

# Improving Institutional Access to Financing Incentives for Energy Demand Reductions

**Masters Project: Final Report**  
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## **ABSTRACT**

We developed this project in response to a growing local-level demand for information and guidance on accessing local, state, and federal energy financing programs. Knowledge regarding these programs is currently scattered across independent websites and agencies, making it difficult for a lay user to identify available options for funding energy efficiency efforts. We collaborated with The Ecology Center, an Ann Arbor nonprofit, to develop an information-based tool that would provide tailored recommendations to small businesses and organizations in need of financing to meet their energy efficiency aspirations. The tool was developed for use by The Ecology Center along with an implementation plan to strengthen their outreach to local stakeholders and assist their efforts in reducing Michigan's energy consumption. We researched and analyzed existing clean energy and energy efficiency policies and financing opportunities available from local, state, federal, and utility entities for institutions in the educational, medical, religious, and multi-family housing sectors. The design and content of the tool and its accompanying educational materials was influenced by a series of social surveys and interviews conducted with local business and nonprofit representatives. The surveys and interviews revealed the level of existing institutional knowledge on energy efficiency, local barriers to accessing financing and implementing projects, and the motivations and concerns of individuals regarding efficiency upgrades. The resulting information tool will help fulfill the project's goal of improving accessibility to energy efficiency financing for qualified stakeholders in Washtenaw and Oakland Counties

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## INTRODUCTION

Climate change mitigation requires a reduction in greenhouse gas emissions (GHG). Reducing the energy demands of our nation's building stock serves as "low-hanging fruit," because of the favorable ratio of implementation costs to potential energy savings and GHG emission reductions. Despite the high potential for benefits, and proliferation of supportive policies and financing incentives that are designed to support this transition towards a more energy efficient building stock, several structural and behavioral barriers persist that complicate technology uptake. Chief among these challenges are limited information and high transaction costs associated with gaining information about upgrade and financing opportunities. This pervasive lack of awareness or adequate knowledge can manifest as confusion, frustration, or a lack of confidence for business owners and complicates their ability to effectively identify and enroll in available programs. Barriers are particularly challenging for small businesses and nonprofit organizations that do not have access to the more typical loan and grant opportunities provided.

The Ecology Center of Ann Arbor, MI approached students at the University of Michigan to design a Financing and Technology Toolkit (toolkit) in the hopes of addressing some of these barriers and catalyzing the transition towards more energy efficient commercial and residential buildings in Southeast Michigan. This master's project sought to tackle the knowledge gap through the creation of the informational resources detailed within this report. This report focuses on local, state, federal, and utility-level programs that provide financing for energy efficiency and small-scale renewable energy projects due to the prominent role funding plays in whether a project is carried out.

### *Goals*

Our overarching goal was to work with the Ecology Center to improve the accessibility of energy efficiency information and funding opportunities for small businesses and community organizations in Southeast Michigan. To achieve this we needed to learn more about this target group of stakeholders, the range of funding opportunities available to them, and how best to reach them. To attain these goals, we identified the following discrete objectives:

### *Objectives*

- 1) To research and analyze existing clean energy and energy efficiency policies and financing opportunities available to educational, health care, religious, and multi-family housing institutions at the local, state, federal, and utility levels.
- 2) To learn through a business community survey and a literature review the current institutional knowledge surrounding energy efficiency, which barriers to improving energy efficiency persist locally, and why and how institutions choose to explore energy efficiency options.

- 3) To apply the business community survey results and policy research toward the creation of an energy financing toolkit that provides guidance to local educational, health care, religious, and multi-family housing institutions on the best energy efficiency projects and financing opportunities available to them based on their eligibility, energy needs, budget, and long-term planning goals.
- 4) To pilot-test this toolkit to enhance the Ecology Center's ability to inform and communicate with local stakeholders on options for reducing energy consumption and pursuing clean energy projects.
- 5) To develop an implementation plan for the Ecology Center to strengthen their efforts to promote clean energy solutions in Michigan. The plan would include action items to improve messaging and community outreach strategies to solicit engagement with the financial toolkit.
- 6) To provide recommendations on ensuring the long-term accessibility, integrity, and utility of this project's outcomes and next steps to inform future projects.

The following report is divided into six major sections. The *Background* section provides a summary of the energy efficiency sector, potential benefits tied to energy savings, and the current barriers that persist in highlighting the need for this project. The *Project Design* section provides a graphical representation of the project, and its three pillars of research and outputs. We then launch into the methods and results for each of these three pillars; the *Business Community Survey*, the *Financing and Technology Toolkit*, and the *Implementation Plan*. We end the report with a *Discussion* on some of our findings and implications for the Ecology Center as our client moves to implement our materials.

## **BACKGROUND**

### *Climate Change Mitigation*

Climate change is a leading driver behind emerging energy and resource management policies world-wide. Scientific evidence shows the impacts of climate change are already occurring in the form of more frequent and/or intense extreme weather events, heavier rainfall, longer periods of heat, and more severe floods and droughts. The warming global climate is also accelerating the melting of glaciers and Arctic sea ice, putting coastal populations at risk from rising sea levels. In addition, oceans are becoming more acidic as they absorb the excess carbon dioxide in the atmosphere. The collective impacts from these factors are disrupting people's lives and harming economic sectors today, while laying the groundwork for catastrophic consequences for humans over the next century (U.S. Global Change Research Program, 2014). Driven by rising concentrations of GHG in our atmosphere, mitigation of these impacts will require the reduction of GHG emissions resulting from human activities. GHG reduction stands to dictate electricity generation, transportation, and many other facets of daily life in the future.

The multifaceted nature of climate change and its impacts makes it an especially challenging target to address through broad policies. This leaves a gap between conditions in the field (be they socio-economic, environmental, or technical) and the policy tools available to the public and private sectors in responding to issues related to climate. The closure of these policy gaps can be even more difficult depending on the degree of politicization of the issue, general state of the economy, availability of federal program funds, and the environmental predilections of the party in power at the time. One avenue for overcoming these political realities is the pursuit of policies dealing with businesses, homeowners, and other large groups of building-owners.

County and municipal governments operate at a different scale than the federal government when dealing with climate change. Despite the trans-boundary nature of both GHG emissions and their effects on the planet, solutions must still be tailored to each region. Impacts vary by geography, demographics, adaptive capacity, and economic trends – “one size does not fit all” when dealing with climate change. Likewise, local policymakers have a limited capacity (budget, personnel, expertise, infrastructure) to implement meaningful mitigation measures in order to do their part to reduce global GHG emissions. Out of legal and geographic necessity, local-level mitigation has to focus on components that are “in the neighborhood” and often showcases buildings and energy usage. The result in the United States has been a patchwork of similar, yet distinct programs across major metropolitan regions designed to re-shape both the carbon footprint and energy consumer behaviors over the long-term. City-wide emission reduction goals serve as anchors to programs meant to shift energy trends in specific sectors (industry, residential, commercial). These factors have led to the creation of many government or utility-funded programs intended to motivate property owners and renters to reduce their energy

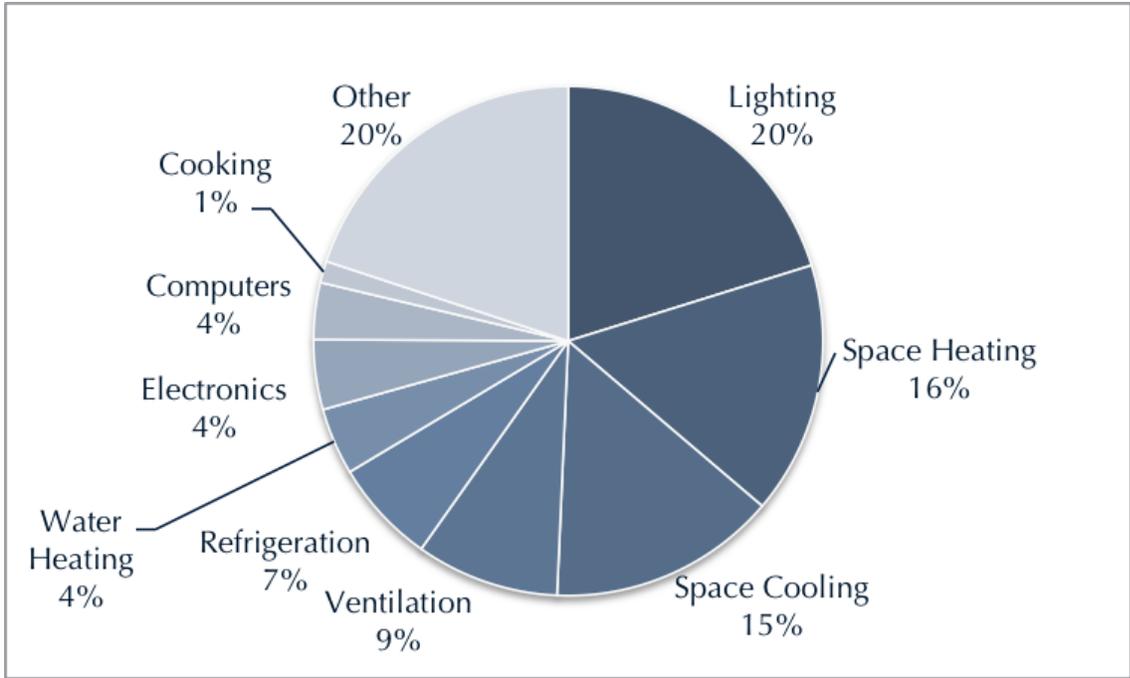
consumption. This includes green mortgages, low-interest loans for property improvements, energy efficiency and pollution prevention grants, as well as utility sourced rebates that compensate a portion of the costs associated with EnergyStar appliances.

### *Human-Sourced GHG*

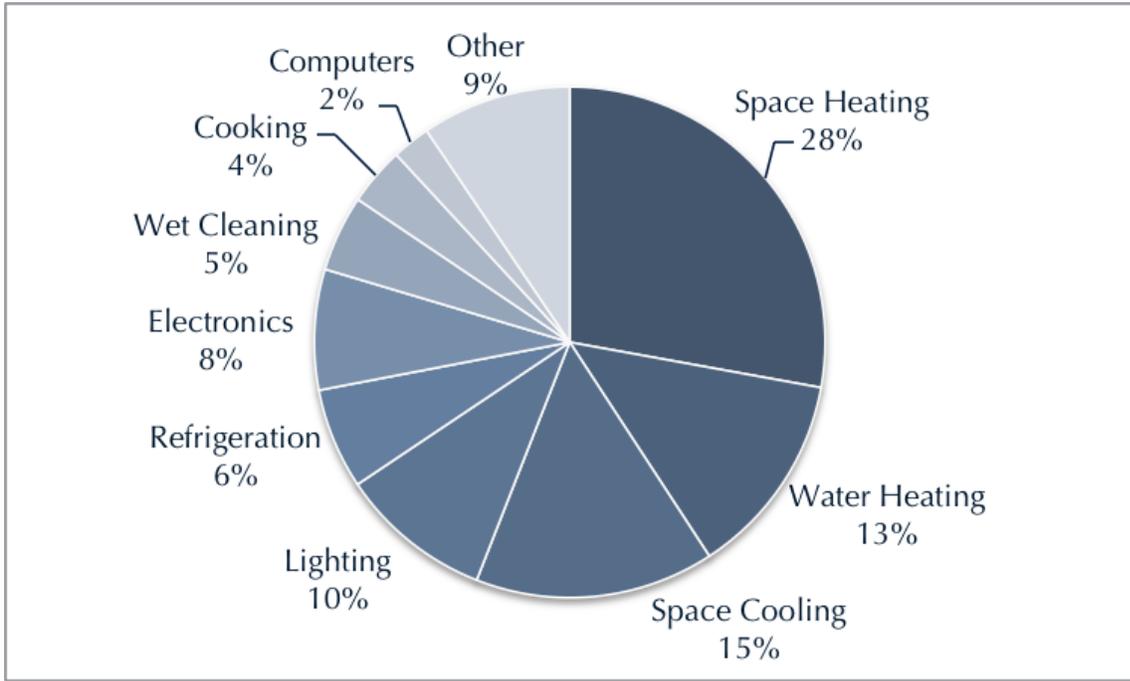
The design, use, and construction methods of buildings accounts for a substantial portion of the demand for this emissions burden. Energy consumption from the commercial and residential sectors, known collectively as the building sector, accounts for nearly 40 percent of total U.S. energy consumption and GHG emissions, according to the U.S. Department of Energy's (DOE) Energy Information Administration. After a period of declining emissions, the building sector's GHG emissions have increased 6.3 percent just in the last two years (EIA, 2015).

