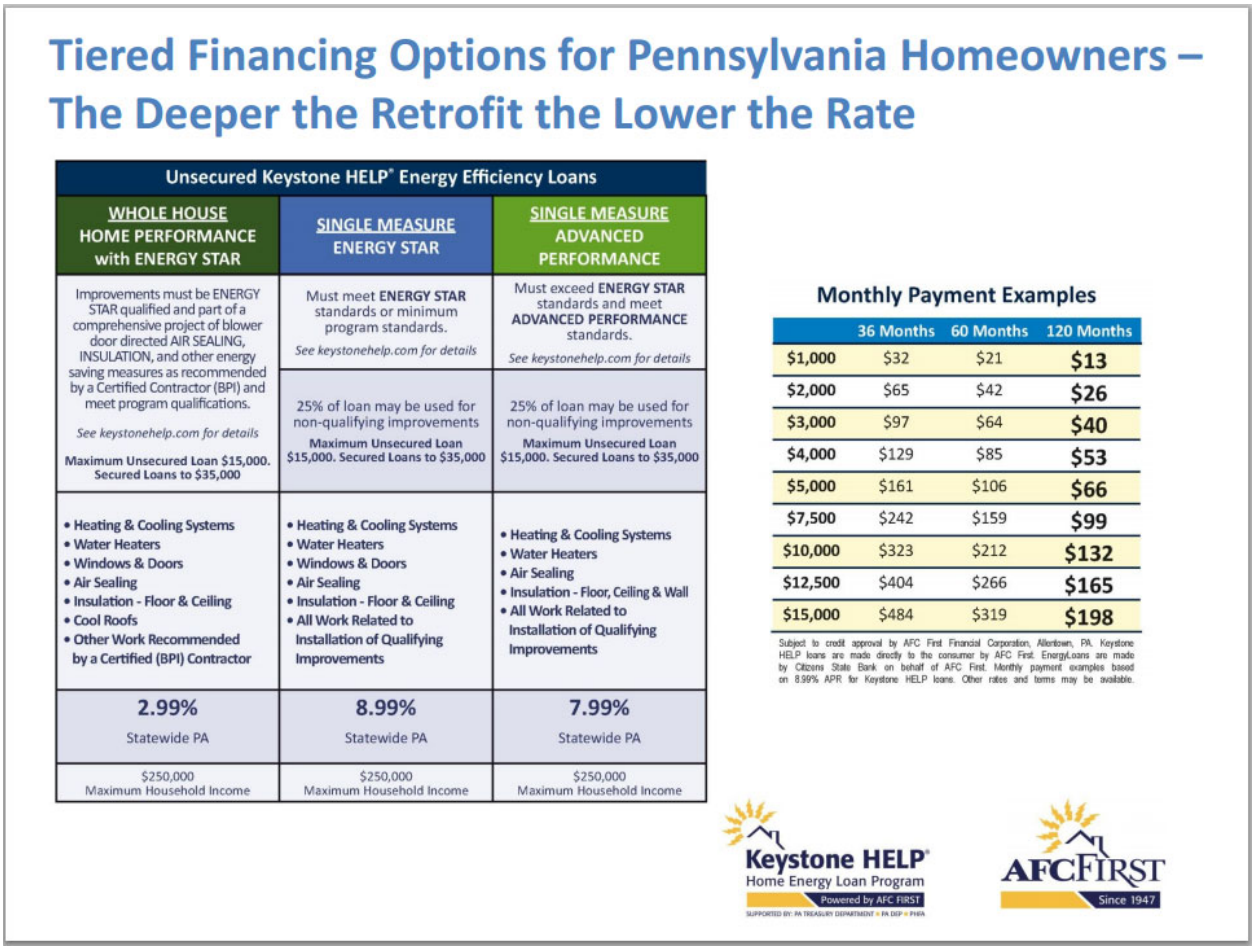

Figure 3. Keystone HELP Financing Options. *Source*: Krajsa 2012.

The lower rate is designed to entice more customers to complete whole-house retrofit projects. Yet results from the program demonstrate how challenging it can be to get customers to take this leap. Program results show that a full 85% of Keystone HELP customers take advantage of the single-measure loan, despite rates that are five to six percent higher than the whole-house rate (Krasjsa 2012). These results suggest that even subsidized financing may not be sufficient to draw enough reactive customers into the proactive market to achieve public policy goals.

