BETTER BUILDINGS FOR MICHIGAN

Final Report

September 30, 2013

Executive Summary

The BetterBuildings for Michigan program included energy efficiency work in both commercial buildings of greater downtown Detroit and 58 residential areas across the state over the past three years. We offered loan and grant incentives to home and property owners to encourage energy-saving modifications to homes and commercial buildings that, in the long run, would save money, decrease energy consumption, and stimulate job growth. The program was designed as a pilot project to test elements in different communities and determine how to most effectively conduct future campaigns. The program met and exceeded the goals of the grant in terms of its effectiveness and benefit to the public.

Program Goal	Actual Performance	Progress
Make energy efficiency improvements in 9,180 homes	11,571 homes served	Surpassed
Retrofit 13.5M square feet of commercial, industrial, and public buildings	14.8M square feet completed	Surpassed
Avoid 0.74 TBTUs of energy consumption per year	0.36 TBTUs avoided	On track*
Avoid 70,754 metric tons of carbon dioxide emissions per year	29,780 tons avoided	On track*
Create approximately 2,063 green jobs	3,214 jobs were created	Surpassed
Achieve 5:1 ratio in terms of leveraged dollars	5:1	Met

*The life of most improvements is anticipated to be ten or more years. The program goal for energy savings will be reached in the first two years of energy savings.

Lessons Learned

Smaller initial packages of work combined with low interest rates loans and rebates encouraged investment in more extensive energy efficiency work. We began by offering larger initial packages that included extensive energy efficiency improvements like air sealing and insulation, but found people were reluctant to go any further because the initial package had satisfied their energy needs. We changed the program design to offer smaller initial packages in combination with other incentives to engage in more extensive work.

Lower copay amounts elicited greater initial participation. Lower copay amounts help overcome the initial cost barrier to signing up for the program. We saw consistent decreases in signup percentages as the copay amount increased.

Instant cash rebates and 0% interest rates were very popular, but we were challenged to make such attractive incentives sustainable within a limited program budget. People loved financing offers of 0% interest for ten years but that was costly to the program. We changed incentives to offer 0% for two years *or* an instant cash rebate, rather than 0% (or other low interest rate options) *and* an instant cash rebate. Almost 90% of those who upgraded chose the instant cash rebate over the financing offer.

Messaging must be based on what's important to the customer. In both the residential and commercial programs we began by framing our message around energy savings and reducing environmental footprints. In the residential program, we garnered more interest when we talked about comfort and lower heating and cooling bills. In the commercial program, we reframed our message around cost savings and found much more resonance with business owners.

Deep energy efficiency work takes more time than we anticipated. Even when we had excited commercial participants and shovel-ready projects, it took longer than we expected to begin projects due to the paperwork and legwork necessary on the part of the property owner. We needed to provide hands-on guidance to property owners to complete the application process, and we needed to monitor projects to ensure they were completed within our timelines. Similarly, homeowners wanted more time to think about their decision and required more close support at each step of the process.

Next Steps

While the impact from this program is strong, our work is not done. Our program supported many opportunities to continue this work into the future:

- The Michigan Energy Office will continue to support energy efficiency work through grant funding, policy development, and state programs and resources.
- Michigan Saves will continue to offer financing, maintain a network of authorized contractors, and drive demand for energy efficiency improvements.
- Regional partners and nonprofit organizations will continue to work with organizations to support energy efficiency programs.
- The commercial program now has multiple financing mechanisms to address the barrier of finding money to support these improvements.

The program is supported by the American Recovery and Reinvestment Act (ARRA) and developed by the Michigan Energy Office, Michigan Saves, the City of Grand Rapids, the Economic Development Corporation of the City of Detroit, and the Southeast Michigan Regional Energy Office. Additional partners include: Building Science Energy Services, Clean Energy Coalition, City of Marquette, City of Traverse City, City of Wyandotte, Consumers Energy, DTE Energy, Michigan Energy Options, Michigan Land Use Institute, Michigan Public Service Commission, SEEDS, St. Joseph County EDC, Superior Watershed Partnership, and the townships of DeWitt and Bath.

Foreword

Governor Snyder has aptly noted that energy efficiency is a no-regrets energy policy for the state. Within this context, the U.S. Department of Energy grant for the BetterBuildings for Michigan program—*the second largest such award in the nation*—afforded us an opportunity to create a best-in-class energy efficiency program. The partnership combined the historical and technical knowledge of the MEDC Michigan Energy Office with the financing and program implementation expertise of Michigan Saves.

We could not have accomplished the program's goals without a large network of partnering organizations. To our operating partners named in the original grant—the Southeast Michigan Regional Energy Office, the City of Grand Rapids, and the Detroit Economic Growth Corporation—and to all of our supporting partners at state agencies and regulatory bodies, electricity and natural gas utilities, lenders, contractors, nonprofits, energy efficiency consultants, and local units of government, we extend a heartfelt thank you.

Together, our work has established new pathways and expectations for energy efficiency work in Michigan, and expanded the permanent, energy efficiency financing system for the state.

It was our sincere privilege to lead the diverse, creative, intelligent, and passionate team of statewide partners in implementing the BetterBuildings for Michigan program. We were both humbled and pleased when the U.S. Department of Energy acknowledged Michigan's position as one of the highest performing Better Buildings Neighborhood Program grantees in the nation. As this grant award reaches its conclusion, we look forward to new rounds of program creativity and energy efficiency performance from all of our partners in every region in the state.

Sincerely,

Mark Clevey
Manager, Renewable & Energy Efficiency Programs
MEDC Michigan Energy Office
BetterBuildings for Michigan Co-Principal Investigator

Jeff Williams
Founding Executive Director
Michigan Saves
BetterBuildings for Michigan Co-Principal Investigator

Mary Templeton
Program Manager
BetterBuildings for Michigan

This report outlines how we structured the program, intentionally testing elements of that design, and reports on the program's impacts on energy efficiency throughout Michigan. The results of this analyses lend insight into the most efficient and effective ways to engage residents and business owners in energy improvement efforts. For more details about the effectiveness of the program, read about

How We Structured the BetterBuildings Program

The BetterBuildings for Michigan program was designed to create a sustainable energy efficiency market by providing outreach and education to increase demand, a skilled energy efficiency workforce to meet that demand, and the tools for lenders to make ongoing investments in energy efficiency in residential, commercial, industrial, and public buildings. The community-scale outreach used deep energy efficiency retrofits as a catalyst for the development of economically, environmentally, and socially sustainable neighborhoods generating growing market demand well beyond the program.

The program represents a multi-stakeholder effort. The knowledge and outcomes derived through this unique program have enabled the U.S. Department of Energy (DOE), along with the State of Michigan, Michigan Saves, and their partners, to understand what drives energy efficiency improvements and provides a scalable, replicable model for national rollout.

This section of the report will provide an overview of the original program plans and how those plans changed over the course of the program based on lessons learned. We will explain how we designed the residential and commercial sides of the program and how we innovated by experimenting with program design to achieve greater impacts.

Original Goals

Our overall approach had a dual focus: residential retrofits across specific regions of Michigan, and energy efficiency upgrades to targeted commercial

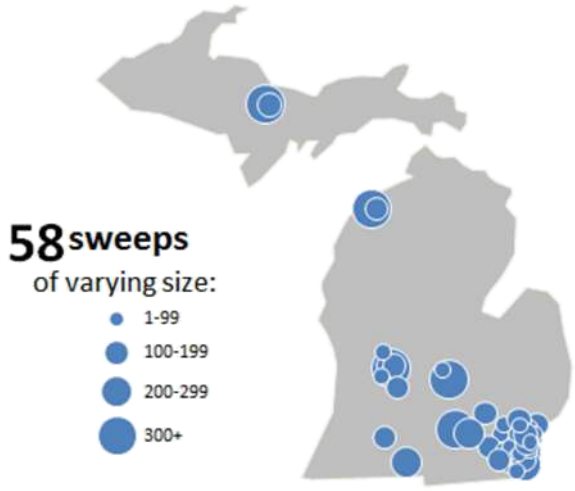
areas in the City of Detroit. Our intention was to test and deploy different designs and approaches to learn what strategies and techniques work best to encourage deep energy retrofits. The total $30M grant was divided into $10M for the commercial program and $20M for the residential program. Administration costs were limited to 10% of the total program budget.

The initial goal of the commercial program was to provide energy improvements to 131 buildings. That goal was revised when the DOE guidelines were changed in 2011 to become the retrofit of 13.5M square feet of commercial, industrial, multi-family, and public buildings in Detroit. The residential program goal was to market to 11,340 building owners and perform work on 9,180 homes.

We expected to avoid 0.74 TBTUs of energy consumption and 70,754 metric tons of carbon dioxide emissions per year while creating approximately 2,063 green jobs. Additionally, we wanted to leverage at least five dollars from other sources for every grant dollar spent to extend the reach of the grant funds.

Residential Program Structure

Throughout this report we refer to a "sweep," which is one targeted intervention of services over a defined period of time in a defined area—a neighborhood, an entire city, or all employees at a one organization. The 58 sweeps, mapped below, are where program staff reached out to residents to elicit participation.



Retrofits were available in a series of intensities. Homeowners who chose to participate in the program started with an initial base package of service for a modest copay; this included, at a minimum, an energy assessment. Based on the outcome of the assessment, contractors recommended a more extensive level

of services, which could be purchased by homeowners with reduced interest rates, utility rebates, and other financial incentives. Upgraded services included improvements like insulation and energy-efficient furnaces.

Site Selection

While some sweep locations were named as part of the grant application, other locations were identified through a Request for Proposals issued by the State of Michigan. Once the location was selected, specific sweep areas within those locations were chosen according to these criteria:

Specific groups of homeowners were offered reduced-cost energy efficiency improvements.

- Presence of leveraging partners including utilities, foundations, and community action agencies
- Demographics and income mix—no more than 20% of the homeowners should be eligible for low-income assistance funding
- Neighborhoods with high percentage of homeownership, particularly for initial sweeps
- Presence and strength of neighborhood groups and agencies
- Loan eligibility—at least one in three homes eligible for Michigan Saves financing
- Synergy with other Michigan programs
- Other special considerations unique to the region

Within each sweep, the program aimed to reach 420 total homes with 95% of them expected to be built before 1970. New houses are unlikely to need major energy improvements, while houses that are too old often contain asbestos or knob-and-tube wiring that can prevent improvement work.

Recruitment

After identifying a sweep area, program staff elicited participation in a number of ways, depending on the sweep.

Yard signs were used in almost every neighborhood. Some program staff canvassed door to door. Where the area was more geographically spread out the regional coordinators invested in radio and TV ads, Facebook ads, and other print and media campaigns.

Regional coordinators initially planned to recruit potential participants with the support of local champions—high-profile people that could publicly vouch for and perhaps even canvas for the program. In a similar vein, coordinators looked for areas with a sense of community identity, even if within a larger metropolitan area. In some cases, this meant the local champion was from the neighborhood church,

which acted as the community pivot point. In other cases, the community trusted their mayor, local council, or nonprofit organization. Regional coordinators developed marketing plans that were based on utilizing these trusted messengers in letters, case studies, community meetings, and in canvassing efforts.

Once the homeowner signed up to participate, program staff scheduled an appointment with an authorized local contractor. The contractors conducted the initial package of services, assessed what additional upgrades should occur, and implemented the upgraded services when homeowners chose to do so.