In 2010, emissions attributed to commercial and residential buildings in the U.S. accounted for roughly 40 percent of total domestic CO<sub>2</sub> emissions and seven percent of global CO<sub>2</sub> emissions (Center for Climate and Energy Solutions, 2016). Buildings were also responsible for seven to eight percent of methane and nitrous oxide emissions that year. Emissions resulting from electricity consumption are the primary source of GHG in both commercial (67 percent of that sector's emissions) and residential buildings (76 percent of that sector's emissions). The commercial sector exhibits significant variety in terms of the size, energy intensity, use, and ownership of its buildings. Office space is the most prominent type, at 21 percent of the sector's total square footage and 22 percent of its energy consumption. Other major sectors include retail, education, and health care (Brown and Southworth, 2006).

The commercial and residential sectors' actual energy profiles are distributed across a variety of functions, as exhibited in Figures 1 and 2 below. In 2010, forty three percent of the commercial sector's energy usage consisted of heating, cooling, and ventilation. Lighting also accounted for a substantial portion at 20 percent. The remaining energy consumed by commercial buildings was spread across water heating, refrigeration, and specialized uses (electronics, computers, cooking, etc.). The residential sector also devoted 43 percent of total primary energy use to heating and cooling. Water heating (13 percent), lighting (10 percent), electronics (eight percent), and refrigeration (six percent) rounded out the typical usage profile for homes (Center for Climate and Energy Solutions, 2016).



**Figure 1.** Commercial Buildings Electricity Usage, 2010 (Center for Climate and Energy Solutions, 2016)



**Figure 2.** Residential Buildings Electricity Usage, 2010 (Center for Climate and Energy Solutions, 2016)

### *Methods to Reduce Energy Demands Within the Building Sector*

The variety of ways buildings consume energy can make it challenging to pinpoint solutions, but also presents a range of opportunities and strategies for reducing energy demands of the building sector. Energy demand reductions can be categorized across a continuum of strategies from strict curtailment, to efficiency installations, to on-site renewable energy generation, which increase progressively in costs and complexity as one moves from the former to the latter. Throughout this document we will refer to this tripartite collection of strategies collectively as CEG, or “curtailment, efficiency, and generation,” activities to reduce building stock demands for energy.

Curtailment, also known as conservation, describes a set of actions and behaviors that building occupants can engage in to reduce their energy consumption. Energy efficiency is distinct from energy curtailment in that efficiency measures are often heavily technological in nature and allow businesses to continue as usual at a lower energy budget. Curtailment measures, by contrast, involve some form of restriction of behavior or use that leads to a lower energy budget. Energy efficiency is a measure that “delivers more services for the same energy input, or the same services for less energy input” (International Energy Agency, 2016). Alternatively, efficiency can be defined as something that displaces demand, such as the displacement of fuel-coal necessary to meet demand for electricity (American Council for an Energy Efficient Economy, 2015).

While energy efficiency strategies allow people to reduce the GHG surplus while still meeting their energy needs, researchers have found that individuals are far more likely to identify highly visible curtailment measures as options to reduce energy consumption instead of the less visible efficiency upgrades (Gardner and Stern, 2008). The drawback in this is that curtailment behaviors are more challenging to sustain and are not as impactful on the GHG emissions reductions outcomes. Technological solutions for enhancing efficiency can help overcome some of these behavioral hurdles associated with curtailment. Efficiency upgrades for both commercial and residential buildings include light bulbs and fixtures, insulation, building materials, as well as heating, ventilation, and air conditioning systems (HVAC).

A key feature in energy efficient design is the “building envelope,” defined as the interface between the interior of a building and the outdoor environment (Pew, 2009). Insulation performance, the quality of the seals on gaps and crevices, and window characteristics also factor into a building’s envelope. These traits directly impact the flow of air into and out of the building, thus significantly influencing the amount of energy expended by the HVAC system. For instance, upgrading the performance of a building’s windows and insulation translates into a reduced burden on HVAC equipment, which could then be downsized to save money. Lighting is another major source of energy demand in buildings. Behavioral curtailment, such as turning

lights off when they are not in use, can be reinforced by installing motion, time, and photo-sensors to automatically switch off unused lighting (Pew, 2009).

Another distinct aspect of energy use for a building, particularly new construction, is its life cycle impact or “embodied energy,” meaning the energy required to obtain, manufacture, install, and ultimately dispose of the materials that make up the building itself. A building’s design influences the amount of embodied energy needed to construct a building, as well as the energy it consumes over a lifetime of use. Designs mindful of energy efficiency can reduce the amount of lighting, heating, and cooling a facility may require to meet the needs of its tenants. Improved architecture and engineering methods are a significant means of lowering the energy demand of the building sector in the future. Building size plays an additional role in a structure’s energy demand, as larger buildings tend to require more energy to meet their lighting, heating, and cooling needs. Notably, residential buildings in the U.S. have seen an increase in size over time (Pew, 2009).

A building’s energy efficiency is the summation of numerous factors that go into developing a project, including everything from the choice of insulation and windows to lighting and thermostats. These decision points are crucial to any building, whether it’s new construction or a renovation of an existing structure. Decisions made early on can make the difference between a cost-effective, energy efficient facility and one with an outsized operations cost due to inadequate energy management features.

#### *Potential GHG Reductions*

Although the building sector is sometimes overlooked in the climate change mitigation dialogue, CEG strategies to reduce the energy demands are typically viewed as the “low-hanging fruit” within any effort to reduce GHG emissions. Compared to the resources required for transitioning nation-wide baseload electricity generation from fossil fuels (coal, natural gas) to renewables (solar, wind, geothermal, hydro), reducing on-site energy demands requires much less capital cost, little to no operating cost, and is generally far more attainable for local-level users. Furthermore, many efficiency measures can be installed within existing infrastructure and facilities in the form of retrofits and technology upgrades.

The continued development of the efficiency sector has the potential to lower energy consumption by 9.1 quadrillion BTUs by the year 2020, reducing the demand for energy by 23 percent. This large reduction in consumption would prevent the annual emission of 1.1 gigatons of GHGs. Industrial buildings represent 40 percent of all end-use efficiency potential, while the residential and commercial sectors stand at 35 percent and 25 percent, respectively (Granade, 2009). By utilizing existing commercial technologies, energy consumption for old and new

buildings can be improved by an estimated 30 to 80 percent over its lifespan with the potential of producing a net profit for investors (EIA, 2015).

### *Sector-Specific Potential*

Multi-family housing is a particularly ripe part of the buildings sector when it comes to energy management. However, multi-family buildings tend to receive less attention than other residential buildings and typically feature 34 percent fewer efficiency measures than other types of housing. Funding for multi-family housing tends to be more scarce in most states compared to other sectors, relative to the proportion of the total housing stock it represents. This issue is compounded by the fact that multi-family buildings are home to a higher proportion of the country's low-income residents, who would reap the greatest benefits from efficiency upgrades. On average, multi-family households spent \$1,141 on energy for the year 2009. Thirty-nine percent of these energy expenses went toward heating and cooling, while the remainder powered hot water heaters, refrigeration, appliances, lighting, electronics, and other equipment. Improvements by property managers to lighting, large appliances, HVAC systems, and insulation could help lower the overall cost of living and contribute to more affordable housing (McKibbin, 2015).

The jobs created through upgrades to multi-family housing reflect the breadth of services that support the energy, construction, and manufacturing sectors. Retrofitting buildings can provide business to auditors, assessors, and various specialty contractors, as well as the manufacturing industries that produce the materials and technologies. Regional investment in energy efficiency programs for these large housing structures can lead to 11.6 jobs per \$1 million invested. Investing in multi-family housing efficiency provides more employment opportunities than new investment in energy generation and distribution. Studies have also found that investment in energy efficiency can spur advances elsewhere in the clean energy sector, producing thousands of additional jobs. Further, these actions would be pursued by and benefit multiple economic tiers. Half of all small and medium-sized apartment buildings in the U.S. are owned by individual investors, whereas large apartment buildings (50 units or more) tend to be owned by limited liability corporations and partnerships (McKibbin, 2015).

The health care industry accounts for nine percent of the U.S. commercial sector's energy use, plus eight percent of the sector's GHG emissions. A typical 50-bed, 200,000 square foot hospital may spend an average of \$13,611 per bed solely on energy costs. Overall, hospitals spend \$8.8 billion annually on energy and have the highest consumption of any other building type by a wide margin in terms of BTUs. The average hospital's energy use intensity (EUI) of 250 kBtu/ft<sup>2</sup> ranks only behind food service buildings. Smaller health care clinics check in with a 95 kBtu/ft<sup>2</sup> EUI, ahead of a typical office buildings' value. Although these smaller outpatient

facilities (clinics) do not consume energy on the same scale as their larger inpatient counterparts (hospitals), the distribution of consumption across their respective profiles for heating, lighting, and other functions shares many similarities (DOE, 2013).

Seventy-eight percent of hospitals named high operating costs as a primary motivation for pursuing energy efficiency upgrades. Hospitals stand to save millions of dollars by reducing their energy use, as utility bills make up over one percent of their average operating revenues. Every dollar saved on energy use can translate into \$20 in revenue for an inpatient facility and \$10 for an outpatient facility. However, the highly sensitive nature of health care facilities means a great deal of expertise and planning is required in order to maintain the necessary conditions around indoor air quality and patient comfort, as well as how and where energy must be deployed for specialized equipment. If done properly, the payoff can be substantial, since resources saved through efficiency can be directed toward improved patient care and service. For instance, improving a hospital's HVAC system can reduce health care costs by up to 20 percent through the reduced transmission of airborne illnesses. Modernizing equipment can lead to reduced noise levels, leading to reduced stress levels for patients. Upgraded lighting has also demonstrated patient benefits through fewer falls and facilitating a more pleasant mood (DOE, 2013).

#### *Corollary Benefits of Improving Building Energy Efficiency*

Upgrading buildings for energy purposes can have additional indirect benefits aside from the environmental boon of decreased GHG emissions. Indeed, the pursuit of energy efficient buildings presents significant economic benefits nationwide. The market for energy efficiency in the U.S. is robust and is reflected in the overall national growth trends. The U.S. population is expected to increase to 378 million by the year 2035. Meanwhile, the country's built environment is projected to increase by 70 percent between 2005 and 2035 just to keep pace with demand. Maintenance services will be needed for both new construction and existing structures as they age and can provide opportunities to integrate energy efficiency upgrades into a building's overall structure (Granade, 2009).

Demand for energy efficiency is fueled by its reputation as a safe investment, with projects providing a net-positive in capital costs in the form of energy saved over a building's lifetime. In order to keep up with their tenants' energy demands and sector-specific energy usage regulations, property owners would be wise to invest in efficiency measures wherever possible over a building's lifetime. Even the most expensive energy efficiency measures are economically appealing and represent the lowest-cost method of meeting future energy requirements (Granade, 2009).

The domestic energy retrofit market presents an investment opportunity of \$279 billion across the commercial, industrial, and residential property sectors. This level of investment could generate \$1 trillion in total energy savings over a decade, while creating over 3.3 million cumulative job years of employment (NIBS, 2013). The energy efficiency market is distributed across 100 million locations and billions of individual devices housed within the three major sectors. Small commercial buildings capture 13 percent (\$36 billion) of the estimated energy retrofit market opportunity, as well as 13 percent (424,000 total job years) of the potential employment that could be created by retrofitting this slice of the buildings sector (NIBS, 2013). Given that small businesses typically occupy these buildings, their prevalence and high potential to exert change on national energy usage underscores the importance of developing and promoting financing programs to encourage the adoption of efficiency actions in these sectors. In total, the construction, renovation, and maintenance of buildings represent 10 to 40 percent of a typical country's Gross Domestic Product and averages 10 percent of a country's employment (UNEP, 2009).

Indoor air quality is closely tied to a building's construction materials and ventilation systems, leading certain efficiency measures to improve conditions. With some parts of the population spending up to 90 percent of their time inside, the environmental conditions of a community's building stock can have a serious impact on public health. For instance, improving a building's insulation and seals can keep out cold air, moisture, and mold spores, leading to better air quality, more consistent comfort, and energy savings. Retrofits can also provide a buffer against fluctuations in energy pricing, reduce water damage from basement flooding, decrease food spoilage, and extend clothing life (Granade, 2009).