Michigan: There's No Free Lunch

The flip side of acknowledging that financing may be limited in its ability to drive demand for discretionary retrofits is accepting that **"there's no free lunch"** when it comes to encouraging such activity. Some interesting evidence on this issue has recently emerged from the state of Michigan, where a range of strategies including financing and other tools have been tested on the ground. The BetterBuildings for Michigan program used grant dollars from the U.S. Department of Energy Better Buildings program to run a series of nearly 60 "neighborhood sweeps," in which the program varied customer incentive and financing levels, along with different levels of audit and direct-install packages, and tracked the results. In the scenarios tracked, much higher conversion rates from audits to upgrades were observed in scenarios in which the customer offering was more attractive.

Figure 4 compares conversion rates from audit and direct-install "base" packages to more comprehensive upgrades under different scenarios. More information on each one of these scenarios can be found through the Michigan Saves website.[5] Generally, the six bars can be grouped into twos: the top two scenarios had larger and more attractive customer offerings; the next two (middle) bars had more moderate offerings, and the bottom two (including the "choice" scenario) had the lowest customer offerings. As can be seen in the figure, conversion rates were significantly higher for the most attractive customer offerings than they were for the least attractive offerings (while the moderate offerings fell in between). This evidence suggests that if programs are truly committed to incentivizing action, their willingness to offer attractive customer packages may make a material difference in their observed results.

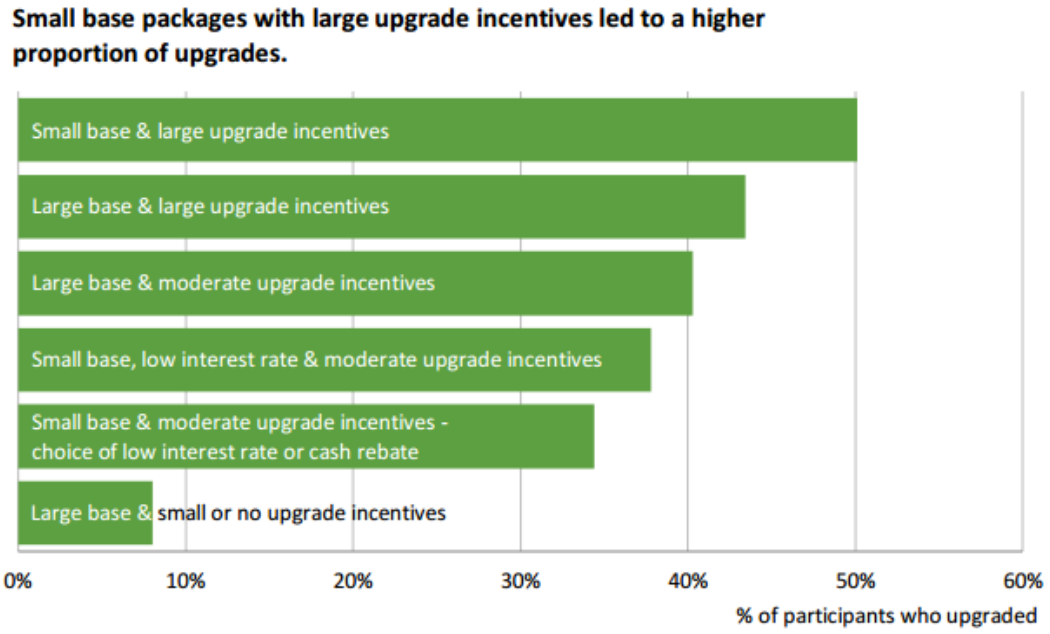

Figure 4. Upgrade Rates Under Different Scenarios. *Source*: BetterBuildings for Michigan 2013.

A few nuances are worth pointing out here with regard to the individual scenarios. First, in comparing the top two bars, it is interesting to note that the program found higher upgrade conversion rates when there was less direct-install offered during the initial audit. Program

[5] See http://michigansaves.org/program/bbfm.

administrators observed that customers who received large direct-install packages tended to feel that the work in their homes was complete.