Innovation

Our efforts explored the drivers of energy efficiency uptake across sectors by intentionally testing different elements of the program design and delivery. These variations included

- conducting sweeps in different seasons,
- varying the amount of the base package copay,
- varying the items offered in the base package,
- varying the upgrade incentives,
- varying the interest rate offered, and
- using different marketing messages to help raise awareness and add credibility.

To the extent possible, we have statistically examined the impact of those differences, which we detail later.

Funding

Out of the $20M for the residential program, more than half went to homeowners in the form of interest rate buydowns, rebates, and audits, and to fund long-term credit enhancements in the form of a loan loss reserve. The loan loss reserve reduces the risk to the financial institution issuing loans by providing partial funding if a loan recipient defaults either during or after the program. The loan loss reserve will continue to support loans after the program ends, thereby extending the program reach to serve Michigan homeowners long into the future.

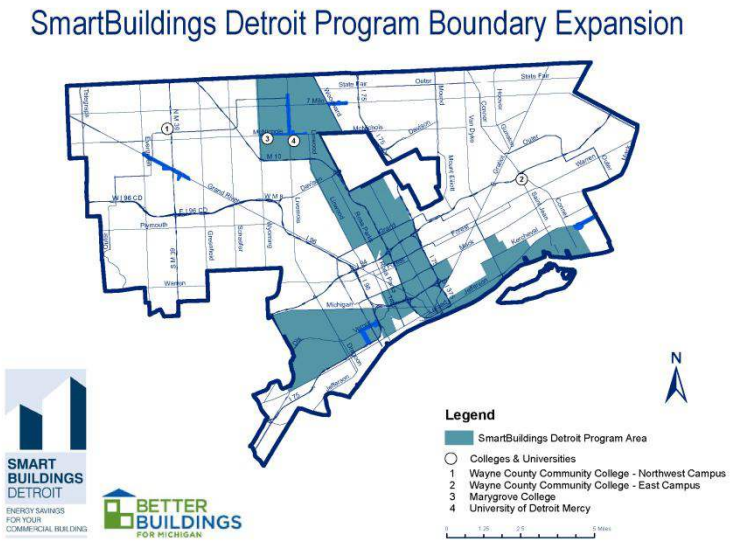
The remaining funds covered program development, marketing and outreach, data system development, quality assurance, program management, reporting, and building systems, processes, and structures that extend beyond this program.

Commercial Program Structure

The commercial program was called SmartBuildings Detroit. We established a steering committee that included representatives of various organizations in the

program area to meet periodically to discuss project status, analyze obstacles impeding progress, provide input to staff on local decisions affecting participation, and review strategies being pursued to make the program a success.

The initial greater downtown program area boundaries established in mid-2010 were ultimately expanded in December 2011 to include a larger area of Detroit, shown below.



To improve the chances of success, local energy experts were retained for preliminary energy assessments, final measurement and verification services, quality assurance and quality control protocols, and compliance with State Historic Preservation Office (SHPO) requirements. Related technical/energy counseling assistance was obtained from firms having considerable experience with these specific areas. Together these elements supported commercial building owners in their decision to participate in the program. We did not intentionally test program design elements as we did in the residential program.

Site Selection

Commercial sites were chosen based on their:

- Ability to meet leverage requirements
- Location within the targeted Detroit city boundaries
- Ability to complete the work in the allotted amount of time

Sites were also expected to align with the program's goal of achieving 15% energy savings through the retrofit.

Recruitment

Marketing and outreach efforts included introductory workshops, web presence, press releases, coordinated promotional activities with utility provider DTE Energy, and meetings and events with primary stakeholder organizations and representatives in the program area, as well as e-mail blasts and follow-up contacts with interested parties. As with the residential program, building owners worked with local contractors to assess efficiency and implement retrofits.

Funding

Out of the $10M for the commercial program, $1M was available as a loan fund to finance energy efficiency improvements for business owners. Approximately $600,000 was issued in a revolving loan fund, and the remaining $400,000 was used to fund a loan loss reserve. In both loan programs, the repayment of funds from the initial project creates a long term sustainable financing option to business owners in the city of Detroit who are interested in making energy efficiency improvements.

The remaining $9M in commercial program funds was used for grants to participating businesses, and to support program development, program management, quality assurance, and marketing and outreach activities. Administrative expenses were limited to 10% of the total program budget.

How We Drove Residential Action

All participating homeowners received a base package of services that included a full energy assessment. These people are described first, in the section called Base Package Participation. Based on the energy assessment, contractors recommended more extensive efficiency improvements. Some homeowners chose to continue the program and install upgraded improvements. These homeowners will be described second, in the section called Upgraded Participation.

In both sections, we describe the design tests we implemented and how they influenced participation rates. In a final section, we discuss a modified package of services we introduced to address efficiency needs for low-income homeowners.

Base Package Participation

On average, the program was able to deliver a base package of services to 14% of the eligible homes within a sweep. This number varied greatly—some sweeps served almost 40% of the eligible homes with this base package. The sweeps with higher participation rates did not attempt to cover as much geographic area as sweeps with lower participation rates, which may have helped concentrate recruitment efforts and increase participation.

As of July 2013, the program had completed energy efficiency improvements on 7,689 residential households. The program directly leveraged homeowner participation in other programs, like the Weatherization Assistance Program and the Wyandotte Municipal Services WIRES program, by providing services to an additional 1,530 homeowners through program contractors at discounted fees. A second leverage point was loans issued to 2,082 households through the Home Energy Loan Program of Michigan Saves.

Several sub-grantees offered versions of the program to households residing outside eligible territories. These families typically received full energy assessments for the same copay amount as eligible households, with no program subsidy paid to the contractor. As of July 2013, 270 homeowners fell into this tertiary leverage category. Including these leveraged homes, we served 11,571 homeowners in total.

Demographic Profile

Homeowners most likely to participate in the program tended to be younger, college educated, and in an older home where they had lived for less than ten years. Among those who participated, median home age was about 60 years, ranging from homes built as early as 1800 to as recently as 2011.

Median home square footage was 2,106. Median household income in sweep areas was $51,000 per year, slightly above median income for Michigan of $48,669. Median household income in sweep areas ranged from $28,850 to $75,000.

About the Data

Data about health and safety is collected by our contractors, when they conduct an initial energy assessment. Such data gathered directly on-site is rare and valuable, but the specific numerical results should be regarded as illustrative rather than definitive, since the information was not gathered uniformly from every home.

Strength of our Data

3 out of 5

Health and Safety

Our data show that health and safety issues were a moderate obstacle to participation in certain sweep areas. Overall, contractors reported suspected asbestos in only 3% of the homes we served; however, among those homes, 91% were located in five sweeps conducted in areas of Detroit and Grand Rapids. In those five sweeps, we found suspected asbestos in 17% of the homes. Similarly, knob-and-tube wiring was found in only 6% of those we served, and was concentrated in only a few sweep areas. We then better targeted neighborhoods that were less likely to have these problems, such that later sweeps had fewer health and safety issues. The other types of health and safety problems we encountered in just 5% of homes were:

- CO2 detection
- Inadequate ventilation from bathroom, kitchen, dryer, and chimney
- Poor air quality
- Relative humidity levels that were too low or too high
- Inadequate maintenance of heating and cooling systems
- Mold
- Gas leaks

People living in older homes, which tended to have more health and safety barriers, were more likely to want to participate.

When contractors were unable to fix the problem, they referred homeowners to remediation resources. In some cases, our contractors were able to fix the problem and proceed with energy efficiency work, or contractors were able to substitute alternative energy efficiency efforts, though this could lead to smaller energy savings.

Despite the presence of health and safety issues, participation rates were greater in areas where we felt the health and safety barriers to renovation and retrofitting were greater. In other words, people living in older homes, which tended to have

more health and safety barriers, were more likely to want to participate. Future work around energy efficiency should anticipate and plan to handle these issues.

How We Drove People to Initial Action

When we analyzed how various neighborhood factors influenced participation rates, we found that initial participation tended to be higher in areas with more developed, stronger neighborhood associations. Participation rates were not affected by the percentage of residents who were retired, the median age of the houses in the neighborhood, or the median income of the neighborhood.

We asked those who chose to participate what their reasons were for doing so. Nearly two-thirds of these householders (65%) said they did so to save on energy costs or to be more energy efficient. More than a third of these householders (36%) said they decided to participate because the cost was very affordable, while a few others said they chose to participate because financing (4%) or tax breaks or rebates (3%) were available.

Another 29% said they chose to participate because they wanted to see how efficient their homes were and what they could do to improve, while 16% said they wanted to see what they could do to improve the comfort of their home. One in thirteen (8%) said they chose to participate for environmental reasons, 4% said a neighbor or another trusted friend suggested it.

Experiments with Marketing

We intentionally varied our marketing messages, but none rose above others as statistically better at securing initial or upgraded participation. Out of the 30 sweeps analyzed, some used messages emphasizing saving energy and money, while other emphasized improving home comfort and health. Two sweeps featured marketing pitches focused on what could be obtained at no cost to the homeowner in order to appeal to low-income homeowners.

Regional coordinators noted that they had far less success convincing homeowners to sign up for the program when the message was framed around energy efficiency terminology, such as “reducing leakage” in the home. Regional coordinators and canvassers felt better received by the homeowners when they talked about “comfort” and referred to, for example, neighbors down the block who were feeling fewer drafts in their newborn’s bedroom since their participation in the program.

In terms of the marketing channel, homeowners who read a newspaper article, attended a sweep kick-off event, or met with a canvasser were much more likely to participate in the program. Brochures and word-of-mouth recommendations

About the Data

We were able to interview 1,610 people who participated with our program and 839 people who declined to participate. However, the response rate for non-participant homes was fairly low (14%), thus limiting our ability to draw conclusions about this population and their decision-making. In contrast, the response rate for program participants was over 50%.

Strength of our Data

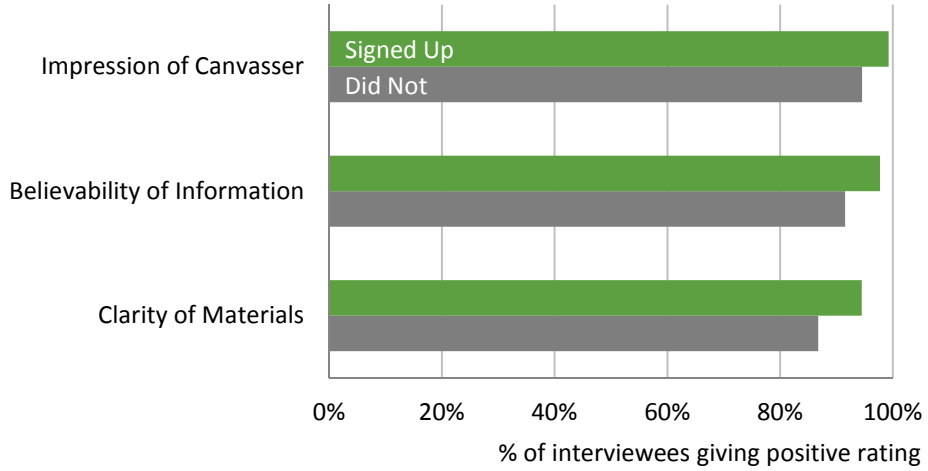
4 out of 5

doubled and tripled signup rates, respectively. The more marketing channels householders were exposed to, the more likely they were to participate.