Sick Building Syndrome (SBS) refers to the consequences of poor air quality in buildings resulting from inadequate construction or design. Addressing SBS can reduce health symptoms, such as asthma and allergies, by 20 to 50 percent. SBS inflicts a toll on America's workforce, costing commercial building occupants \$60 billion annually through sick days, health care costs, and lost productivity. Abating indoor air quality conditions and ambient temperatures can boost employee productivity by five percent and could potentially amount to \$37 to \$210 billion annually in financial gains for companies able to invest in their employee spaces (Granade, 2009).

There is huge potential for savings through multi-family building upgrades, which can have an outsized effect on low-income households, creating a ripple of indirect socio-economic benefits throughout a community. Other vulnerable populations, such as the elderly, could also benefit. If just two percent of the \$21 billion in annual energy use for the multi-family housing sector went unused, it would result in \$420 million in total savings. Money saved manifests in several forms, including direct energy savings, reduced maintenance and equipment costs, and lower

water consumption thanks to reduced hot water demand. Reducing the cost of housing can benefit the local economy as people shift their finances to other goods and services in the region (McKibbin, 2015).

These impacts are significant due to the already high allocation of financial resources to energy bills by low-income households. The average household spends about five percent of its total income on energy, whereas a typical low-income household spends 15 percent, with fixed-income households spending up to 35 percent. Narrowing this energy expenditure gap can greatly improve the standard of living for individuals of constrained means and indirectly ease other household issues. For instance, less money sunk into energy costs frees up funds for essential items like food, education, and transportation. Simple home weatherization measures can cut energy expenses for low-income households by 10 percent, while fixed-income tenants could see a 21 percent reduction (Granade, 2009). Reduced tenant turnover rates are yet another benefit to both managers and the tenants themselves. By making a unit more affordable (lower energy and rental costs) and comfortable (less severe seasonal extremes), building owners will lose less money during periods of transition and vacancy (McKibbin, 2015).

The U.S. building stock primarily consists of “small buildings,” which are classified as having a total area of 50,000 square feet or less. Small buildings make up 94 percent of all commercial buildings and 50 percent of the nation’s total commercial square footage. Improving the efficiency of our building stock remains critical. However, the barrier to realizing the full potential of the nation’s building stock lies in how numerous and diffuse the primary actors capable of implementing efficiency improvements actually are. Buildings tend to be fairly long-lived, with at least half of today’s existing buildings projected to still be standing in 2050. Due to buildings’ long lifespans, any actions taken for new construction can have a lasting influence on lowering overall emissions. Retrofitting may feature different types of operations from new construction, but they share the same efficiency goals and present a prime outlet for influencing the state of the building sector and how it will consume energy in the future (Brown and Southworth, 2006).

#### *Barriers to Policy Success and Demand-side Reduction*

Given the huge potential for GHG emission reductions and corollary socio-economic benefits associated with improving the energy efficiency of our nation's building stock, policy-makers have sought ways to encourage and help finance these upgrades. Both the private and public sphere have pioneered solutions to help individuals and organizations invest in energy efficiency upgrades. These solutions and incentives, include but are not limited to tax credits and deductions, grants, low interest loans, and utility-provided rebates for energy efficient product purchases.

Despite the proliferation of policy-supported financial incentives, a range of barriers persist for institutions and businesses in improving the energy efficiency of properties under their management or ownership. Indeed, prior research has revealed that the slew of barriers that hinder the advance of energy efficiency improvements in our national building stock, permeate both the demand and supply side of the industry. The majority of research has focused on particular technologies, yet a few meta-studies consider energy efficiency in aggregate and have summarized key and consistent barriers to energy efficiency upgrades (Schleich, 2009; Gillingham, Newell, and Palmer, 2009).

Gillingham, Newell, and Palmer (2009) categorize barriers into market (or structural) and behavioral “failures.” Market failures can include the split-incentive, capital constraints, energy pricing distortions, adverse bundling, and high transaction costs. Behavioral failures can include corporate and human decision-making characteristics in the face of risk and uncertainty that challenge commitment to investments into CEG strategies. Table 1 provides a non-exhaustive review of some of these key failures as they are described in the literature.

**Table 1.** Review of common barriers to CEG strategy implementation as cited in the literature. Blue rows denote market or structural “failures,” while orange rows denote behavioral “failures.”

<b>Barrier</b>	<b>Explanation</b>	<b>Reference</b>
Split Incentives or Misplaced Incentives	Investment is dissuaded by the distinction between those who make decisions about property management and would pay for EE upgrades and those who would financially benefit from the upgrades.	Schleich, 2009; Granade et al., 2009
Capital Constraints	Also known as “liquidity constraints,” many groups do not qualify for available financing programs, do not have access to additional funds, or do not know of supportive financing programs that they would qualify for.	Granade et al., 2009; Golove and Eto, 1996
Energy Pricing Distortions	In the US, the energy sector is subsidized such that the average cost of electricity is lower than the marginal cost to produce that electricity. Since prices, and energy bills, are artificially lowered, consumers do not face high price signals that would otherwise encourage them to seek out CEG strategies. Furthermore, returns on investment, as realized through energy savings, take a long time to accrue after the upgrades when energy prices are low.	Gillingham, Newell, and Palmer, 2009; Granade et al., 2009; Golove and Eto, 1996
Adverse Bundling	Although a lesser barrier, energy efficient technologies are often also considered luxury goods that are coupled with other “gold standard” conditions like improvements in sound, size, or air quality, which render the technology more expensive.	Granade et al., 2009; Golove and Eto, 1996

Transaction Costs	There are high costs in time and money required for consumers to overcome the other barriers. For example, researching technology and financing options, current policy standards and building codes, applying for financing, securing contracts, and ensuring that the organization has operation and maintenance capabilities for the new technology can seem like an insurmountable challenge.	Schleich, 2009; Granade et al., 2009
Loss Aversion and the Saliency Effect	When knowledge is uncertain, such as future energy prices which ultimately determine the return on investment from upgrades, humans tend to be risk averse, and therefore are less likely to choose to invest. Additionally, immediate costs are more salient than future benefits in costs-savings which weigh more heavily in human decision-making and lead people to underestimate future benefits in the face of salient present costs.	Schleich, 2009; Gillingham, Newell, and Palmer, 2009
Bounded Rationality and Heuristic Decision-Making	Facing a huge number of options of technology upgrades, brands, and behavioral options, humans must deal with cognitive limitations. Since we cannot effectively juggle the vast amount of information required to compare options, we are required to make decisions in a less cost-optimizing way.	Gillingham, Newell, and Palmer, 2009
Standard Operating Procedures	Priority setting within an organization can play a role on what the leadership chooses to invest in. For example, whether energy efficiency is considered “strategic” may impact leadership interest. Similarly, generating revenue may be of higher importance than saving on expenditures. Commonly cited behavioral limitations for businesses include prioritization within the business community, support from corporate leadership, and personal commitment and know-how in pursuing solutions.	Schleich, 2009; Sisson et al, 2007

Of particular note are the top two barriers in Table 1. Split-incentives is an example of a structural failure in which there is a division between those who make decisions about building structure and operations, and those who pay for electricity and heating (Granade et al., 2009). This dynamic often occurs when businesses lease office or work space, and is similarly found in rental residential sectors where the owner does not pay the energy bill, and thus, does not receive any financial incentive to do so by installing costly upgrades.

The ownership transfer issue is a similar phenomenon in which the beneficial outcomes of reducing energy consumption are not realized until far into the future and the present owner is considering selling the property before that time. In neighborhoods where property turnover rates are high, the ownership transfer barrier may play a significant role. Indeed, when property owners expect to sell a property before the full payback on investments would be realized, they are far less likely to invest in improvements with an extended return on investment (Granade et al., 2009; Schleich, 2009)

Access to capital is another commonly cited barrier, particularly when financing is primarily in the form of loans. Small businesses with poor credit ratings and low-income families may be denied access to funds needed cover upfront expenses such as materials and installation (Granade et al., 2009; Golove and Eto, 1996). This could potentially explain why many individuals cite curtailment activities before mentioning efficiency upgrades as a way to decrease energy use, as the former requires less (if any) upfront capital. Indeed, financing tends to be the major obstacle to implementing purely technological solutions. A survey of the private sector in six industrialized countries found that financiers and developers are believed to be the main barriers to more sustainable buildings (Sisson et al, 2007).

Despite the relative reduction in cost for efficiency at larger scales, projects pursued by small business owners can appear daunting and rife with risk to an organization or individual staking their own money on the efforts' success. Small organizations simply lack the capital of larger entities and often operate under more restrictive budgets. There simply may not be enough funding available to sink into a business' infrastructure for future gains when the building's owner is facing a litany of costly upkeep issues or necessary purchases to keep their operation running smoothly.

While all barriers persist to varying degrees, their primacy or impact depend on the sector in question (Schleich, 2009). For example, while split-incentives significantly hinder demand-side improvements in rental housing, standard operating procedure for capital investment decisions is a more relevant barrier in the commercial and industrial sectors.

An overarching challenge across all of these barriers is a lack of information that imbues the market with risk and uncertainty and engenders high transaction costs for investment. Consumers lack information on energy efficiency options, relative technology capabilities or product ratings, current and future technology costs, their own energy consumption habits, available financing opportunities and policy incentives, and the importance of benefits associated with such upgrades. Indeed, information can be costly to attain in terms of opportunity cost or lost work hours that could be spent on organizational goals (“transaction costs”) and information is not always entirely accurate (Golove and Eto, 1996).

Golove and Eto (1996) categorized all of these informational barriers into four challenges: 1) the lack of information, 2) the cost of acquiring information, 3) the inaccuracy of available information, and 4) the inability to act on information. Collectively these information challenges introduce a series of financial and technical risks for an organization to weigh before investing in energy efficiency.

As Gillingham, Newell, and Palmer (2009) outline, organizations considering energy efficiency upgrades essentially weigh the upfront costs with future potential savings as their financial risk in the investment. Future savings and the length of time until a return on investment is realized depends on current and future product costs, current and future energy prices, and the lifetime and functionality of the technology. Higher energy prices will result in a faster return on investment because energy cost savings will be realized sooner. Since future energy and technology prices are unknown, however, the actual return on investment in energy efficient technologies can be difficult to predict (Schleich, 2009).

Furthermore, a lack of information can create technical risks, which center on whether technologies will be sufficiently energy efficient, whether the organization has the capacity to manage new technologies on the property, and whether new technologies will meet future policy standards or building codes (Schleich, 2009). A lack of standardized efficiency metrics across a range of technology types further complicates investment decisions. For example, Gillingham, Newell, and Palmer (2009) defined energy efficiency as the services provided per unit of energy input. This means that “efficiency” metrics vary by the technology and service they provide. In other words, lighting services are quantified as lumens whereas air conditioners are compared based on their seasonal energy efficiency rating (SEER) which describes the relative energy input needed for a given cooling level (DOE, 2016).

These examples are offered not as an exhaustive list, but rather to illustrate the slew of potential barriers that local Michigan institutions may face in relation to improving energy efficiency. Interestingly, “energy concierge services” are a burgeoning mechanism to further energy efficiency in the residential and commercial sectors and help address many of these aforementioned barriers. Energy concierge services can alleviate structural barriers by lowering transaction costs, behavioral barriers, and availability barriers by linking clients to available service and financing opportunities and educational resources (Miller, 2012). Energy concierge services streamline the energy efficiency process by giving interested individual’s one point of contact for the entire duration of a project (Bain, 2015). An energy concierge service will likely perform tasks like arranging audits and providing guidance on projects to undertake, identifying the best financing opportunities, and connecting the client with reliable and trusted contractors (Sightline Institute, 2016). Concierge services also coordinate between banks and contractors, and help clients adhere to rules and regulations related to their energy efficiency project.

These energy concierge services, such as Elevate Energy based in Chicago, link multi-family affordable housing property owners to consultants that walk them through the upgrade process from initial property assessments to the final contractor payments. Other examples include the municipality of Northampton, Massachusetts, which is establishing public and private partnership models for energy concierge services to increase market performance, leverage

utility investments, and engage business in energy efficiency projects. Miller (2012) outlines how energy concierge services, align with Granade's (2009) theory of overcoming energy efficiency barriers through education and information, financial incentives, regulatory mandates, and third-party involvement.