It is also worth noting that the scenario in which customers had a choice between low interest rates or cash rebates was one of the least successful. This finding suggests that simply allowing customers to pick the most attractive option may not actually have a positive impact on program results. Moreover, program administrators observed that when customers were given a choice between low interest rates and cash incentives, they almost invariably took the cash (Mary Templeton, June 13, 2014).

Finally, perhaps the most important observation in the context of this paper is that the very least successful scenario in the Michigan program was the case in which small or no upgrade incentives were offered. This scenario still included a financing offer, but without any interest-rate buy-downs or substantial cash incentives. The low conversion rate in this scenario raises further doubts as to whether financing at higher rates, while perhaps less expensive than incentives or interest-rate buy-downs, can adequately drive sufficient demand for comprehensive upgrades to meet policy and programmatic goals.

Austin: Throw in the Kitchen Sink

While the lowest upgrade rates in Michigan were seen when the least was done to incentivize action, evidence from other jurisdictions suggests that **"the best solution is to do it all."** A good example of the potential of this type of "kitchen sink" strategy is the experience of Austin, Texas, where Austin Energy experimented with a customer offer that they termed the "Best Offer Ever." Prior to this offer, participants in Austin Energy's Home Performance with ENERGY STAR program had to choose between a rebate or low-interest financing through a local credit union. Between October 31 and December 31, 2010, however, Austin Energy chose to combine both rebates and financing, which for this limited period was bought down to zero percent.

The results of this offer were striking. A record 564 participants completed comprehensive upgrades in six months, which was more than 10 times the utility's typical participation rate. Moreover, as shown in Figure 5, 95% of evaluated homes went on to complete energy upgrades. All of these homes also took advantage of the zero-percent financing offer.

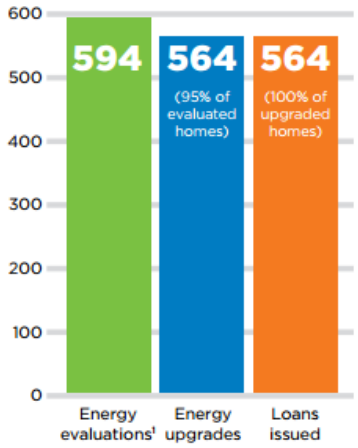

Figure 5. Austin's "Best Offer Ever" Results. *Source*: U.S. DOE 2011.

Clearly, a "kitchen sink" strategy, such as the Best Offer Ever, will be more expensive than offering customers only unsubsidized, market-rate financing. Austin Energy estimates that the additional incentves and buy-downs added up to about $1,200 per household. Still, the fact that there were 10 times as many participants as usual suggests that the additional spending did bring results.

More evaluation is needed in these types of scenarios to determine how cost-effective various financing strategies and other tactics may be, how much they can move the market, and the extent to which they generate new customers, as opposed to free riders who might have completed similar projects with fewer incentives. The Austin example, however, shows that by and large, people respond to better offers, and it is likely that much better offers are needed to achieve big-picture policy goals. Participation rates that are ten times higher than those that most programs are experiencing today would be a very good start.

Conclusion

The objective of this paper is simply to put financing into proper perspective. There is a temptation to view energy efficiency as a common-sense investment that should be relatively easy to promote, if only people had the tools they needed to participate. The temptation can be especially strong to overstate the importance of the up-front cost barrier, without acknowledging all of the other barriers that prevent people from investing in energy efficiency. The enticing proposition that financing may offer a low-cost way to overcome the up-front cost barrier, mixed with the constraints on energy efficiency incentive budgets that persist today, can make financing an attractive option for policymakers. When combined with the sense that financing is inherently sophisticated, these factors may help to explain the disproportionate attention that financing sometimes receives in energy efficiency circles.

Evidence on the ground, however, suggests that there is no free lunch. Efforts to promote energy efficiency through financing alone have consistently been less effective than more comprehensive strategies. One reason may be that helping people overcome the up-front cost barrier is not sufficient to motivate the reactive "vast majority" to participate in energy efficiency programs—particularly those that promote deep, discretionary upgrades. Yet those types of upgrades are a key part of most long-term policy visions. If we are serious about trying to reach such big-picture goals, robust strategies that go well beyond financing alone will likely be needed.

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