Not all of our marketing channels were effective, however. In one sweep, we purchased Facebook ads to appeal to potential participants in dispersed rural areas, where door to door canvassing was difficult. Facebook was useful at generating interest, measured by the number of "likes" on the Facebook page, but this did not directly lead to participation in the program. We offered incentives for referrals to the program, which also didn't produce improved results over asking for referralls without the incentives.

Although householders were more likely to participate if they had a favorable impression of a canvasser, the effectiveness of canvassing was variable. For example, in a northern Michigan community, canvassing was strong because the staff there had experience and was comfortable going door to door, even in the rain and snow. In contrast, there were other neighborhoods that only allowed canvassing with permits, and most homeowners in these neighborhoods did not answer their door or asked to be left alone, even if the permit was prominetly displayed. Overall, householders who did interact with canvassers were more likely to participate if they had a favorable impression of a canvasser.

Participants and nonparticipants had a favorable view of program marketing.



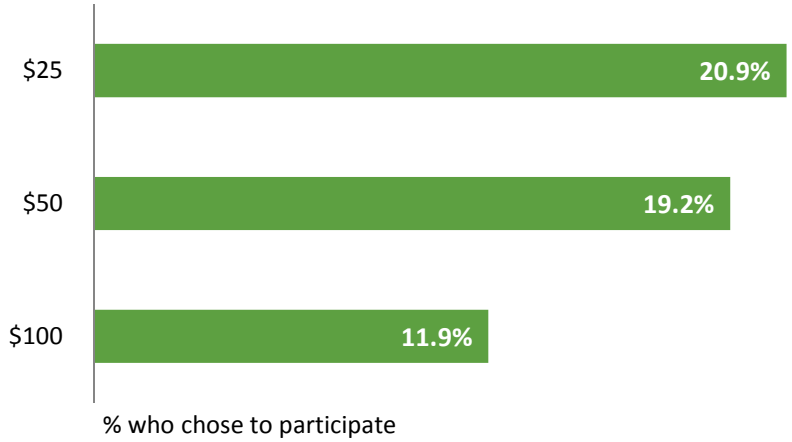
But the effectiveness wasn't limited to exposure to marketing and outreach efforts. Perception of credibility was also a factor. We asked both participants and non-participants to rate whether the marketing material was credible and clear. As shown in the chart above, almost all we interviewed rated the material as credible

and clear. Program participants, however, were consistently more likely than non-participants to rate the materials positively.

Experiments with Copay Amounts

While copays varied from a low of $25 to a high of $100, most homeowners in the program had a copay of $50. In general, the copay amount required was negatively correlated with the participation or signup rates. In other words, the lower the copay, the more people chose to participate in the program.

Lower copay amounts were associated with higher average participation rates.



We will talk more about our other experiments with incentives in the next section, when we discuss what worked to encourage upgrades.

Obstacles to Initial Action

We interviewed people who were approached about the program but decided not to join. While we were only able to speak with a portion from that group, they lent some insight about reasons people may not want to participate.

Four out of every ten of those who declined to participate said their house was already efficient or that they had already made many energy savings upgrades. Another 15% said that it would take more than the value of the base package of improvements to make a meaningful difference in the efficiency of their home. Another 3% said they did not think the audit would be worthwhile since they were already aware of their homes' shortcomings. In other words, over half of this group of nonparticipants wasn't convinced the program would make a big enough impact on their energy efficiency.

Timing was a factor for 21% of nonparticipants. One in nine said the offer came at a bad time because of illness, vacation, or other commitments. One in ten said they just did not have the time or there was no convenient time to meet with the

contractor. We also sensed that timing was an issue while conducting sweeps. We saw that homeowners needed more time to make up their mind and subsequently extended the length of time we worked in each sweep area over the course of the grant period.

One in 12 of the nonparticipants we interviewed (8%) said they could not afford the cost, 6% said they did not receive enough information about the program, and 5% said they did not trust the program contractors or government-sponsored programs. While nonparticipants reported all of these factors as part of their consideration process, none of these reasons proved to be a valid predictor in our statistical analysis. That is, none can be relied upon to determine whether someone will participate.

Upgraded Participation

Of 1,616 homeowners we interviewed who had assessments presented to them, 94% report that the contractor gave suggestions for ways to improve their energy efficiency and reduce their energy costs. In other words, contractors identified areas in need of improvement in nearly every home.

Approximately one-third of the homeowners who received a base package (32%) chose to implement additional efficiency upgrades.

Beyond those participants who officially installed energy efficiency upgrades with us (that is, using our contractors and often our incentives and/or loans), 28% of participants who received only the base package said they went on to do some energy efficiency upgrades on their own, outside of the program, based on our recommendations. While we will only discuss the impacts we can measure from the upgrade work we retrofitted, the survey results suggest that as many as 60% of all homeowners participating in the program engaged in some kind of upgrade after receiving our initial home assessment.

The role of recommending additional energy efficiency measures beyond the base package ultimately fell upon the contractors. Of course, not all contractors are expert salespeople. We offered additional training in sales but still, sales skills varied. Among contractors who worked in more than 50 homes, the top contractors had over 55% of their base package customers choose additional energy efficiency measures. Contractors who focused on offering packages of work garnered more upgrades than those who gave homeowners detailed, line-item choices about what could be upgraded. For example, one contractor presented each homeowner with a choice of “good, better, and best” package options. In each package option, this contractor consistently showed the homeowner the monthly estimated energy and cost savings and compared that

to an estimated monthly loan payment, which in some cases was lower than the anticipated savings.

Demographic Profile of Upgraders

Participants who upgraded were very similar to those who only participated in the base package with the exceptions that those who upgraded tended to have an income above $30,000 and live in a house that was 30 to 74 years old.

Homeowners spent a median of $2,150 on upgrades, with 80% spending between $1,500 and $13,700. The rest of this section examines the program design elements we tested that led to more upgrades and greater upgrade spending.

How We Encouraged People to Complete Deeper Energy Efficiency Packages

We started our program by focusing only on the base package when we signed homeowners up to participate in the program. After the base package was completed, the contractors introduced the concept that homeowners should invest more in their homes and complete additional energy efficiency work. We learned from experience and from survey data that homeowners did not respond well to this approach. Homeowners felt they were being misled—given something for a modest fee just to be asked to spend several thousand dollars.

We implemented a program change such that we explained that program participation was a two-step process: the assessment was the first step, and the contractor completing the assessment would recommend several options for improved energy efficiency as the second step. We were much more successful with encouraging deeper energy efficiency improvements, or upgrades, when we were very explicit about this two-step process with homeowners in initial conversations.

Follow up survey data from participating homeowners showed that the more upgrade recommendations a contractor made, the more upgrades were actually performed. In other words, recommendations to improve the performance of the home were accepted when a holistic assessment of the home's performance was provided during the audit process.

We saw more success when we returned to a previous sweep a year later to work with a community we had educated.

Furthermore, we saw success when we conducted a resweeps; that is, when we came back to an area a year after performing work there and offered our services again, more people participated.

Experiments with Rebates, Copay, and Other Incentives

Instant cash rebates, on average, were capped at $1,500 and available generally

About the Data

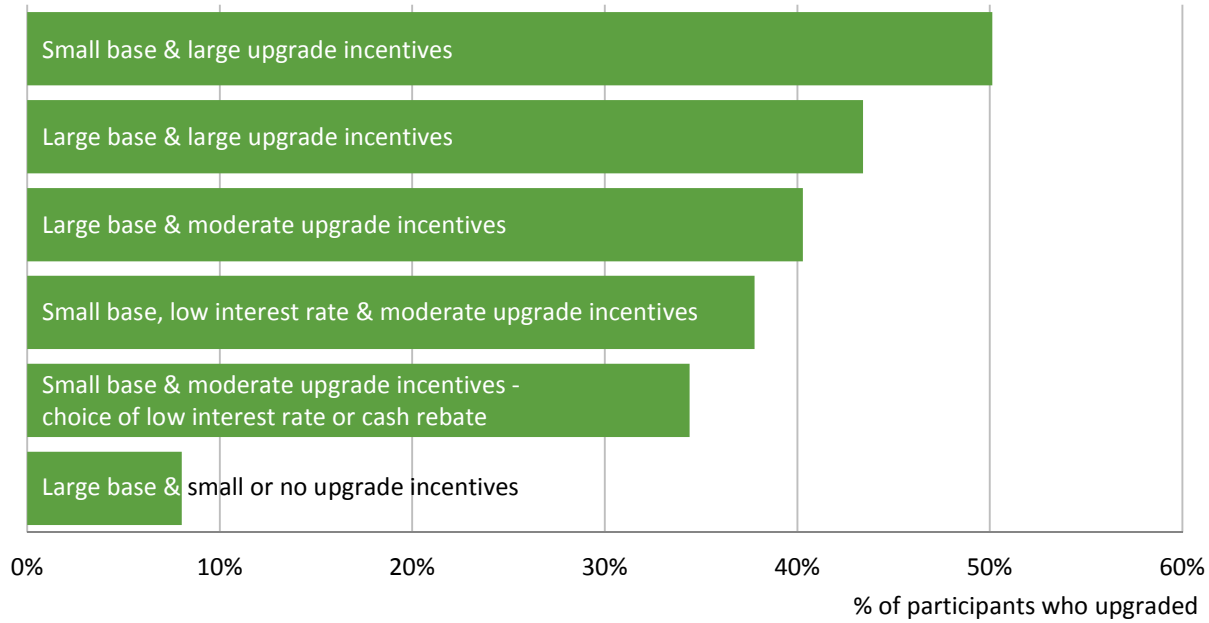
Knowing who upgraded and who didn't was tricky. Some people may have taken contractor recommendations and performed the upgrades on their own. Some may have chosen to perform upgrades after the program ended, and weren't captured in data systems.

Strength of our Data

4 out of 5

to homeowners who chose to upgrade. Some program rebates (when combined with utility rebates) totaled almost $7,000 while others were as low as $75. In addition to the instant cash rebates, we also varied the extent of services, or size, of the base package, as well as the interest rate of the loan.

Small base packages with large upgrade incentives led to a higher proportion of upgrades.



We encouraged the most upgrades when we offered a small base package and large incentives to upgrade work. Large base packages with moderate to large incentives to upgrade also led to a high percentage of upgrades, but were expensive to offer along with upgrade incentives.

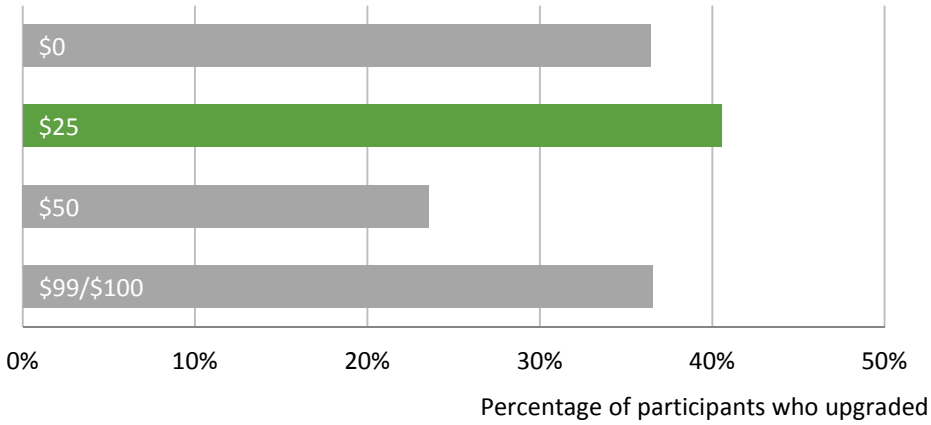
In most cases, higher incentive amounts led to higher average dollar amounts spent by a customer, suggesting that a program-side investment in incentives can lead to greater energy efficiency work. Further, higher customer investments were associated with higher estimated energy savings, our ultimate goal.