#### *Summary of How Our Project Tackles These Issues*

While the Ecology Center does not necessarily aspire to become a full-scale energy concierge service provider, it does hope to link some of the resources provided by those types of groups to small businesses and nonprofit community organizations in Southeast Michigan. Unfortunately, many of those resources are not readily transferable. Indeed, even Elevate Energy, which specializes as an "energy concierge," lacks a standardized process by which it connects participants to available funding and thus has no formalized mechanism to share with the Ecology Center (Skrotzki, 2015). Consequently, this project is designed to create a financing and technology toolkit that applies to organizations in Southeast Michigan, but can also be easily transferred and replicated elsewhere.

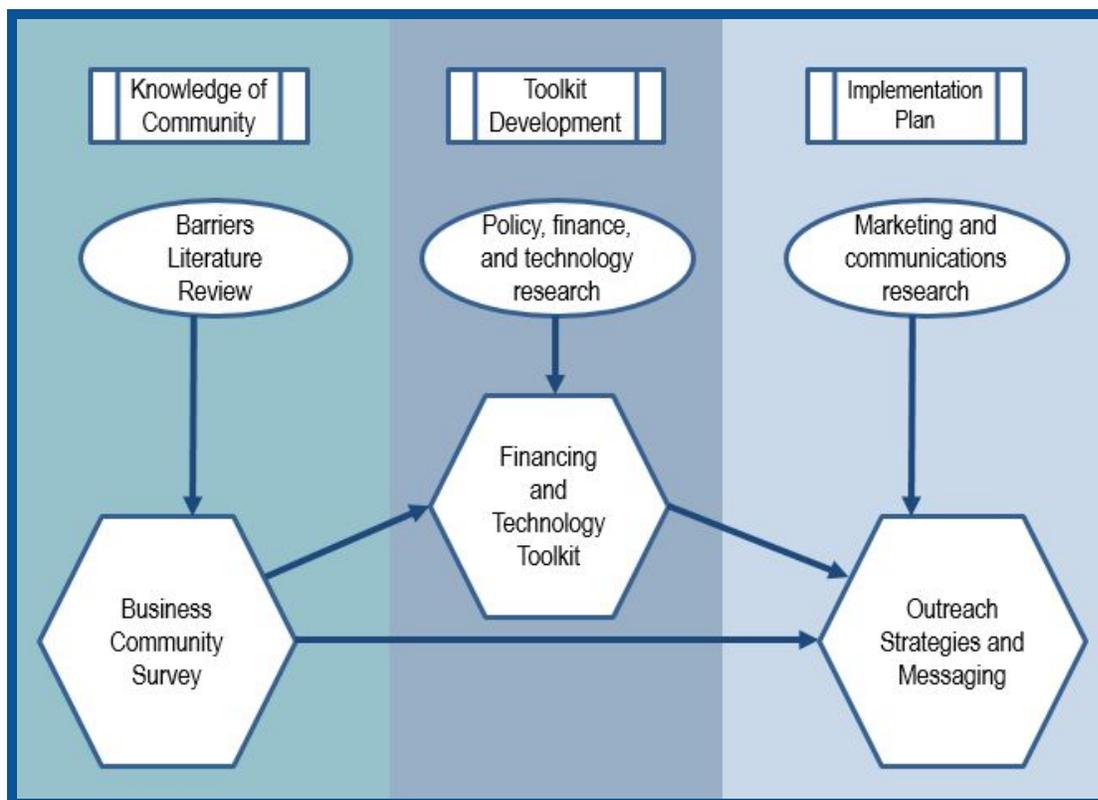
Similar to energy concierge services, this toolkit will serve as a third-party intervention designed to address some of the informational barriers associated with energy efficiency upgrades. Research confirms the success of third-party energy efficiency programs in effectively reducing barriers related to imperfect information and bounded rationality (Howarth et. al 2000). In line with research and the models of other energy concierge services we specifically aimed to reduce some of the transactions costs and barriers to financing by streamlining the process through which community organizations could identify appropriate financing options and technological upgrades prior to connecting with a full-service institution.

In the next section of this report, we provide an overview of our project design and the intention of the three pillars of research and output products.

## PROJECT DESIGN

### *Explanation of Report Components*

There were three essential pillars in this project's design. Inspired by the community-based social marketing model outlined by McKenzie-Mohr (2000), we wanted to 1) identify current barriers to pursuing CEG initiatives and upgrades, 2) design a toolkit that reflects and addresses these current challenges, and 3) offer an implementation strategy by which the Ecology Center could reach their target audience and engage the broader public in this effort to reduce energy consumption of our building sector. Figure 3 depicts how our project research is funneled into these three pillars.



**Figure 3.** Project Design. Ovals denote research while hexagons denote final outputs.

### *Business Community Survey*

While an extensive literature review revealed a litany of potential barriers to CEG adoption, this research team was curious about factors specific to our target audience and geographic region. We used this survey as an opportunity not only to learn about the most prevalent barriers, but also to understand how these organizations perceive energy efficiency and where they seek out information. Results of this survey informed the focus of the financing and technology toolkit and our review of outreach and messaging strategies within the implementation plan.

### *Financing and Technology Toolkit*

The purpose of the toolkit is to provide a comprehensive gateway for interested parties to discover and utilize financing programs for energy efficiency and renewable energy projects. As this report has previously discussed, a wide-ranging lack of awareness exists across various sectors regarding the types of funding options available and how to successfully apply for these programs. Local, state, and federal government agencies encourage small business owners and nonprofit organizations to take advantage of the energy financing programs available, since they are viewed as a relatively cost-effective means of reducing energy consumption and GHG emissions. However, the accumulation of these programs from both government and utility offices has created a complicated mix of programs and resources scattered across numerous departments and websites. The sheer volume of material to sort through would overwhelm even knowledgeable customers and would leave people unsure of where to look to fulfill their needs. Various informational hurdles and uncertainty surrounding benefits contributes to significant portions of energy efficiency program funds going unused, despite a healthy interest from property owners to reduce their monthly bills (Palmer, Walls, and Gerarden, 2012). This underutilization includes home owners, where Neme et al. (2011) estimate that even a modest residential building retrofit rate of 2 percent per year has proven unachievable for every region in the U.S.

The toolkit is designed to address the underutilization of energy financing programs through education and customized information sharing for those small businesses and organizations currently left in the dark. It walks users through the process of identifying and selecting the financing programs that represent the best fit for their business or organization. The near-comprehensive listing of programs available in Southeast Michigan helps provide users with as many options as possible, while also informing them about the benefits and criteria inherent to each program. A set of appendices supplements the core with detailed readouts on individual programs and technologies. Taken as a whole, the user will complete the toolkit exercise with a list of energy financing options for their building, an improved understanding of how each program potentially fits into their organizational goals, and basic knowledge of the steps necessary to pursue those programs.

### *Implementation Plan*

With a financing and technology toolkit in hand, the Ecology Center will need to reach out to appropriate target audiences to solicit participation. The toolkit alone will not lead to greater energy efficiency in our regional building stock. Hence, the purpose of the implementation plan is two-fold. First, it will provide a brief summary of the target audience and lessons learned from our community survey regarding their knowledge, motivations, and barriers around energy efficiency. It will then review and assess the viability of potential avenues for outreach to solicit

members from these target organizations and businesses, as well as the messaging techniques that might prove most effective or enticing.

Many researchers have found gaps in knowledge and demands for more information. Our project hopes to address these gaps, but we caution that implementation of energy efficiency upgrades will not be driven solely by knowledge. In a review of prior research, Gillingham, Newell, and Palmer (2009) identified papers that found awareness of financing credits alone did not directly transfer into use of the credit. We review some key messaging strategies in the implementation section of this report that could help complement information-based toolkit and lead to actual upgrades and improvements. For example, individuals are more likely to engage in risk-taking behavior to avoid a loss rather than to receive a gain (Shogren and Taylor, 2008). If energy use in the building is framed as a loss of capital, individuals might be more willing to engage in the risk of investing in building upgrades.

### *Project Scope and Terminology*

Considering no prior model existed for the type of streamlined, replicable, and scalable toolkit featured here, the team decided to narrow the project's focus to the key sectors that the Ecology Center hoped to connect with in the near future. The project's relatively brief timeline and constrained capabilities prevented a more expansive integration of other sectors into the first complete draft. For instance, the unique needs of restaurants, small retail storefronts, and industrial facilities were not actively considered in the toolkit's design, but would still find it useful due to its broad capabilities and the nature of the programs captured. This narrowing allowed the team to dedicate more time towards documenting and formalizing the research process to better equip the toolkit for expansion and scaling-up over time. Therefore, the version of the toolkit presented in this report may be viewed as a prototype with an intentionally narrowed scope and a built-in capacity for growth.

The project team identified multi-family housing units, health care facilities, private education facilities, and religious institutions as small businesses and/or nonprofit organizations located within Washtenaw and Oakland Counties as our target group for survey and financing research. These sectors were chosen as a snapshot of the total potential audience for future iterations of the toolkit.

The following terms are narrowly defined to delineate the scope of our project:

- **CEG.** Refers to the spectrum of curtailment, energy efficiency, and energy generation strategies that can be implemented on-site to reduce end-user demands for grid electricity. Financing programs vary in which of these strategies they prefer to support.
- **Institutions.** Defined as educational, health care, religious, and multi-family housing institutions located within Washtenaw and Oakland Counties in the state of Michigan.

Institutions would be further sorted according to criteria used to classify small-business types.

- **Small Business.** Defined by the total number of employees, as set by the federal Small Business Administration (ranging from 500-1,000 employees depending on business type).
- **Financing Opportunities.** Limited to active programs implemented by city, county, state, federal, or utility entities designed to assist eligible institutions with reducing overall energy consumption through various mechanisms (rebates, grants, loans, and tax incentives).

In the next section we will provide an overview of the methods and results associated with our Business Community Survey.

## **BUSINESS COMMUNITY SURVEY**

The objective of the business community survey was to better understand the barriers to improving energy efficiency, as well as the energy efficiency needs that are specific to our target business population: educational, health care, religious, and multi-family housing institutions in Washtenaw and Oakland Counties. More precisely, the business community survey was used to glean information on organizational barriers to energy efficiency, motivations for obtaining energy efficiency upgrades, and the mechanisms through which organizations seek out energy efficiency opportunities, all to inform the development of the financing and technology toolkit as well as the Implementation Plan.

### **Methods**

#### *Survey Construction*

Survey construction began with background research on motivations and barriers to achieving energy efficiency in general, and specifically within organizations. Articles that surveyed and reported on individual and organizational energy usage and opinions were reviewed as well. Additionally, these studies, especially Hasanbeigi et al (2010), helped inform question and language choice in the questionnaire. Survey design, language, crafting and ordering of questions were all informed by best practices in survey methodology, especially using insights from Dillman, Smyth, and Christian (2009).

The questionnaire consisted of four major areas of interest: current energy usage, interest in energy efficiency, barriers to energy efficiency, and knowledge of financing opportunities for energy efficiency amounting to a total of 28 questions (see Appendix 1). Not all participants viewed all 28 questions, since seven of the questions were contingent on the participant's answer to previous questions.

The majority of the survey questions were four-point Likert scale questions. We chose an even point scale to avoid the social desirability bias (Garland, 1991) that is typically associated with the midpoint of odd point Likert scales. The choice of the four-point scale was also informed by literature that suggested there may be increased validity and reliability for coarser likert scales (trichotomous) versus higher point likert scales (Matell and Jacob, 1972; Chang, 1994). Our survey tool was constructed and implemented using a digital platform called Qualtrics.

Based on the major themes found in the literature and the interests of the Ecology Center, our key research questions for the survey were as follows:

- What are the main motivators for organizations seeking energy efficiency?
- What are the current barriers for organizations seeking energy efficiency?

- What is the thought process that institutions go through to find appropriate funding opportunities for energy efficiency improvement projects?
  - How are institutions most likely to search for this information? Who do they turn to for information? What are their main sources of information right now?
  - What is the most useful mechanism for institutions in receiving this information?
  - What are the types of questions institutions ask and seek to have answered?

Our target outputs from the survey were:

- Sector and Country-specific data on barriers and interest in energy efficiency to inform the toolkit.
- Sector and Country-specific data on information receptivity and processing to inform the toolkit.

### *Ground Truthing*

Once the initial questionnaire was drafted, we performed interviews with representatives from local institutions to ground-truth the comprehensibility and relevance of the questions, language, and design of the questionnaire.

Interview participants were selected using the snowball method. We relied on referral contacts from our client, the Ecology Center, as well as our own network of business organizations within Oakland and Washtenaw Counties. In addition, potential interviewees were contacted via email and/or in person. Participants included a building manager, a member of an organization that rents office space, and a school district employee who works on energy efficiency for the district. The interview lengths ranged between 45 minutes and 90 minutes. Two of the interviews were conducted in person and one was conducted over the phone.

Two project members were present for each of the in-person interviews. One of the team members walked the interviewee through the online 28 questionnaire on a laptop computer. The other group member took notes on the participant's reaction to the survey and other pertinent information.

One group member conducted the phone interview. The respondent was emailed the survey link before the scheduled interview and went through the survey independently. During the phone interview both the respondent and team member went through the survey again and the interviewer took notes on the interviewees' feedback.

The interviews revealed several key perspectives on barriers to energy efficiency which were not frequently mentioned in the literature including office culture. For the respondent's office culture includes the larger environmental norms and values of the organization (e.g. It's expected that

employees recycle; We do not use styrofoam products at our organization ). These perspectives were incorporated into the final version of the survey.

### *Sampling and Recruitment of Participants*

Based on the target population identified by the Ecology Center, a list of religious organizations, schools, health care facilities, and rental housing facilities located within Washtenaw and Oakland Counties was downloaded into Excel using ReferenceUSA. These organizations were identified based on the county search mechanism in ReferenceUSA and North American Industry Classification System (NISCS) codes. In total 7,584 business were identified after the initial download.

These initial data were cleaned in Excel to remove duplicates entries, organizations that did not fit our “small business” definition (those with a staff size greater than 100 and/or annual profits greater than \$7 million). Additionally, all information columns except business name, address, phone number, number of staff/employees, sector, and annual profit or expenses/budget were removed.

After data were cleaned there was a total of 5,423 organizations remaining. From the remaining organizations we conducted a randomized stratified sample of our eight strata: four organization types (health care, private education, religious, and multi-family housing) in two counties (Washtenaw and Oakland). One hundred and twenty five organizations were randomly sampled from each strata, totaling 1,000 organizations. To achieve this, we generated 125 random numbers between one and the total number of businesses in each strata for our sample in Excel. For example, in the Oakland religious strata there were 911 organizations to sample from. In Excel we used the following formula 125 times to select the sample organizations: `=(randbetween(1,911))`.

### *Postcard Mailing*

The survey link was then mailed to the 1,000 sample organizations via postcard. We contracted a local business to print and postmark all of the postcards, which were mailed during the week of August 30, 2015.

The postcard invited recipients to take our online survey and included a link to the survey and a contact email for follow-up questions. Enticing and appreciative language and an incentive for completing the survey are proven tactics for improving response rates (Dillman, Smyth, and Christian, 2009) and were all included in the text of the postcard (see Appendix 2). The incentive used was an opportunity for a respondent to win a free energy audit for their organization’s building via a raffle. The project team contracted a local audit company to perform the service.

### *Phone Call Follow-ups*

Due to an extremely low response rate after the initial postcard mailing, follow-up phone calls were made to sample organizations. One hundred and forty six postcards were returned after the initial mailing. Subsequently these organizations did not receive phone calls and were removed from the sample.

Organizations were each called once, sometime during the workweek (Monday-Friday), between the hours of 9:00 am and 5:00 pm. When calling organizations, group members used a script to guide the conversation (see Appendix 3). The main goal of each phone call was to encourage the call recipient to provide an email address where the survey link could be emailed or have the call recipient write down the survey link. If a call recipient provided an email, a standardized follow-up message was emailed to them shortly after the phone call ended.

### *Snowball Method*

To increase the breadth and depth of information to be gathered from the questionnaire as a result of the extremely low response rate, the snowball method was used to circulate the questionnaire more widely. While making follow-up phone calls, if a call recipient seemed particularly interested in the survey, they were encouraged to forward the link to associates and colleagues after they received the email. We also asked several organizations in the area that dealt with energy efficiency and/or who shared the target organization's sector to send the email containing our survey link to any of their contacts that fit the description of our study population.

A duplicate of the initial questionnaire was created for the snowball sampling process. Thus, participants that were identified via the initial random sample method used one online link and participants that were identified via the snowball method used a different online link to complete the questionnaire. The two links remained separate so that we could identify the true response rate of the initial random sample.

### *Closing the Survey*

After the initial postcard mailing went out, the survey links stayed active for about two months. Once the survey link was deactivated, data were downloaded from Qualtrics and assessed using descriptive statistics in Excel. After the survey was closed we identified the winner of the raffle, drawing from the subset of questionnaires that were 100% completed.

## **Results**

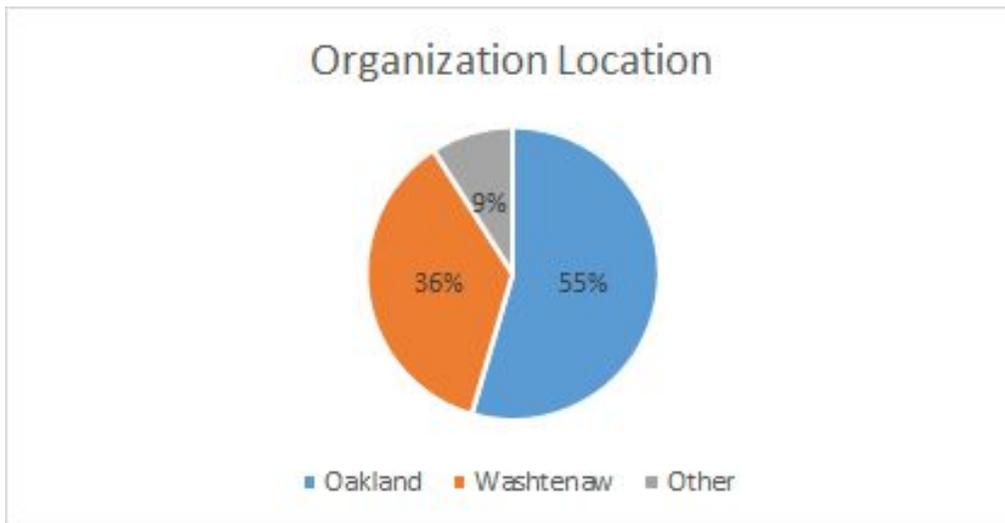
### *Response Rate*

In total we received 40 responses from the survey, including both the stratified random sample and the snowball sample. Nineteen of the 40 responses were from the random stratified sample.

After adjusting the size of our sample for the 146 returned postcards that were removed from the sample count, the response rate was a mere 2.4%. The other 21 responses were obtained through the snowball sampling technique. While the snowball method yielded slightly more survey responses, more respondents from the stratified random sample completed the survey in its entirety.

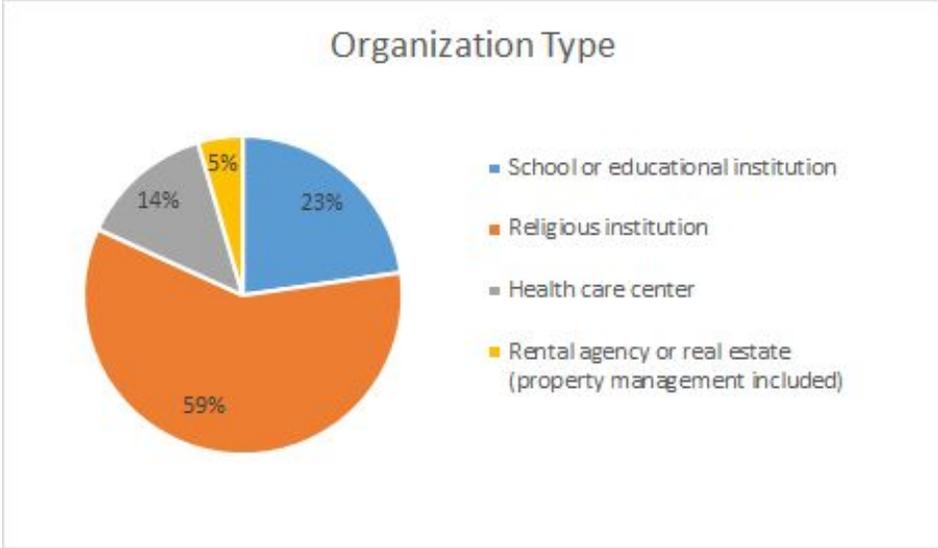
### *Demographics*

Overall, 55 percent of the total sample was located in Oakland County (Figure 4). Washtenaw County accounted for 38 percent of the total sample, while organizations located outside of the target Counties account for 9 percent of the total sample. The 9 percent of responses outside of the target sample is one of the limits of the snowball method. While we were able to reach more participants we were not able to restrict the geographic range to only Oakland and Washtenaw Counties.



**Figure 4.** Location of sampled organizations by county.

Religious Institutions constituted the majority of respondents (Figure 5). Schools or Educational institutions are the second highest sector represented in the overall survey, followed by health care Facilities and Rental Agencies.



**Figure 5.** Sampled organizations by sector.

While a few of the sample organizations were led or owned by individuals that have been historically marginalized in American society, all of the respondents noted they did not feel that they faced any particularly unique challenges (e.g. loan discrimination) in achieving or undertaking energy efficacy projects as a result of the demographics of their leadership.



**Figure 6.** Demographics of organizations’ leadership.

## *Key Findings*

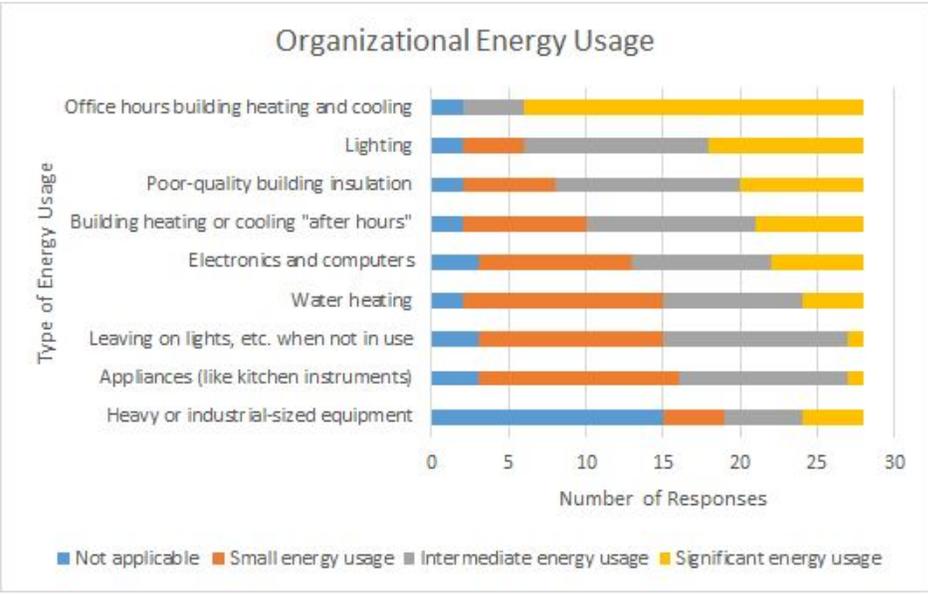
### *Current Status of Energy Efficiency Programming and Leadership*

Sixty eight percent of the sampled organizations reported they do not have an official plan for energy efficiency. The plans that organizations do have typically consist of measures to upgrade the facility, reduce energy use, and better track energy usage, although specific targets and metrics were not identifiable from the response. Notably, organizations were at a variety of different stages in the drafting and implementation process for these plans and did not necessarily develop them independently. Indeed, some organizations noted they were adopting materials created by umbrella organizations or external intuitions. For example, one of the religious organizations noted that they use the Green Church plan and one of the schools noted that they adhere to the Michigan Green School plan.

While only about 30 percent of the organizations have formalized plans to improve energy efficiency, over 45 percent of respondents reported their organization has some type of individual champion for improving energy efficiency and/or reducing energy demands. Respondents described typical responsibilities for an energy efficiency champion as increasing awareness of staff energy use and encouraging co-workers to “unplug” devices when not in use, while other tasks and duties varied across the sampled organizations. These additional tasks included writing about energy efficiency in a weekly bulletin, sponsoring sustainability initiatives to reduce energy, water and resource waste, or even monitoring the outcomes of prior efficiency projects and efforts. Conversely, other respondents admitted that although they have a designated energy efficiency champion, this person does “nothing” or “not much” at all.