In addition to rebates for completing energy efficiency improvements, we varied the copay amount we required from participants for the initial assessment. Most of our sweeps required a $50 or $100 copay. These sweeps offered similar upgrade incentives, and upgrade rates tended to be greater when the copay required was also greater. We expect that the higher initial cost to participate filtered out homeowners who were less interested in investing in energy efficiency improvements, and that people may see more value in things that cost more money.

We required a $25 copay in some of our low income sweep areas. Areas that were offered a $25 copay were also offered relatively large upgrade incentives, and, most likely due to these incentives, had the highest upgrade percentages.

Interestingly, in the one sweep where we offered the initial program for free, people upgraded at a similar rate to those that paid a $100 copay. This particular sweep was offered to an entire city, ran for over a year, was supported by the local city-owned utility, and used contractor performance rewards. While many of these factors likely support the strong upgrade rates, further investigation of the effect of copays on upgrade rates may be useful.

Just as with base packages, the $25 copay led to the highest upgrade participation.



Experiments with Interest Rates Combined with Rebates

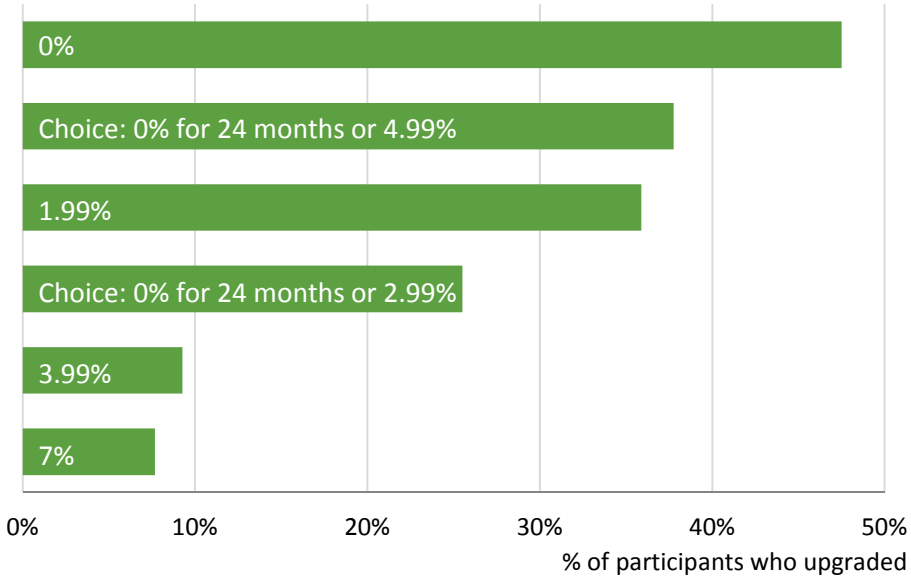
Lower interest rates resulted in more upgrades. Loan rates ranged from 0% to 7%. In fact, one-third of the sweeps offered a 0% interest rate for up to a ten-year term and another one-third offered participants a choice. The choice offered to sweep participants varied amongst sweeps and included a choice between a 0% interest rate for 24 months and a higher interest rate for ten years, or a choice between a 0% interest rate for 24 months and an instant cash rebate. The final one-third of the sweeps offered ten year terms with interest rates above 0% and up to 7%, and varied in each sweep area.

The interest rate offered was a significant predictor of initial participation and it continued to play a deciding role in moving beyond the initial package. Upgrade rates tended to be higher in sweeps where the interest rate offered was lower. The higher the interest rate, the lower the upgrade rate and vice versa, as shown in the chart on the next page. The interest rate that was most successful in securing upgrades was 0% financing for ten years. When homeowners were offered this incentive, nearly half of the participants (48%) upgraded. When the interest rate offered was 1.99% for up to a ten-year term, or when the customer

had a choice of 0% for 24 months or either 4.99% or 2.99% for up to a ten-year term, 36% of the participants upgraded. Upgrade rates were significantly lower in areas where the interest rate offered was closer to 7% (on average only 8% of participants chose to upgrade), but we should note that we changed other aspects of the program in those areas that may have affected upgrade rates as well.

Generally, the lower the interest rate, the higher the upgrade rate.

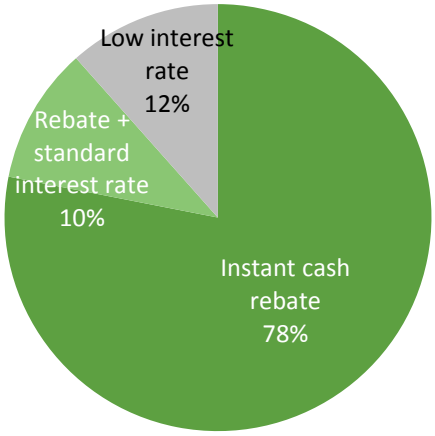
All rates are for 10 years unless otherwise stated.



We also tested different designs involving low interest rates and instant cash rebates. We offered rebate only, low interest rate only, low interest rate *and* rebate, and a choice between a low interest rate *or* a rebate. The combination of a low interest rate with a cash rebate garnered the highest percentage of upgrades. There was little to no difference in upgrades when we offered a low interest rate alone or offered the choice between a low interest rate or a cash rebate.

In those cases where people had a choice between a low interest rate or a cash rebate, the instant cash rebate was much more popular. The low interest rate was only chosen 12% of the time. Some who chose the instant cash rebate still financed the energy work at the standard interest rate of 7%.

Instant cash rebates were far more popular when we gave homeowners the choice between the rebate and low interest rates.



In three sweeps where we offered cash rebates alone, upgrades were chosen only 2% of the time. We know, however, that cash rebates alone were offered in three early sweeps, when we advertised a large base package. We found that after such a sizeable base package, people felt satisfied with their energy improvements and thus didn't want to upgrade, even though they were offered a modest cash rebate. Then we modified the program design to offer a smaller initial base package but more choices in terms of incentives and rebates (and we changed our marketing), all of which appears to have been effective in encouraging upgrades.

When participants used financing our total job cost was roughly $10,000. Those who did not use financing had a much lower total job cost, only $4,400. The difference here suggests that use of financing allows for greater energy efficiency work than would otherwise be possible. Among participants who took financing to engage in energy efficiency work, only 18, or 0.66%, defaulted on their loan as of July 2013. In contrast, average consumer loan default rates are 3.0%, suggesting that the loans to program customers were a good investment for lenders.

Experiments with Contractors

Contractor project averages ranged from $2,500 to over $12,000, while individual project sizes ranged from $210 to $78,000. The contractors with the lowest percentage of upgrades also had the lowest average dollar amount of customer spending. Some contractors consistently produced more upgrades and averaged higher amounts spent by their customers. However, among the ten contractors who had the highest upgrade rates, only five produced average customer spending rates above the program average of $6,500. We provided sales training to contractors who participated in the program, with varying performance by contractors after the training. In some areas, we put performance incentives in place to reward contractors who were better at producing upgrades by offering

them more customer appointments, and we noticed improvements in contractor performance. We also eliminated some contractors who did not meet performance goals.

Obstacles to Upgraded Action

We asked participants who declined to upgrade what went into their decision. More than nine out of ten of these householders (92%) said they decided against the changes because of the costs of doing so.

In Summary

One of our program goals was to encourage homeowners to perform deep energy efficiency work in their homes. We needed to convince homeowners that spending their discretionary income on something that can't be seen should be a priority. Many of these homeowners weren't even aware that they had a problem. We know financing and financial incentives encourage action. We know that full disclosure about upgrading helps. We know strong neighborhood and government support helps, as do some forms of advertisement and face-to-face connection with program staff. We know that targeting the right neighborhood helps. We know that choosing the right contractor helps. We know that asking homeowner to contribute to the cost of the first visit helps. Together, these factors increase the chances that homeowners will participate and invest in upgrades, even if they take some of those actions on their own.

Low-Income Program

Our original plans included serving 20% of our targeted area with low-income assistance funds. We served at least 13 homes that qualified for savings through Michigan's Low Income Energy Efficiency Fund (LIEEF), which provided energy efficiency work at no cost to the customer. Soon after the program began, however, the LIEEF funding source was terminated due to an appeals court ruling that affected the entire state (not just BBFM). We referred over 240 participants to Community Action Agencies (CAAs) responsible for delivering Weatherization Assistance Program (WAP) services. In early 2012, CAAs funding was substantially reduced, along with staffing cuts that impacted their support program. We were unable to collect data on 81% of the cases to determine who received what assistance. In the 22 cases (9%) for which we do have data, homeowners completed deep retrofits.

Because of these obstacles, we adjusted the program for low-income homeowners. We developed a modified base package that only included a home energy audit and air sealing. Upgrade packages were not offered. We implemented this package in the Detroit Air Sealing sweep of 1,200 homes,

featured to the right, which we will highlight again when we discuss our achievements. In addition, we offered an enhanced base package in three sweep areas that included a home energy audit and incentives based on modeled energy savings. In these low-income areas, payments to contractors were based on expected energy savings. These enhanced base packages were designed to allow deep insulation and air sealing work to be performed at little cost to the homeowner.

Detroit Air Sealing

"It became clear that we were not going to be able to serve as many homes in Detroit if we didn't have a low-income program," said regional coordinator Jacob Corvidae. The team devised a low-income program option that concentrated on providing air sealing to create an enhanced base package.

Though air sealing just means sealing up cracks, usually with simple caulking and targeted spray-foam insulation, the impact was profound in older buildings that haven't received regular maintenance—an excellent fit for low-income housing.

Corvidae notes, "If a community is already struggling, they are spending more money per house on energy. Without spending a lot of money, we can dramatically bring down people's energy bills and help stabilize the economy in those areas."

How We Drove Commercial Action

In contrast to the residential program, with clear levels of efficiency packages, the commercial program was customized to address areas of need identified by each business owner.

The work included insulation, glass replacement, interior and exterior lighting and electrical, HVAC, plumbing, solar panels, geothermal, and water systems.

The commercial program offered loans (covering up to 40% of project costs, up to $100,000) and grants (based on a 3:1 leverage ratio, where the grant can provide a 25% rebate) for eligible energy improvements. For projects requiring review by the State Historic Preservation Office we provided technical assistance and facilitated preparation of required reviews for historic buildings.

We contracted with a specialized energy coach, who assisted us with initial energy marketing workshops and also met with potential program participants to help them determine financing strategies for their projects.

Among other notable projects, we handled the retrofit for Detroit's largest convention center, Cobo Hall. Click the screenshot to watch a 5 minute report on that project.

The remainder of this report section will describe what we know about the types of buildings we retrofitted and what we found to be most effective in bringing commercial property owners on board with the program.

Demographic Profile

In total, we retrofitted 81 buildings in the Detroit area, containing 14.8 million square feet of space.