### *Current Energy Usage Patterns*

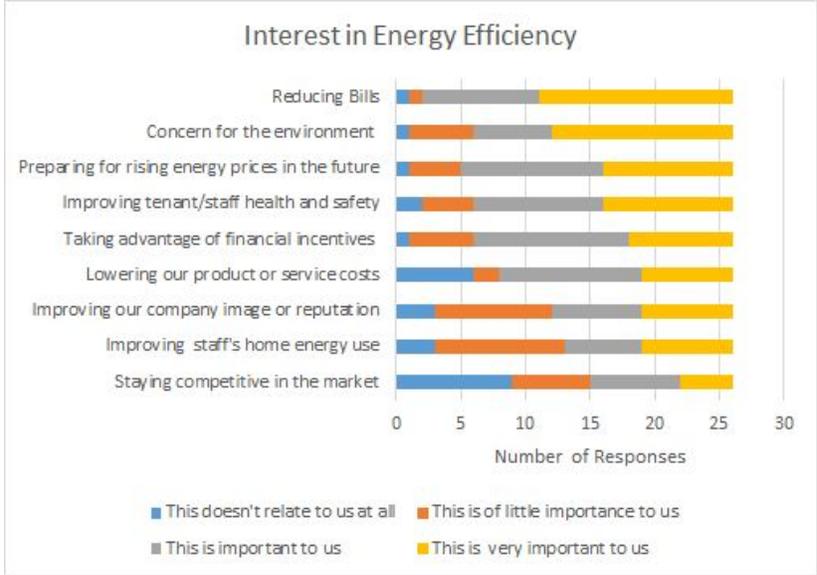
Respondents most often identified water heating, appliances, and leaving lights on when not in use as small sources of energy consumption. Additionally, respondents identified heating and cooling during office hours as the largest source of energy demand, with 78 percent of survey participants rating it a significant source of energy demand, followed by lighting and poor quality building insulations (Figure 7). People are notoriously inaccurate at estimating energy consumption and savings and tend to emphasize curtailment activities as offering high potential savings counter to expert opinion (Attari et al., 2010). Nonetheless, these findings suggest that organizations from this target audience may be more aware of building envelope concerns and consequently, may be interested in a mixture of building stock improvements and retrofitting technologies to improve energy efficiency in the Washtenaw and Oakland County area.



**Figure 7.** Organizations’ perceived energy usage and loss.

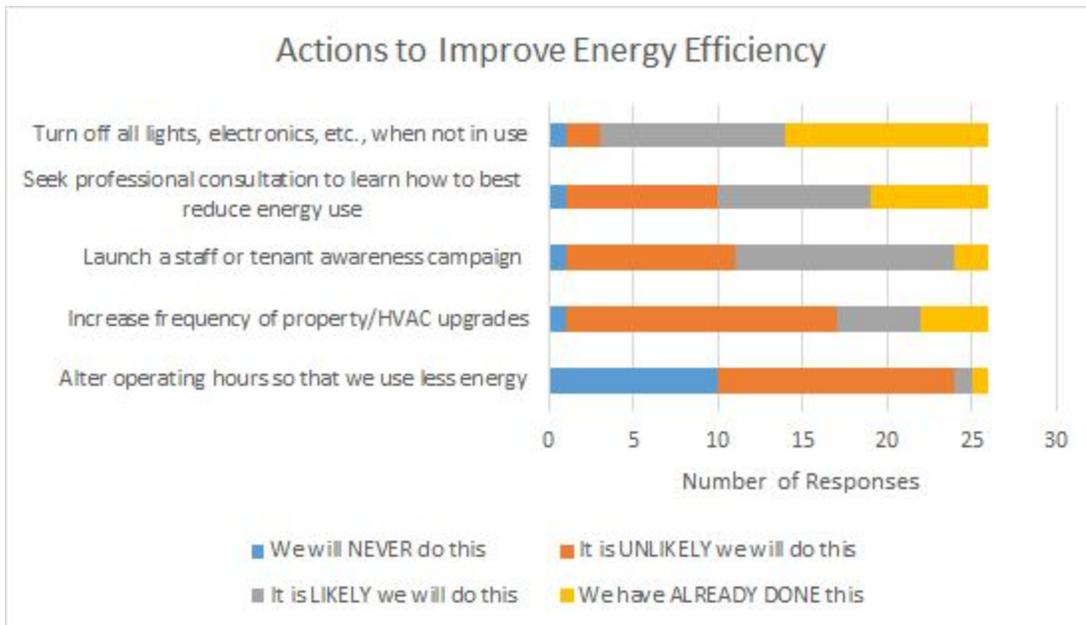
Interest in Energy Efficiency

As expected, survey respondents identified an interest in reducing energy bills as the dominant motivator for pursuing energy efficiency projects (Figure 8). Energy efficiency interest is also rooted in a concern for the environment and a desire to combat future energy costs. Overall, sampled organizations are least interested in energy efficiency as a means to stay competitive in the market or to lower production and service costs. We suspect this is likely due to the fact that the sample was overwhelmingly schools and religious institutions who do not often compete in market environments.



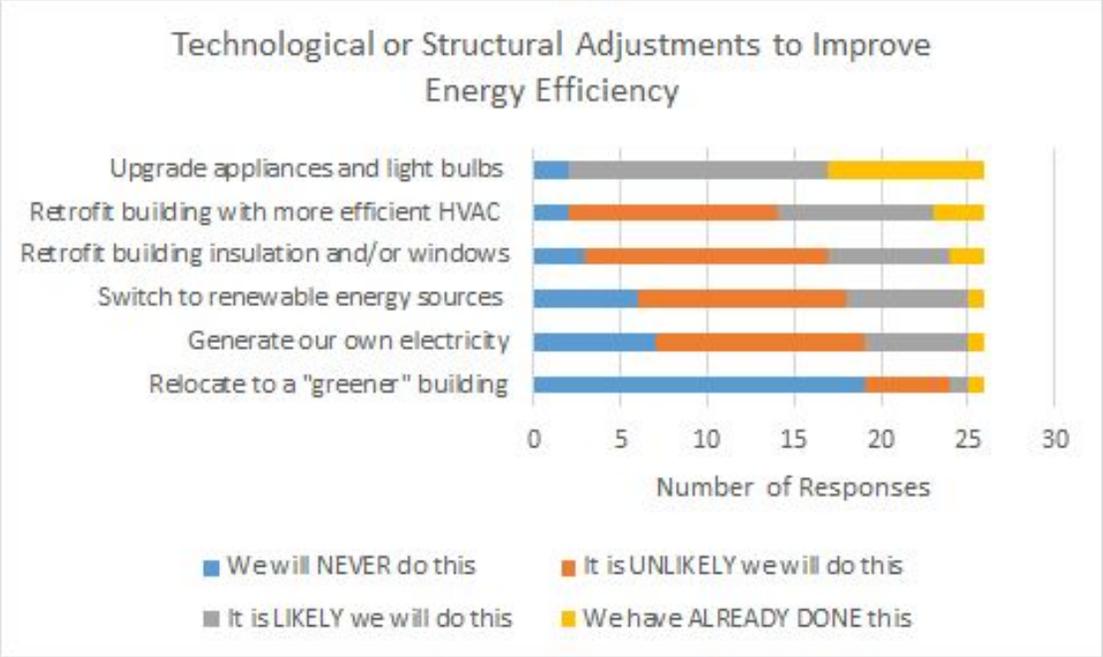
**Figure 8.** Organizational interest in reducing energy demands.

In regards to past, current, and future behavioral strategies to improve energy efficiency, 46 percent of respondents noted they have already taken actions to turn off all lights and electronics when not in use, and 42 percent will likely adopt this behavior in the future (Figure 9). Some of the ground-truthing interviewees, however, noted that turning off electronics when not in use was often not an option as office computers were updated overnight necessitating 24-hour energy demands. In terms of taking new actions, organizations conveyed they are most likely to launch a staff or tenant awareness campaign. Interestingly, respondents were split as to whether they were willing to pursue professional consultations, with 34 percent saying they were likely and an equal number saying they were unlikely to do so. This poses particular challenges to the Ecology Center, which hopes to encourage stronger adoption of energy audit and assessment services to streamline efficiency upgrade processes.



**Figure 9.** Organizational behavioral strategies to improve energy efficiency.

In regards to technological and structural adjustments, 35 percent of respondents reported they have already upgraded lighting and appliances, while 58 percent noted they would likely do this in the future (Figure 10). This was the only technological and structural adjustment where the cumulative likelihood to implement was greater than the unlikelihood. While 34 percent of organizations noted they are likely to retrofit the building with a more efficient HVAC, making it the second most common structural change behind upgrading appliances, 46 percent still noted they are unlikely to retrofit the building with a more efficient HVAC system.



**Figure 10.** Organizational technological and structural strategies to improve energy efficiency.

Cumulatively, organizations conveyed they are more willing to or had already undertaken behavioral action steps and curtailment strategies towards energy efficiency above technological and structural adjustments. Specifically, 50 percent of organizations had already or are likely to undertake behavioral changes while only about 40 percent of organizations were willing to undertake a technological or structural adjustment. This aligns with prior research by Attari et al. (2010) that notes curtailment behaviors as more salient and visible to daily operations and are more likely to be listed within intended future strategies.

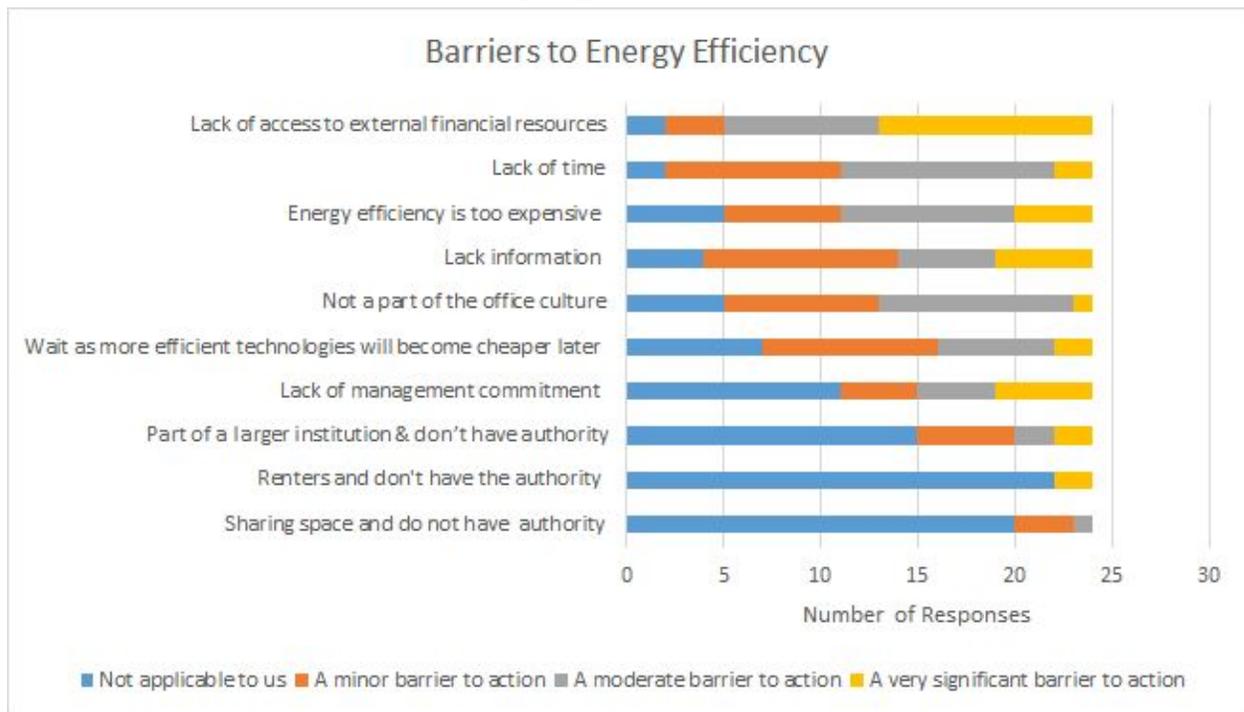
Importantly, respondents further identified that they were more likely to undertake particular actions or technological upgrades when they believed they were cost effective. Cost effectiveness was the most popular motive, when undertaking a technological adjustment, while ease of implementation was more important when considering behavioral strategies (Figure 11).



**Figure 11.** Organizational motivations for reducing energy demand.

### Barriers

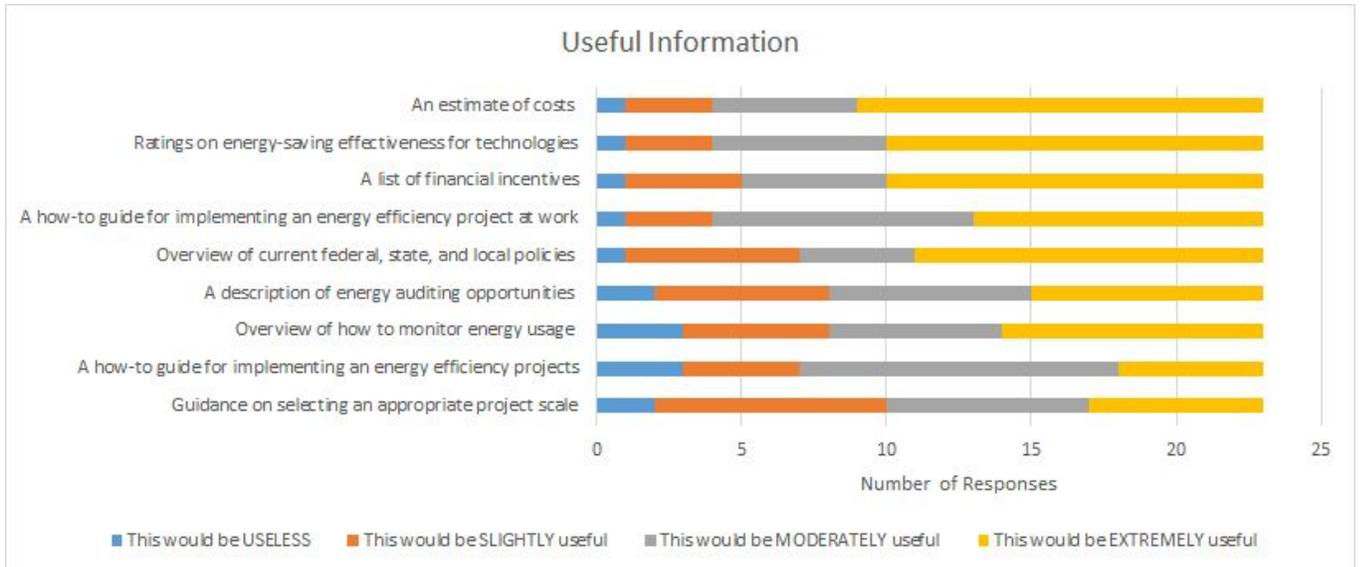
With 45 percent of respondents identifying “lack of access to external financial resources,” as a very significant barrier to action, clearly this is a pervasive constraint. Essentially, organizations need more access to loans and other financing programs to undertake energy efficiency projects. In addition to financial barriers, other key barriers for organizations are a lack of time and information to undertake projects, particularly since efficiency projects are considered too cost-intensive (Figure 12). Many of these salient barriers fit under Golove and Eto’s (1996) categorization of informational barriers including the lack of information in-house, the cost of acquiring that information in time and resources, and the inability to act on information due to lack of financing. These results collectively show that many of the barriers within the literature persist within our sectors of interest in Southeast Michigan and demonstrate the potential value offered by our financing and technology toolkit in addressing many of these time, information, and financing barriers. Renting, space sharing, and being part of a larger organization were not reflected as the main barriers from survey respondents.



**Figure 12.** Barriers to reducing energy demands.

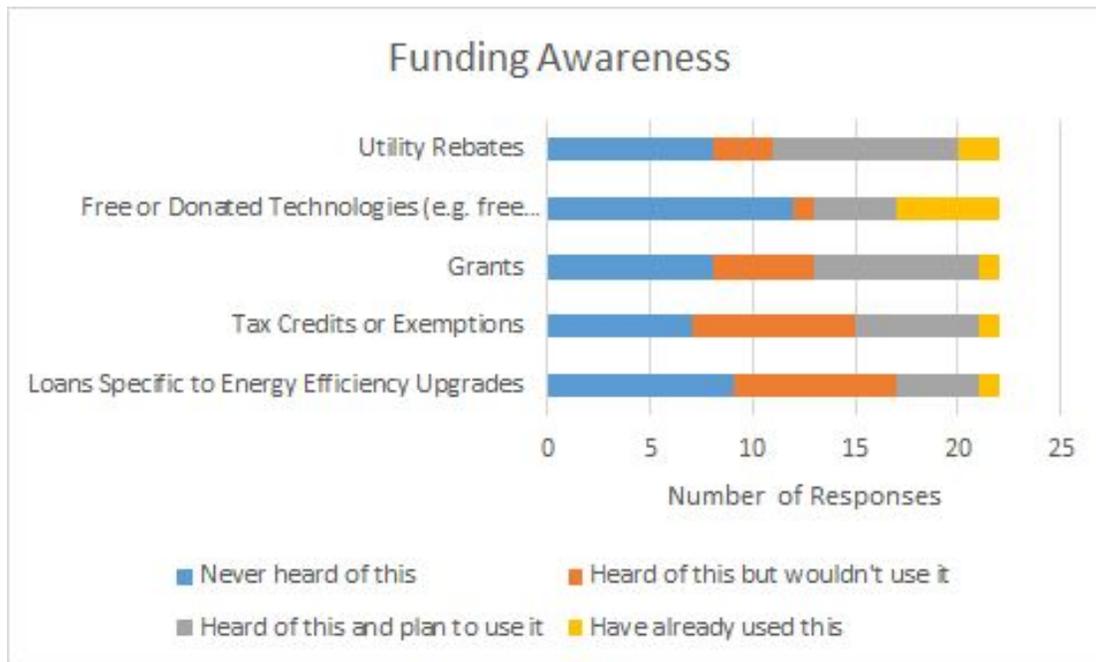
Desirable Information

Organizations most often felt information about cost estimates, financial incentives including loans, grants, rebates, and tax credits, and reviews of energy efficient technologies, and, with 58%, 54%, and 54% of respondents respectively rating these options as extremely useful in supporting them to undertake energy efficiency projects (Figure 13) . Hence, the financing and technology toolkit has the potential to meet some organizational need as it includes information on cost, financial incentives, and technologies.



**Figure 13.** Desirable information for reducing energy demands.

In terms of financing opportunities, sampled organizations reported they are most familiar with utility rebates and least familiar with loans for financing energy efficiency projects (Figure 14). Organizations also seem to have limited familiarity with grants and tax credit opportunities. Since many sampled organizations are nonprofits, which do not have access to additional tax incentives, this latter result is not surprising. Still, comparing their slightly higher familiarity with grants and tax credits in contrast with the desire for more financial information could indicate the main barrier to information is information about loans.



**Figure 14.** Organizational awareness of funding sources.

Sampled organizations reported they are most likely to learn about financing through direct marketing and through conversations with co-workers (Figure 15). Special events also seem to play a key role in shaping awareness of funding sources. In particular, respondents noted the Ann Arbor Mayor’s Green Fair and the Michigan Interfaith Power and Light Conference. Although utility providers were not the top ranking information source, information from utility companies is still reaching organizations, considering that participants noted they are most aware of utility rebates. It is likely that their awareness is a result of information coming from the utility provider and suggests the potential for additional messaging and collaboration with utility companies for targeted outreach.



**Figure 15.** How organizations gain awareness of funding opportunities.

In the next section, we will review the research and design methodology used to develop the Financing and Technology Toolkit. The end of that section will guide you to the Appendix where the 89-page Financing and Technology Toolkit serves as the “results” for that section.

## FINANCING AND TECHNOLOGY TOOLKIT

### Methods

#### *Policy and Program Research*

The objective of the “policy research” module was to learn of existing clean energy and energy efficiency policies and financing opportunities available to educational, health care, religious, and multi-family housing institutions at the local, state, federal, and utility levels.

Our research questions were:

- What are current city, county, state, federal, and utility policies and clean energy financing initiatives?
- Where are there contradictions between clean energy financing policies and other related policies and programs?
- What energy technologies are best suited to specific types of structures or business capabilities?

Our target outputs were:

- Eligibility criteria on the available options for financing energy efficiency improvements to inform the toolkit.
- A comprehensive report describing existing energy efficiency and clean energy finance programs for institutions.

To appropriately scope the project, our target audience was defined as the collection of educational, health care, religious, and multi-family housing for-profit and nonprofit institutions located in Oakland and Washtenaw Counties in Southeast Michigan. Notably, only policies that pertained to the target audience were analyzed and so, while many state and federal policies will apply to a larger group, further research will be necessary to expand the applicability of the toolkit to other sectors or geographic locations.

The policy research was performed through an iterative process. An initial literature review began with the DSIRE policy database. DSIRE is an initiative funded by the U.S. Department of Energy and operates out of the North Carolina Clean Energy Technology Center at N.C. State University. DSIRE is the most comprehensive, publicly available source that captures both regulatory and incentive-based programs for the adoption of renewable energy and energy efficiency measures at the federal, state, and local levels, nation-wide (DSIRE, 2016). Our project’s initial list of financing options was generated through this resource.

While DSIRE presented a broad collection of relevant programs, its listings lacked the necessary degree of detail. The database’s usefulness was challenged further by infrequent updates, to the

point that its information was not completely reliable. To fill close the gaps in our initial research through DSIRE, we utilized online search engines to supplement our list of relevant energy financing programs. Search terms included “energy efficiency financing,” “commercial buildings,” “funding opportunities,” “renewable energy upgrades,” “Michigan,” “Washtenaw County,” and “Oakland County,” and others in various combinations. While these searches only added a relatively small number of programs to the DSIRE collection, it was highly useful in identifying and removing expired programs. Program websites that mentioned other financing opportunities facilitated a “snowball-style” search effect and contributed to an even more complete list of programs.

From the initial literature review list, each program and associated agency website was scoured to collect in-depth information on the program logistics, timeline, qualifiers and other components. This entailed a detailed review of agency-held databases, governmental websites, NGO publications, and utility company websites.

Programs were then categorized as either tax incentives, grants, loans for residential properties, loans for commercial or industrial properties, or rebates. Key distinguishing factors for each category were identified and used to frame an Excel spreadsheet. For example, loans for commercial properties were differentiated largely by whether the owner occupied space in the building, the loan’s term length and principal amount, and characteristics of the lessee. By contrast, loans for multi-family housing properties differed substantially by the number of units within the building. Once key factors were identified, information for each program was then sorted into the Excel spreadsheet for side-by-side review, while websites were revisited to capture any missing information.

The spreadsheet was used to develop the toolkit’s survey component. Distinguishing criteria that differentiated the financing programs were integrated into the survey questions in a manner that would allow us to eliminate certain financing opportunities based on whether the respondent’s answers indicated they may be eligible or not. Once the toolkit’s survey and scoring process was formally outlined (as detailed below), information on each program was re-shuffled into the toolkit’s Appendix as educational materials for survey participants.

Throughout the process, sources were revisited to ensure the program information remained current. Meanwhile, conflicting or confusing information flagged during the pilot study phase was addressed and resolved.

### *Technology Research*

The goal of the technology research was to learn of current clean energy and energy efficiency upgrades available to small businesses and nonprofit organizations in the educational, health care, religious, and multi-family housing institutions in Washtenaw and Oakland Counties.

Our research questions were:

- What renewable energy generation technologies are affordable and accessible to small businesses in Washtenaw and Oakland Counties?
- What building energy efficiency retrofits and appliance upgrades are affordable and accessible to small businesses in Washtenaw and Oakland Counties?

Our target outputs were:

- Available technology options for clean energy generation and energy efficiency.

Payback period in capital budgeting refers to the period of time required to recoup the funds expended in an investment, or to reach the break-even point (Paul, Bendle, and Pfeifer, 2010). Using payback period instead of using project cost only, it is because project cost depends on a number of variables, like the amount of energy usage, the amount of building square feet, the change of equipments' price, therefore, the project cost is vary from one small business to another. Using payback period can narrow down the range, and it is also understandable to most individuals.

The first step in designing the toolkit's educational materials was the creation of an initial candidate list of common energy efficiency and small-scale renewable energy generation technologies. Online search engines and academic journal databases were used to conduct a literature review of these technologies, acquire information, and build a profile of applications, capabilities, and limitations for each technology. Specific information for each technology included a definition, operational lifetime, installation and maintenance cost estimates, energy savings estimate, and distinct benefits. Annual energy savings for a technology were calculated using the formula: operating hours per day(h/day) \* energy generation per hour(KWh) \* 365 (day), the unit is KWh/year.