About the Data

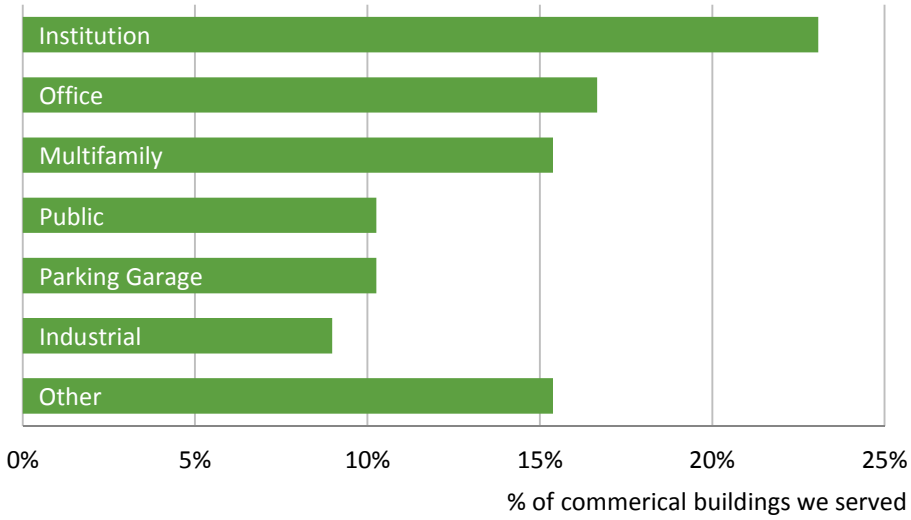
Data in this section are generally based on interviews with program staff and project records.

Strength of our Data

4 out of 5

We served a variety of commerical buildings in Detroit, 81 in total.

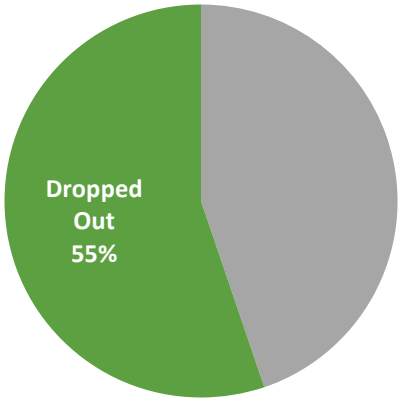
40% were institutions and offices.



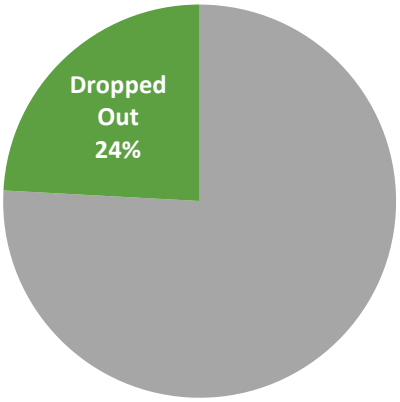
In terms of participation, we had the best results from medium to large corporations. Smaller firms did not have the technical and administrative capability to undertake energy projects and comply with federal requirements.

Small projects had a much higher dropout rate than large projects.

Small Projects (under 50,000 sq ft)



Large Projects (over 50,000 sq ft)



How We Drove Action

The commercial program was designed to be customized to the needs of each building; therefore, we did not conduct pilot testing of the program's parameters or phase the work as we did in the residential program. Rather, we worked with each building owner—leveraging what we learned on each project to help future projects move along faster to completion.

The financial incentive provided by the grant portion of the program was a tipping point for commercial property owners already contemplating energy improvements, despite the amount of paperwork required to receive reimbursement. The incentive was more helpful than a simple energy assessment. We know numerous property owners had completed energy assessments in the recent past and still had not proceeded with an energy project due to other non-energy-related building issues, lack of affordable financing, or poor market conditions. Moreover, many building owners contacted us expressing an interest to be "green," that is, to pursue alternative energy sources such as solar, wind, or geothermal. However, the payback for these costly installations was far longer than other traditional energy retrofit projects—especially without utility or governmental incentives being available. Thus the financial incentive provided by the program was critical to recruitment and participation.

The least effective recruitment approach seemed to be broad, unsubstantiated statements about energy savings. For example, we gathered business owners together to participate in workshops, to create interest in participating in our program. In some of our early workshops, we spoke about saving energy, but gave no details. Over time, we refined the workshops to highlight case studies where specific examples of energy and cost savings measures were highlighted. In these later workshops, business owner responses were more positive.

In retrospect, one of our biggest assets was understanding and be able to articulate federal American Recovery and Reinvestment Act and program requirements to participants early in the application process. As in the case of upgrades in the residential program, being upfront with potential participants prevented later surprises or disappointments.

We also learned to be specific and firm in how the program works. If property owners think that guidelines will change and become more favorable at a later date (for example, offering a larger incentive), they will wait to apply, scuttling efforts to drive demand and expedite the program. In addition, property owners talk to each other and any perception that someone is getting a better deal outside of established parameters will create problems for success.

Music Hall Retrofit

The Detroit Music Hall has been a cornerstone of the city's entertainment district since it first opened in 1928, but time and near constant use had taken its toll, tarnishing the 85-year-old cultural gem.

SmartBuildings Detroit helped pay for structural and HVAC upgrades. It is now possible to limit heating and cooling to specific areas, instead of the entire building.

The investment in a roof repair launched what is now *3 Fifty Terrace*, a unique rooftop, open air space for special events, creating an additional revenue-generating space for the hall.

Some building owners were able to address other pressing issues (leaky roofs, for example) at the same time as improving their energy efficiency. Many became much more aware of the cost of energy throughout the process. These additional benefits should be highlighted in future recruitment efforts.

Finally, we learned that even proposed projects deemed “shovel ready” required considerably more time and work to complete than was estimated. Property owners needed to be highly motivated to bring a project to successful conclusion. We found that lighting projects were the quickest (and easiest overall), taking 3-6 weeks to complete. We recommend budgeting at least 3-6 months for most other work, though we had several larger projects that took over a year.

Newberry Retrofit

Though Newberry Hall had many uses since it was built in 1898, new developers planned to turn it into apartments and wanted to make sure it was as energy efficient as possible.

SmartBuildings Detroit made upgrades to windows, installed geothermal heating and cooling and added high-efficiency water heaters without changes to the architectural splendor.

Analysis predicts Newberry Hall will see 63% savings on heating bills, overall using 15% less energy than similar structures.

What We Achieved

The program aimed to drastically reduce energy consumption (by at least 15%, on average) by retrofitting homes and commercial properties. In doing so, we intended to create over 2,000 jobs during the length of the program and leverage five times our grant dollars. This section of the report details how these goals were met or surpassed.

Energy and Cost Savings

Overall, the residential and commercial energy efficiency work avoided 0.36 TBTUs of greenhouse gases and 29,781 tons of carbon emissions. This is the equivalent of the emissions saved by removing 6,204 passenger vehicles from the road each year. Commercial participants saw an estimated 31% savings in energy each year. Residential participants saved an estimated 14%, approximately the targeted 15% energy savings we anticipated at program inception.

On average, homeowners who chose the base package saved 404 kilowatt hours and 86 therms in energy consumption per year, offsetting nearly three-quarters of a ton of carbon dioxide from the atmosphere. The base package saved each homeowner $137 per year—recouping even a large $100 copay in the first year.

On average, homeowners who were offered and chose the small base package saved 385 kilowatt hours and 53 therms in energy consumption per year. Homeowners who were offered and chose the large base package saved 420 kWh and 120 therms. While the electricity savings were comparable to the small base package, the gas savings were, on average, almost twice the size.

Participants who upgraded by completing energy efficiency work beyond the base package, on average saved approximately twice as much energy as the large base package. Estimated savings vary considerably due to the wide range of installed improvements and the energy savings estimation tools used by contractors. When we estimated energy savings using a consistent deemed savings methodolgy, a conservative estimate, participants who upgraded saved, on average, 550 kWhs and 245 therms. Contractor modeled energy savings estimates show even greater energy savings averages. On the conservative end, homeowners who upgraded offset about 1.7 tons of carbon dioxide each year, about one ton more than those who just took the base package. Cost savings also increased—to an average of $300 per year.

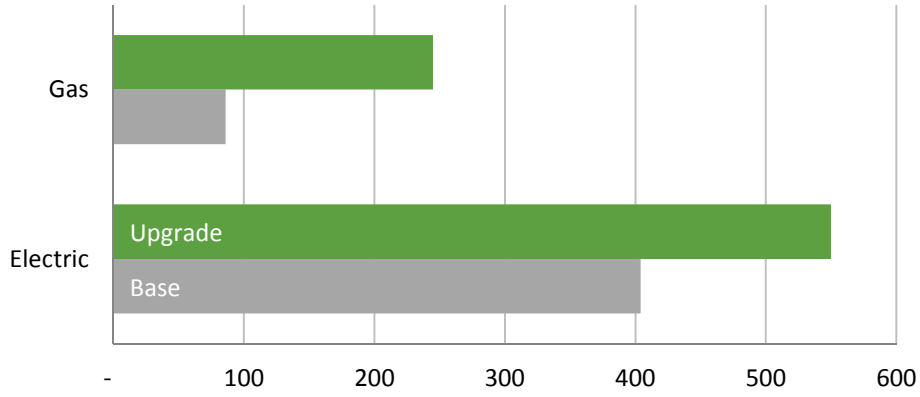
In general, the more money a homeowner spent through the project, the greater the energy and cost savings. The largest savings in terms of cost and energy occurred where we also offered the most generous incentives to upgrade. Conversely, our

lowest savings were seen in areas with the greatest concentration of low-income participants, where few people upgraded.

The modified base package offered to low-income Detroit Air Sealing participants saw an average of 425 kilowatt hours saved and 125 therms saved each year, greater than the regular base package. Participants in this sweep saved, on average, $175 per year in energy costs, more than 3 times the copay in just one year.

Upgraded efficiency work produced higher energy savings.

Gas units are in therms. Electric units are kilowatt hours.



Commercial program participants also saw major energy savings. The size of the projects varied significantly but on average each building saved over 160,000 kilowatt hours and 15,000 therms. Together those energy savings mean each building avoided 193 tons of carbon dioxide each year. Energy savings carried over into increases in cost savings. In total, Detroit-area business will save over $3,000,000 per year in energy costs due to the improvements in efficiency made through the program.

Jobs Created

We estimate that the program has generated work equal to more than 3,200 full-time jobs. We exceeded our goal by 1,200 jobs. The majority of those jobs came from the residential side. Hours spent on marketing, outreach, program design, quality assurance, product development, operations, and financing programs were more than double those spent by contractors. Contractor hours were estimated based on job complexity.

The commercial arm of the program, considerably smaller than the residential arm, produced 80 full-time jobs; program

About the Data

Residential energy savings data is based on 7,689 homes, more than are included in other sections of this report.

Attempts to collect actual data from energy providers was generally difficult and cumbersome, even though there were agreements and consents in place.

Thus, we estimated energy savings based on multiple methods detailed in Appendix C.

Commercial energy savings were estimated using either a modeled or deemed approach, and based on assessments conducted for each building.

Jobs were calculated by estimating hours based on job complexity, such that
$0–500 = 4 hours
$501–1,200 = 8 hours
$1,201–10,000 = 16 hours
$10,001–15,000 = 24 hours
$15,001–20,000 = 32 hours
>$20,000 = 40 hours

Strength of our Data

3 out of 5

Detroit area business will save over $3,000,000 per year in energy costs.

development and management, marketing, quality assurance, and administrative time was about half that of contractor hours.

As we will discuss in the next section, some aspects of the job creation are sustainable beyond the end of the grant, including new skills and markets for our local contractor networks, and financing programs that serve residential and commercial customers.

Program Costs

The program also successfully leveraged funding to accomplish the impacts described here. Other funding came from commercial and utility sources, from Michigan Saves (both from a trust fund and from other sources), low-income housing supplementary sources, and private capital backed by the loan loss reserve. Even more leveraged funds came from the homeowners and business owners themselves. Together these funds accumulated $154M over the life of the program. Thus we leveraged $5.12 for every grant dollar, surpassing our goal of $5 for every grant dollar.

Deciding Factors

Joe Scanlan, of South Marquette, now saves $726 on utility bills, a 28% expected annual energy savings.

Joe faced cold spots in his basement and high heating bills due to an inefficient furnace.

Improvements included wall panel insulation of the entire basement, spray foam insulation at cavities, and installation of a 96% efficiency furnace, hot water pipe insulation, and CFL bulbs.

“The BetterBuildings for Michigan program benefits were appealing by themselves, but the low cost up front for the initial visit and evaluation sealed the deal.

I was incredibly impressed with the speed of the program and the services provided by everyone involved, from the project management to the contractors to the staff at the bank doing the financing. I’m very happy with the results and I highly recommend BetterBuildings for Michigan!”

What Works & What's Next

Home retrofits require a personal investment into something largely invisible to most homeowners. Convincing homeowners and property owners to spend hard earned money is difficult and there is no easy solution. Anyone looking to take on such a task should account for the learning curve that will be necessary. It takes thoughtful planning, a host of partners, plenty of time, and application of these lessons learned.

What Works—Innovative Tests on Program Design

Smaller base packages combined with great interest rates and rebates encouraged investment in upgraded energy efficiency work. We began by offering large base packages but found that people were reluctant to go any further because the base package had satisfied their perceived energy needs. We changed the program design to offer smaller base packages in combination with other incentives.

Lower copay amounts elicited greater initial participation. In essence, lower copay amounts overcome any barrier to signing up for the program. We saw consistent decreases in signups as the copay amount increased.

Instant cash rebates and 0% interest rate for a ten-year term encouraged homeowner investments in energy efficiency work. People loved 0% interest for ten years and it allowed us to do deep work, especially when combined with instant cash rebates. But that incentive level was also costly to a program with a fixed budget. We changed incentives to offer 0% for two years *or* an instant cash rebate, rather than 0% (or other low interest rate options) *and* an instant cash rebate. The 0% rate created interest, but, when given a choice, it wasn't an option people chose often. Rather, nearly nine out of ten people who upgraded (88%) chose an instant cash rebate. About 10% of those who chose the instant rebate took out a loan at a 7% interest rate.

Sweeps take longer to administer than we initially thought. Both our residential and commercial work needed more time than the initial 4-6 weeks we'd planned for each area. Homeowners and building owners wanted more time to think about their decision and required more close support at each step of the process. Moreover, as staff, we needed time to adjust the program design to achieve maximum impact. Our learning curve was steep but we were still able to hit our stride early because we already had a financing structure in place.

Messaging must be based on what's important to the customer. In both the residential and commercial programs we found that potential participants were not very responsive when we framed our message around energy savings. We garnered more participants when we talked about comfort and lower heating and cooling bills—

basically, when we talked about what's important to the customer, not what's important to the program.

Lessons Learned

Aside from achieving major program impacts and learning a great deal about who is likely to participate in energy efficiency improvement work, we also better understand how to implement a program like this.

Seed and return. We had particularly good success in cities where we held a sweep, followed by a city-wide offering a year later. This approach of concentrated work, followed by time to let the experience sink in, and then offering it to a wider pool, was very effective.

Quality control. We maintained quality control in several ways. We monitored the program via weekly reports and conference calls or weekly meetings with contractors and regional staff. Close oversight and checks and balances were put in place to catch early issues before they became problematic, and ensure that program guidelines were being followed. In addition, we performed file reviews on all projects, conducted real-time or mentoring inspections on the first three projects of each contractor, and performed post-installation site inspections on 20% of the upgrade projects for each contractor thereafter. We put standards in place for contractors to fix issues we found. We also increased inspections and conducted mentoring inspections for enhanced supervision when required.

Utility cooperation. Utility rebates available in program areas were described and included in quotes to homeowners. In early sweeps, direct install items like CFLs and thermostats were provided by the local utility. Several utilities, including the two largest in the state, helped market the program through letters and e-mails to their customers, and by providing information on their website. In those matters, the utilities were strong partners. However, when it came time to collect utility usage data as part of the evaluation, it was difficult to get actual data from utilities. We obtained informed, signed consent for access to utility data from every participant, and our central office, staff, and data systems successfully passed information security audits in order to receive, store, and analyze the data. But as of the date of this report, the program has received utility usage data on fewer than one quarter of the homes that participated in the program. In the future, advocates should work on state energy commission open data sharing policies (available in some states, but not in Michigan) that allow access for research with homeowner consent.

Local trusted source. We often relied on a local trusted source to help win over community approval. But the local source can't just be the enthusiast; it has to be the enthusiast with credibility in the community.

Work through employers. Two regional coordinators saw success in running programs through large employers, like Grand Valley State University. Those sweeps benefitted from a built-in peer effect and an inherent trusted source.

Assess community readiness. Ideally, we would consider the following issues as part of community readiness: robust communication networks, trusted local champions, awareness of energy efficiency benefits, actions previously taken, and demographics of the housing stock and residents. We had strong participation rates when we returned to sweeps for a second round of work. It is also critical to match the program package to the community, as in the case of the low-income sweeps.

Set incentives to align with program goals. In order to gauge success, you have to know what you'd like to achieve. Having clearly established goals at the beginning of the program will allow for program elements, financial incentives, and budgets to be structured to align with the goals. We found that tightly lining up financial incentives with achievement objectives produced stronger overall results, especially when following by regular monitoring and adjustments when performance did not meet expectations.

Challenges

Challenge 1: Time to Action

Our original expectation in the residential program was that we would deeply penetrate small sections of neighborhoods (420 homes) in short bursts of 8-12 weeks. We wanted to go way beyond the early adopters to create communities of energy efficiency advocates. Our goal was to inspire 80% of these small neighborhoods to take action in a base package of offerings.

It became clear that moving people from no awareness of the benefits of energy efficiency to taking deep action and spending their own money to make improvements was going to take longer than anticipated. People needed time for the concept to sink in before they dipped into their pocketbooks. We subsequently lengthened the time in each sweep, up to a full year.

Challenge 2: Referrals to Low-Income Assistance Programs

We were timid to ask homeowners if they qualified, almost afraid to talk about personal information like income. We role played, changed our forms to have people check boxes when they thought they qualified, and changed our talking points so that it became just another question we asked as we signed people

Working with Employers

One sweep experienced notable success, primarily because the regional coordinator worked through a large local employer to offer program services.

Grand Valley State University posed an opportunity in that it employed many well-educated homeowners with financial stability who were likely to buy in to the program because it was presented through their employer. Rather than work through a local government or seek out credible neighborhood sources, GVSU became the trusted network hub.

GVSU saw above-average participation and somewhat high upgrade rates. Success was due to very low administration costs. The sweep did not require the same investment in marketing that other sweeps entailed. Person hours usually spent locating neighborhood sources and convincing local government to back the project were consolidated with GVSU.

The success justifies alternate models of targeting potential participants and consideration of other employers with a well-suited employee profile.

up. Just when we got better and the referrals were picking up, LIEEF ceased to exist due to a court ruling and a second avenue, the Weatherization Assistance Program (WAP), experienced substantial funding and staffing cuts that impacted the local agencies administering their support program. Our original plans included serving 20% of our targeted area with WAP and LIEEF funds, approximately 2,300 people, but due to the cutbacks we were only able to serve 250 people through these programs.

Challenge 3: Marketing to Inspire or Explain

When we first launched the program, our marketing materials were text heavy and focused on explaining as much as possible about what the program offered, including some of the technical details like how air sealing works. We found that it was just too much to explain in a brief moment when trying to catch someone's attention with a postcard, a knock on the door, or a phone call in the middle of dinner. We moved our material to focus on "inspiring action" and developed case studies with pictures of people from the target area, which were intended to get a more emotional response. Marketing experts know this, and have for a long time, but it took a fair bit of trial and error to get it right. And our outreach staff and contractors, who were so passionate about energy efficiency, learned over time how to inspire rather than explain and then only explain when the homeowner was ready to listen.

Challenge 4: Adjusting Incentives

The DOE established an overarching goal for all grantees of achieving 15% energy savings on average. Our initial base package of air sealing, duct sealing, direct installs, and an assessment was not, on its own, going to reach that benchmark. When we offered a larger base package, few people invested in additional energy efficiency measures. In order for people to become more vested and spend their own money, we had to change the incentives to align more closely with our goals.

Challenge 5: Commercial Green Fund Use

Driving demand for the commercial Green Fund loan program also turned out to be a significant challenge for the program. Building owners naturally gravitated towards the "free" grant money instead of a loan, and even owners who may have needed additional financing were able to tap into other sources (one of which was the Michigan Saves loan program, which we included with our marketing materials). Many program participants did not have a need for additional financing; or among those who did not end up participating, did not have an appetite for a loan. This was true even when the energy cost savings resulting from a project would cover the payment cost of the loan.

Unanticipated Impacts

Throughout the entire program, we learned as we went by revising, adapting, and sharing best practices. While these impacts were not part of our main program goals, our work produced extra results.

Impact 1: Collaboration wins.

In early sweeps, we were ineffective in the way we positioned our program in conjunction with utility programs. We stepped on each other's toes a bit, when the intention was to leverage rather than compete. Over time, we worked more closely with utilities. One e-mail blast from a utility to its customers generated over 700 leads in a few days. Collaboration helped us get better, faster.

Impact 2: Contractors improved their skills.

The program specifically chose to partner with local contractors in each community for energy assessments and efficiency work. Each lead contractor was required to have at least one person on the partnership team (including subcontractors) certified by Building Performance Institute Inc. (BPI) to conduct home energy assessments. With this skill, the individual assessor has a good grasp on the whole-home approach to reducing a household's energy use. However, some contractors lacked critical sales skills that the program relied on to secure commitments to upgrade from homeowners. They knew their subject (whole-home energy efficiency) extremely well, but needed to learn to focus more on addressing individual homeowners' needs and less on trying to educate them on the technical aspects. The program offered the contractors additional sales training and funding to attend the training. Not all contractors took advantage of this opportunity but those who did gained new skills in sales that will continue to impact their small, independent business into the future.

Spreading the Word

We met regularly with our stakeholder council and steering committee to share results through the end of the grant period, intentionally discussing early insights about the program in an effort to inform them of what worked and what didn't, so they can use our learning in their work.

We also will continue to distribute the model and lessons learned to others who may be in a position to replicate the program through speaking engagements and conferences, such as with the Midwest Energy Efficiency Alliance, Michigan Municipal League, and US DOE BetterBuildings Residential Network.

Sustaining the Change

There are at least six ways the program impacts will be sustained.

1. All participating homeowners and business owners will enjoy the benefits of living or working in a more comfortable, less costly, and potentially safer environment. The homeowner or business owner now has a roadmap that shows what can be done to further improve their building's efficiency. And if they've taken the next step of deeper energy efficiency, they will enjoy the benefits long into the future.
2. The thousands of homeowners we marketed to but who weren't ready to take the next step now have an awareness that they didn't have before. Therefore the lack of education is no longer as much of a barrier.
3. Contractors have experience they didn't have when this program started. They have learned techniques for improving their effectiveness in educating homeowners, describing the benefits, calculating financial returns, and ensuring quality, and have worked closely with teams to improve marketing to continue to grow their business after the grant is over. Several contractors expanded their businesses by adding staff and offices in new areas.
4. Credit unions serving the residential part of the program have increased the volume of loans—good, viable loans that have been shown to have very low default rates—and they have increased the number of customers they serve.
5. Teams from nonprofit organizations, townships, cities, counties, and utilities have experience in effectively marketing energy efficiency programs to homeowners and business owners, which will put them in a good position to continue this work in its next iteration.
6. Collaboration among a diverse set of stakeholders to address a market need will continue because the relationships have developed to the point where the various stakeholders see value in the collaboration and ability to learn from each other.

Most, if not all, of these effects can last well into the future.

Sustainability of Program Infrastructure

Michigan Saves will continue to offer financing, maintain a network of authorized contractors, and drive demand for the foreseeable future. One of the primary sustainable impacts is the loan loss reserve, which reduces the risk to the financial institutions issuing loans by providing partial funding if a loan recipient defaults. The loan loss reserve backs loans issued both during and after

the program, thereby extending the program reach to serve Michigan homeowners long into the future.

A Sweep Tool Kit will be available to anyone who would like to use it and will be maintained through 2013. If communities, organizations, government entities, or others would like to be supported by teams of experienced resources as they implement their own programs, Michigan Saves staff and a network of nonprofit partners may be available for hire.

Regional partners and several nonprofit organizations throughout the state, as identified in each of their own strategic plans, will continue to work with organizations to support energy efficiency programs. These programs can be funded through many sources, including utility energy optimization programs, contractor-funded marketing programs, and local communities or organizations.

The Southeast Michigan Regional Energy Office will continue to promote energy efficiency and renewable energy development to Michigan's residents, businesses, and public institutions. The office advances this market through a variety of services, including information dissemination, technical and financial assistance, and demonstration projects. Partly as a result of this program, the office has grown to include 25 local governments, which represent over 10% of the state's population, with a commitment to ongoing energy improvement.

The commercial program has several avenues for continued growth. Over the course of the last three years, there have been multiple financing mechanisms developed to address the barrier of finding money to support these improvements. A revolving loan program for public and private entities to make energy efficiency and renewable energy improvements is available through the Michigan Energy Office. The Michigan Saves Business Energy Financing program serves the small commercial market and the multifamily market. A third option is the Green Fund, a loan fund that serves commercial building owners in the city of Detroit with loan capital. Staff from the Economic Development Corporation of the City of Detroit will continue to support business owners and their use of the loan program by marketing to them, offering consulting services, and brokering audit services.

Historic Waiver

People who engage in energy efficiency home improvements know that the biggest impact can be made on older homes, yet it is those same homes that are often protected under historic home regulations that require paperwork and permission for improvements to take place.

The program was able to circumvent the typical lengthy regulation process by entering into an agreement with the Michigan Department of Energy and the Michigan State Historic Preservation Office. The agreement specified the types of home improvements that could be made under the program, which were exempt from Historic Preservation Office consultation and included documentation to be completed for each house receiving the exemption.

The waiver can be located online and adapted for use by other entities.

Appendix A: Sweep Names

This list provides the name of each sweep where we operated, grouped by the three regional coordinators. Names with an asterisk were operated in conjunction with a local employer. Those including the term “Expansion” indicate a large geographical area that typically represented an entire city or township.

Grand Rapids	Alger Heights
	Creston
	Eastown
	Grand Rapids Expansion
	Grand Valley State University*
	Oakdale
	Riverside Park
	Westside
Non-Entitlement Communities	Bath
	Dewitt
	Marquette North
	Marquette South
	Sturgis
	Three Rivers
	Traverse City 1
	Traverse City 2
	Wyandotte
	Wyandotte 2
SouthEast Michigan Regional Energy Office	Beaumont Hospital*
	Southeast Michigan Businesses*
	City of Farmington Expansion
	Compuware*
	Dearborn Expansion
	Detroit Air Sealing
	Detroit Diesel*
	Detroit Expansion
	Eastpointe Expansion
	Ferndale
	Ferndale Expansion
	Grosse Pointe Expansion
	Grosse Pointe Shores Expansion
	Grosse Pointe Woods Expansion
	Hazel Park Expansion
	Highland Park Expansion
	Hubbard Farms
	Huntington Woods Expansion
	Lathrup Village
	Lathrup Village Expansion
	Lincoln Park Expansion
	Madison Heights Expansion
	Mount Clemens Expansion
	River Rouge Expansion
	Rosedale Park
	Roseville
	Roseville Expansion
	Royal Oak Expansion
	Saint Clair Shores Expansion
	South Lyon Expansion
	Southgate
	Southgate Expansion
	Sterling Heights
	Sterling Heights Expansion
	Team Detroit*
	Warren Expansion
	Washtenaw County
	Washtenaw County - Choice
	Wayne Expansion
	Ypsilanti Expansion

Appendix B: DOE Six Pillars of Best Practice

This appendix outlines best practices that could be shared publicly and in future programs that address all six pillars of the program, as defined by the DOE:

Pillar 1: Institutional Design and Business Model

Our best practices related to this pillar include:

- We had a lot of the right partners involved, including many nonprofits.
- We composed a steering committee and a stakeholder council to guide our development.
- We focused on setting overall goals at the statewide level (coordination), while making as many decisions as possible at the local, regional coordinator level (implementation). We relied on the advocacy of people on the ground in the areas where we worked. We valued being community-based and we worked with many local partners.
- We centralized data reporting to DOE and program finance operations—but let each community choose its own software and business approach to tracking and serving its residents.
- We had the right staff on board, who had been embedded in the community for a long time, had existing networks in place, and knew who to call.
- We were able to take the variety of existing related programs and coordinate them into one.
- There was statewide recognition of the importance of public policy in large-scale change. Our financing organization, Michigan Saves, was created as a result of public policy that supports energy conservation.

Pillar 2: Program Design and Customer Experience

Our best practices related to this pillar include:

- Our initial criteria list for site selection was a helpful guide for ensuring that the program would work when implemented.
- Although we initially expected short and intense sweeps, we learned that potential participants needed more time, both to decide whether to participate and to be led through the process.
- We strove to align our message and our incentives to the end goal of increased energy efficiency. In some cases, this meant revising the program design to make it available to people who could not otherwise participate.
- We adopted a “test and learn” methodology for our program design by intentionally varying aspects of our program to see the effect on sign up and upgrade rates and energy savings and modifying future sweeps based on what we learned.
- We learned that community readiness was a key component to a successful sweep. Communities needed a local champion and some previous exposure to some aspect of our

work. Indeed, when we returned to a community for a second sweep, our signup and upgrade rates were strong.

- On the commercial side, we learned to give a lot more handholding than we thought property owners would need. We took time to explain how to make a decision to invest in energy efficiency, how to get a contractor, etc. We even hired an energy coach for additional support to guide property owners through the process.
- In the commercial side of our work we discovered that the size of the business we worked with mattered. Smaller businesses did not have the capacity and resources to go through the process of obtaining a loan, dealing with required paperwork, and managing the process to the end.
- Our commercial arm didn't lead participants to a network of contractors, as in the residential program. This required a bit more legwork on the part of the property owner but removed the responsibility of contractor oversight and training from our tasks.

Pillar 3: Driving Demand

Our best practices related to this pillar include:

- We talked about the range of program participation with homeowners. When we were upfront about the cost of upgrades, homeowners were more likely to adopt our recommendations.
- We found that our marketing efforts were less successful when we focused on energy savings. We were more successful in the commercial program when we talked about money and how much we could save a property owner. With homeowners, we were more successful when we framed the message around comfort, health, and safety.
- We looked at a variety of definitions of community in order to define a sweep and begin work. No single definition would work in all areas across our state.
- We successfully drove demand when we used a large employer as the basis for a sweep. Work location provided the common link among participants and that gave us more opportunities to reach potential participants and a built-in referral network.
- The more marketing channels we could use, the better our participation rates.

Pillar 4: Workforce Development

Our best practices related to this pillar include:

- We provided training for our contractor network in both sales and technical skills.
- We set expectations and standards for contractor performance and contractors met them. We established incentives to achieve the desired performance metrics.
- We built close contractor quality control and monitoring systems with tight feedback loops that let us adjust contractor incentives or terminate unsatisfactory contractors quickly.
- We implemented a programmatic review of the contractor work being done in addition to our regular quality control measures.

- We communicated regularly with contractors, and asked for feedback to incorporate into program improvements. This created a strong working relationship between contractors and program staff.

Pillar 5: Financing and Incentives

Our best practices related to this pillar include:

- We offered various levels of incentives to encourage deep energy efficiency work.
- We offered some participants 0% interest loans to make engagement with us more affordable. We purchased the buy-down from the standard 7% interest rate with grant funds.
- We offered rebates for engaging in upgraded energy efficiency and worked with local utility companies to make homeowners aware of utility rebate programs.
- Our work fell into place early because we had an operational financing structure in place when the grant began. It would take other programs longer to cover as much ground unless they set up a financing structure before launching the work.
- We established a loan loss reserve, which has and will continue to leverage the financing dollars to make more loans possible.
- We understood the need to balance the size of customer incentives with our ability to serve the number of homeowners and commercial property owners we wanted to serve.

Pillar 6: Data and Evaluation

Our best practices related to this pillar include:

- We identified the metrics we wanted to track to determine whether our program was producing the results we expected. We tracked performance regularly, and shifted our program design as we identified ways to improve the program.
- In both the commercial and residential programs, we struggled with the fact that there are a variety of ways contractors determine energy savings. We recommend developing a standard methodology for estimating energy savings for use in marketing to potential customers, and to calculate the impacts of the energy efficiency work.
- We had data sharing agreements in place with utilities and required homeowner consent to use their utility data for evaluation purposes.
- We built a central database for participant information, populated by us and our contractors.
- We made program operations easy by integrating a tight data system to track day-to-day activity, with buy-in from our contractors. We were able to quickly follow up with referrals, who appeared to have a higher rate of upgrading than people to whom we marketed directly.
- We designed systems to gather and monitor data, and we informally reviewed the program at various stages, which helped us address challenges and accomplish our goals. We would have, however, liked to conduct systematic interviews with contractors and midterm interviews with staff, and analyze early results from our tracking system to better steer the program early on. We recommend investing in an early evaluation for learning and development.

Appendix C: Data Collection Methodology

Energy Savings Measures

Contractors collected information about the home during the initial assessments. Information regarding work completed in the home was collected on specification sheets that were submitted to the program. Homeowners were asked to give permission for the program to collect utility bill information directly from their utility. In addition, quality control reviews were completed on a portion of the jobs. Still, we ended up with missing data for some variables.

Data from the commercial program was collected by contractors performing the work, by energy audits completed by program staff or by independent auditors, and through quality control reviews.

Follow-up Surveys—Residential Program

The residential program engaged the Office for Survey Research (OSR) at Michigan State University to design and conduct telephone interviews with all of the householders in each sweep—both those who chose to sign up and those who declined or were unresponsive.

Data about owner-occupied housing was made available by grant recipients from townships, cities, counties, or municipal utilities. We supplemented this with Census data. In each sweep, the coordinator responsible for conducting the sweep would develop a database of all addresses in the sweep area and, if possible, the names and phone numbers of the individual householders. As the sweep progressed, regional coordinators would designate the outcome status of each household, that is, ineligible, vacant, unresponsive, declined to participate, participated by choosing the base package only, or agreed to make additional modifications (upgrades) as recommended after the base package assessment. Regional coordinators also collected information about how homeowners heard about the program as they signed people up.

Databases for the sweeps were provided to OSR either at the conclusion of the sweep or at mid-sweep (hence, partially completed). The mid-sweep updates avoided a large backlog of homes to call but created the possibility for a subsequent change in status.

As a practical matter, OSR could only attempt to contact the households for which the regional coordinators were able to provide household phone numbers. In most sweeps, the coordinators could not provide phone numbers for houses that could not be contacted by the sweep teams or for many of the homeowners who chose not to participate in the program at all. Nearly all the homeowners who did choose to participate in the program provided phone numbers.

Having the phone number did not guarantee cooperation in completing an actual interview. Although OSR interviewers tried to contact all homeowners in each sweep for which we were given a phone number, interviewers were able to complete interviews with appreciably less than 100% of these

householders. Also, program participants were more likely to complete an interview than non-participants. OSR attempted to complete the interviews with householders in each sweep within two to three weeks after the conclusion of the sweep.

OSR conducted the surveys of sweep households as computer-assisted telephone interviews (CATI). OSR uses CASES 5.5 as its CATI system. OSR interviewers made calls throughout the day and evening hours during the two-week period, although calling was heavier in the evening and on weekends.

OSR sent an advance letter to each household for which a phone number was provided. The letter advised the householders that they would receive a call from one of our trained interviewers and explained the purpose of the call. Householders who had declined to participate in the program were told they would be offered a $10 gift card upon completion of the interview. Interviewers were instructed to make up to nine call attempts to contact each household before assigning a final outcome disposition.

The average interview with those who chose to participate in the program took approximately 15.4 minutes. Interviewers had to make an average of 7.0 call attempts to complete the interviews with program participants. An average of 6.1 call attempts were made to program participants that could not be reached or who refused to complete the interview.

The average interview with householders who chose not to participate in the program took 9.5 minutes. Interviewers had to make an average of 3.0 call attempts to complete the interviews with non-participant householders, and made an average of 5.0 call attempts to non-participant householders who could not be reached or refused to complete the interview.

The interview included questions regarding all the potentially relevant characteristics of each home (such as age, history of energy-saving improvements) and the householder (such as age, sex, race, education, marital status, income, employment status), along with questions about how they had heard about the program. Survey respondents were asked why they did or did not choose to participate. Additionally, interviewers asked respondents about making energy saving modifications to their homes and about their interactions with program representatives and contractor.

The regional coordinators were asked to use a 5-point scale (1=low, 5=high) to assess the strength of the neighborhood association, the local government's support or cooperation for the sweep, and the local media's coverage, support, and cooperation with the sweep.

Subsequently, the regional coordinators provided through the project manager an updated listing of all households that were to be officially classified as upgraders. OSR cross-checked these against the householders with whom interviews had been completed. The official listing of upgraders included 1,032 householders. Of these, nearly six out of ten (595) had completed interviews.

In the interview with householders who had signed up to participate in the program, interviewers asked if the contractor had yet installed the base package and if a team member had completed the energy audit of the home. If so, interviewers asked whether the contactor had reviewed the audit results with

the householder. If the contractor had, interviewers asked whether the contractor informed the householder of any other improvements that would reduce energy bills; and if so, the householder was asked whether they had decided to make some of the recommended changes. Interviewers asked what specific changes had been recommended and which of these the householder had decided to make.

More information about the results of our interviews and our multiple regression analysis, which examined demographic factors associated with participation and upgrading, can be found online.

Energy Savings

The contractors for the residential and the commercial program estimated the amount of energy savings per year when they filled out their forms after completing a job. It is important to note that these are *estimated* savings. Access to actual energy data was not available, despite state agreement and homeowner consent.

	Residential*	Commercial	TBTUs	CO_2 Tons
kilowatt hours	7,521,125	12,975,212	.07	14,461
therms	1,663,194	1,223,878	.29	15,319
	14% average savings	31% average savings		
Total			**.36**	**29,780**

*Residential energy savings based on 9,771 primary and secondary projects captured in the contractor database. Tertiary projects could represent an additional 0.04TBTUs of energy savings if energy savings averages are consistent with projects captured in the database, and are not represented in these numbers. We chose to use a conservative estimate of energy savings by not including these 1,800 projects in our energy savings totals.

Using EIA figures we used a translation to BTUs by multiplying kilowatt hours by 3,412 and therms by 1,000. To calculate TBTUs, divide BTUs by a trillion. We used the EPA site: http://www.epa.gov/cleanenergy/energy-resources/calculator.html#results to calculate tons of carbon dioxide and the more tangible figures like number of passenger vehicles.

While the anticipated energy savings percentages fell within the expected range of 15% energy savings, the total first year energy savings fell short of expectations. Total commercial and residential savings are estimated at 0.36 TBTUs, approximately half (49%) of the original energy savings goal. As we described earlier, we fell short on our work with the weatherization assistance programs and changed our base package offer to incent deeper retrofits, which also contributed to our shortfall. The life of most improvements is anticipated to be ten or more years. We will reach the original program goal for energy savings—but it will take us the first two years of energy savings instead of the first year alone as projected.

Commercial energy savings were estimated using either a modeled or deemed approach, and based on assessments conducted for each building. The commercial energy savings percentage was calculated by using an average across the entire portfolio. Residential portfolio used an average energy savings methodology, as described below.

Residential Energy Savings Methodology

Modeled Data. Of the 7,689 records available for analysis for determining overall savings of program activities, 2,935 had modeled data provided by contractors through energy audits. Analysis of the data provided for these 2,935 projects indicates an overall savings of 19.66%. This is based on a "cap" of no more than 50 percent energy saving for any project, with the rationale that very high energy savings are unrealistic and most likely the cause of data entry error.[1] Likewise, projects that did not provide either a percent savings or a total electricity or a gas savings amount could not be included in this data analysis.[2] This is compensated for by using statewide averages base on the home's square footage.

Deemed Data. Another method used to calculate percent savings for the overall project is to estimate the deemed savings based on the Michigan Energy Measures Database (MEMD). The MEMD was created as a basis for development of initial energy efficiency savings calculations and potential savings for energy efficiency programs. The MEMD was purchased by gas and electric providers in Michigan and incorporated into the development of provider-specific Energy Optimization (EO) Plans.

These estimated savings per project were then compared against the Michigan average energy consumption for electricity and gas in BTUs based on the specific home's square footage.[3] Average Michigan energy consumption per square foot was chosen as a more accurate representation of the variety of homes in the program, as opposed to simply one statewide average consumption number. The total BTUs saved and average starting point were used to calculate the percent savings for each home. Using this method, estimated savings could be calculated for 7,296 of the 7,689 projects. Using a "cap" of 50 percent energy savings, the average percentage saved for properties was 11.87%.

Overall Estimated Savings Percentage. Whereas the modeled data may over estimate the percent savings if not all identified measures were installed, the deemed data provides a very conservative estimate because deemed savings estimates use current building code as baseline data. In most cases, energy saving measures that were replaced in this program were **less** energy efficient than current code, thereby understating the energy savings estimates.

Since both methods are incomplete, we used a blended approach to best reflect the work conducted. Deemed energy savings estimates and Michigan average energy consumption for the homes based on square footage were utilized when modeled data was unavailable or incomplete, and finally, average estimated percent savings based on the scope of work was applied to remaining properties with missing

[1] For example, several projects reported savings percentages greater than 100 percent. The majority of savings are below the 50 percent level.

[2] There were 743 projects that provided total saved BTUs, but did not provide a percent savings that would allow us to calculate a starting BTU level for analysis. In subsequent analysis, these missing starting points were filled in with Michigan averages for the size of house in question.

[3] Source: U.S. Energy Information Administration, Office of Energy Consumption and Efficiency Statistics, Forms EIA-457 A and C-G of the *2009 Residential Energy Consumption Survey*. Household Site Fuel Consumption in the Midwest Region, Totals and Averages, 2009 British Thermal Units (Btu), Final: Table CE2.3

data.[4] By utilizing these steps, all 7,689 properties were included in the overall savings calculation. Using the blended approach, total average savings is estimated to be 14.1%, using the 50 percent savings "cap." The properties are estimated to have a total starting electricity and gas usage of 1,103.6 BBTU and a total electricity and gas saved of 147.6 BBTUs.

Using a similar methodology, energy savings estimates for the secondary source of leveraged programs, the Michigan Saves Home Energy Loan Program representing 2,082 projects resulted in 16.8% energy savings. The properties are estimated to save 44.2 BBTUs.

In total, the 9,771 projects in this database are estimated to save 191.8 BBTUs, representing a total energy savings estimate of 14.6% portfolio-wide. If average energy savings are applied to the additional 1,530 Weatherization projects, Wyandotte WIRES projects, and 270 tertiary leverage projects, we expect a program-wide residential savings total of 227 BBTUs.

Cost Savings

Residential cost savings per home were calculated by taking the average energy savings in kilowatt hours and therms and multiplying those figures by current energy rates.

	Base package	Detroit Air Sealing	Upgrade package	2nd level work	Total cost savings estimates
Dollars saved due to electricity savings (@$0.154/KwH)	$62.22	$65.45	$84.70	$95.90	$907,102
Dollars saved due to gas savings(@$0.875/therm)	$75.25	$109.38	$214.38	$127.18	$1,435,619
Total	**$137.47**	**$174.83**	**$299.08**	**$223.08**	**$2,342,721**

NOTE: Used Bureau of Labor Statistics figures for energy costs in the Detroit area, as of January 2013. http://www.bls.gov/ro5/aepdet.pdf.

Commercial costs savings varied significantly by project scope, and were estimated by contractors after the work was completed using deemed savings or modeled energy savings estimates. The table below shows total estimated cost savings per year.

	Commercial Program
Dollars saved due to electricity savings	$1,998,183
Dollars saved due to gas savings	$1,070,893
Total	**$3,069,076**

[4] Of the 7,689 properties, 2,935 had completely modeled data, and an additional 3,962 had either deemed data/Michigan averages or a combination of the deemed data/Michigan averages and modeled data provided. A total of 792 properties had no modeled or deemed data available. To estimate the percent savings for these properties, an average percent saved for properties with a similar scope of work was calculated and applied to the properties with missing data.

Jobs Created

Jobs were calculated based on the number of estimated hours worked per project through Q4 2012 for both contractors and project administrators, following American Recovery and Reinvestment Act guidelines http://www.recovery.gov/News/featured/Pages/Calculator.aspx.

	Residential Jobs	Commercial Jobs	Total Jobs	
			#	%
Contractor	982.9	51.8	1,034.7	32.2%
Program development, management, marketing, quality assurance, and administration	2,150.9	28.7	2,179.6	67.8%
Total Jobs	3,133.8 (97.5%)	80.5 (2.5%)	**3,214.3**	

Default Rates

Consumer loan default rates were taken from the Federal Reserve banks, quarterly figures, averaged over the eight quarters of 2011 and 2012. See http://www.federalreserve.gov/releases/chargeoff/delallsa.htm.

Initial Participation

Median income for the state of Michigan was taken from Census figures averaging 2004-2011, obtained at http://quickfacts.census.gov/qfd/states/26000.html.