The technologies were then examined and verified to ensure sure they were all affordable and suitable for the toolkit's targeted organizations and locations. Factors taken into account included the initial start-up cost of a technology, payback period, regional climate suitability, and the typical needs of organizations operating in the target sectors at a small business scale. During this review, technologies like geothermal electric, biomass, and landfill gas were removed because of their large scale or ill-suited land use requirements.

Payback period was also utilized to give toolkit users a better sense of their investment over time rather than just a static project cost valuation. The payback period was calculated using the formula:  $\text{project cost}(\$) / [\text{annual energy savings}(\text{KWh}/\text{year}) * \text{electricity price in Michigan}(\$/\text{KWh})]$ , the unit is year.

Energy efficiency research was mostly based on the U.S. Environmental Protection Agency's (EPA) Energy Star database. Energy Star is a voluntary program that helps businesses and individuals save money and indirectly reduce GHG emissions through the purchase and use of appliances featuring superior energy efficiency (EPA 2014).

While Energy Star provided a long list of energy efficient appliances, it was too broad for small business to explore effectively. To address this problem, we compiled a curated list of common, highly applicable Energy Star appliances to provide a more user-friendly guide to the energy efficiency options available. Appliances were filtered according to relevancy and use for typical small businesses and included refrigerators, boilers, and HVAC systems. Meanwhile, specialized, industry-specific items such as medical imaging equipment were not included. A deeper inquiry into available Energy Star literature and findings from online search engines yielded additional details surrounding each technology. Some in-depth information for technology were some non-profit organizations or appliance upgrade companies instead of Energy Stars. While calculating amount of energy saving per year, the formula followed up was  $\text{use} - \text{hours working per day}(\text{h}/\text{day}) * \text{power}'\text{s difference between old appliance and modern appliance}(\text{KWh}) * 365(\text{day})$ , the unit is KWh/year.

Each technology type was then integrated into the toolkit's Program Code List and Response Guide, the use of which will be discussed later in the report. The characteristics and features of the technologies were treated in a similar fashion as the financing program criteria, meaning they were used to narrow down an organization's list of eligible programs through responses to the toolkit's survey questions.

### *Toolkit Development*

After research on available financing and technology upgrades was complete, the team focused on developing a formalized mechanism by which participating institutions could easily identify their best fit financing strategies. The toolkit survey and scoring sections were designed around how best to gather, interpret, and deliver information on energy financing to property managers. Conversations with professionals in energy efficiency retrofitting and auditing, education and advocacy, and public policy informed the team's decision to model the toolkit after a social survey with a highly customizable assessment tool embedded. The operative assumption was that the property manager would typically not have the degree of expertise or time necessary to complete a multi-step assessment exercise on their own, or at least at a level to allow the labor

spent to yield worthwhile results. It also seemed unlikely that an individual with sufficient depth of knowledge on the financing programs would be available to advise each individual on their best options, since a lack of freely available, centralized resources represents a pervasive problem already.

The core component of the toolkit is the Survey Form used to collect data from individuals participating in the exercise. The 22 question survey is divided into three sections covering the organization and building characteristics, specific energy needs faced by the organization, and additional preferences dealing with financing and project options. Survey questions were developed by combing through the minute details of each financing program to identify distinguishing characteristics that could be captured within questions. As participants provide responses to the survey, programs are slowly eliminated from the list of financing opportunities until the survey's conclusion, at which point all that remains on the list are a narrow collection of programs the participant specifically qualifies for.

A major challenge in establishing the coding scheme was crafting survey questions that were both simple to understand and insightful enough to be tied to a program's criteria. Care was taken to fully capture and assess the eligibility criteria of each program to ensure the most accurate coding possible. The workbook authors acknowledge the limitations inherent to this approach, as unforeseen or overly complex answers may present themselves and not fit neatly into the coding system. However, the workbook was designed with this limitation in mind, as the person who is administering the survey (most likely a representative from the Ecology Center) is given instruction and materials to assist the survey participant in walking through these special cases. In addition, open-ended questions in the survey are intended to flag potential problem areas for an organization in the context of the exercise, such as uncommon energy needs or chronic building issues that may manifest in opaque ways.

More information on the full survey process and coding system can be found within the Financing and Technology Toolkit itself (See Appendix 4). Feedback on the toolkit survey questions and coding scheme was solicited from project advisors and client contacts at the Ecology Center before launching the pilot test.

### *Pilot Testing*

The toolkit survey and coding process was pilot tested after feedback from the project advisors and Ecology Center was integrated. The product was pilot tested with two organizations, one from each of the study counties. The main objective of the pilot test was to assess the usability, understandability, and comprehensiveness of the toolkit and accompanying policy and technology educational materials.

The organizations that pilot tested the toolkit were selected from the organizations that participated in energy efficiency survey. During the survey, organizations indicated if they were willing to be contacted at a later date and participate in the pilot testing of the toolkit. Seven organizations indicated their willingness to participate. During January 2016, we contacted all seven organizations inquiring about their availability and continued interest. Several organizations followed up, and we were able to secure test interviews with two organizations.

The team generated a pilot-test protocol to create consistency between the two test organizations and test dates (see Appendix 5 for details). Feedback from the pilot tests was integrated into final toolkit design and scoring processes. Appendix 4 features the culmination of this research in the form of the Financing and Technology Toolkit.

The following section provides our research methods into community marketing as well as our outreach and messaging recommendations for the Ecology Center presented within our Implementation Plan.

## **IMPLEMENTATION PLAN**

### *Background*

The implementation plan is designed by feedback obtained during the business community survey. The response to the survey fell short of expectations and resulted in a relatively small sample size. Also, with some limitations of the survey, we supplemented the plan with other outreach and advertising strategies. In part, the challenges encountered during the project's outreach phase motivated the development of outreach and advertising strategies for the client to overcome the information barriers present and better disseminate the final toolkit. First, we analyzed the results of the survey and sought to understand what outreach practices could be applied to our proposed marketing strategies. Next, we researched organizational performance on marketing to determine which types of marketing strategies best fit the client's capabilities and goals. Finally, the project team assessed how these different marketing strategies could be used to effectively deliver the toolkit to potential customers.

The purpose of the implementation plan is to lay out alternative strategies for the Ecology Center to consider in conducting outreach to broader group of prospective clients for their services in energy efficiency guidance for buildings. The information barrier discussed earlier in this report highlighted some of the opportunities for improved outreach methods, such as social media, to solicit participation in the Ecology Center's programs and implement the Financing and Technology toolkit. In this section, we identify some of the potential advertising strategies to raise public awareness of the Ecology Center and its resources. In addition, we examined the utilization of trade shows as an outreach platform. We also examine the demographics of the Ecology Center's target audience, lessons learned from the business community survey within the context of outreach strategies, and a review of the viability and application of these strategies.

### **Methods**

#### *Target Audience*

Small businesses and community-scale organizations offer distinct benefits and services, but are not always held in mind during the design of energy financing programs. The size of these organizations can lead to them being overlooked in large-scale energy programs, while they are also excluded from the abundant funds intended for residential sector retrofits. As an operator within the small business and nonprofit sector, the Ecology Center is uniquely positioned to assist these organizations in accessing the information necessary to secure financing for efficiency upgrades. The Ecology Center's primary client base consists of property owners in Southeast Michigan and requested this project focus on four subsets of that population: health care, private education, religious institutions, and multi-family housing. All components of the

toolkit were designed with modularity and future upgrades in mind, making it straightforward for the Ecology Center to widen the toolkit's applicable scope in the future.

### *Lessons from the Project's Mailing Effort*

While mailing is viewed as an effective means of reaching potential clients and distributing branded information from the Ecology Center, the response rate for our project's own mailed survey was surprisingly low. The response rate (meaning a postcard recipient went online and filled out the survey) was 1.9 percent for 1,000 postcards sent. At a \$700 cost to print and mail the postcards, this translates to a cost of \$36 per positive response for the project. Furthermore, the amount of labor required to gather and vet the necessary mailing addresses was highly inefficient. Although this method of "cold mailing" has the capacity to be effective and is relatively inexpensive compared to other forms of outreach, some studies suggest it may lead to indifference or backlash toward the mailing organization (Drake, 2015; IPA, 2016). However, the Ecology Center could benefit from using mailings as a means of following up with previously identified clients and interested parties.

The phone calls conducted as a follow-up to the mailed survey requests led to the discovery that many recipients were not directly responsible for building management decisions due to a division of labor between administrative and facility management duties. Oftentimes, the individual contacted would be unsure of who the best point of contact would be for our survey inquiry. The follow-up calls further revealed that most individuals did not even recall receiving the postcard or automatically assumed it was junk mail and discarded it without studying it further. Studies have found that people tend to be more responsive to mailed surveys if they are at least somewhat familiar with the organization sending it (Taylor, 1987). The matter of the survey's relevance to in the mind of the recipient is also crucial and may have been a significant barrier to this project. Social media may present an opportunity to cut through some of these barriers, though further research is needed to determine the degree to which the Ecology Center's primary clientele (older generations) actually utilize social media platforms, particularly in a business context.

## **Research and Findings**

### *Discussion of Outreach Messaging and Strategies*

A more effective outreach plan tailored to individual client's needs can be derived from the lessons learned via this project and our literature review of marketing best practices. For instance, certain audiences may not respond well to the incentives because they do not have the authority to actually make those sorts of financial decisions (Katina. Personal interview. 23 Sept. 2015). This inconvenience and effort required to follow up might have dissuaded participation. With this type of insight, we can design messaging that will be more relevant and effective for

the target audience. Presenting convoluted fiscal details, program criteria, and technical information in a plain-language, user-friendly format can also greatly improve reactions to messaging and products like the toolkit, while also empowering individuals to take more independent actions. Moreover, approaching the right person (building manager) who is in charge of the properties can also make our outreach messaging become more effective.

The Ecology Center expressed a desire to contact new groups in the community, but they are also sensitive to doing so at a realistic cost point. Online advertising methods present one option for maximizing exposure and striking the balance between flexibility, cost, and market coverage.

Table 2 outlines a list of potential avenues we developed for reaching the target audience for the Ecology Center’s new toolkit. Three primary outreach methods are presented, along with secondary methods, and the advantages and disadvantages of each.

**Table 2.** Outreach methods for increasing adoption of the Ecology Center’s energy services. Adapted from a guide by the Caribbean Institute for Meteorology and Hydrology, 2011.

Method	Potential of Mutual Participation	Target Audiences	Advantages	Disadvantages	Costs
<b>Online Ads</b>	<ul style="list-style-type: none"> <li>- High potential via:</li> <li>- Blogging</li> <li>- Listservs</li> <li>- Chat</li> <li>- e-networking</li> <li>- Two-way communication</li> </ul>	<ul style="list-style-type: none"> <li>- Younger generation</li> <li>- Listservs can be set up for specified audience</li> </ul>	<ul style="list-style-type: none"> <li>- Target new generation</li> <li>- Global outreach versus local or international</li> <li>- Target group can be specified</li> </ul>	<ul style="list-style-type: none"> <li>- Lower conversion rate</li> <li>- Internet access is required</li> <li>- Customers get distracted and may ignore the ads</li> </ul>	<ul style="list-style-type: none"> <li>- A webpage can cost \$1,500 to \$5,000</li> <li>- Listservs can be cheaper, but more expensive if the process is to be monitored</li> </ul>

<b>Trade Show</b>	<ul style="list-style-type: none"> <li>- High potential</li> <li>- Two-way communication</li> </ul>	<ul style="list-style-type: none"> <li>- People who are in the same industry or who have the same interest</li> </ul>	<ul style="list-style-type: none"> <li>- High status</li> <li>- Networking</li> <li>- New knowledge learning</li> <li>- Enhancing goodwill</li> <li>- Gaining company publicity</li> </ul>	<ul style="list-style-type: none"> <li>- High &amp; rising costs of participation</li> <li>- Tied to time of trade show</li> </ul>	<ul style="list-style-type: none"> <li>- 10x10 booth displays cost around \$500 to \$1,000</li> </ul>
<b>Partnership with other institutions</b>	<ul style="list-style-type: none"> <li>- Medium</li> <li>- Two-way communication</li> </ul>	<ul style="list-style-type: none"> <li>- Similar / complementary entities to the Ecology Center</li> </ul>	<ul style="list-style-type: none"> <li>- Synergistic effect</li> <li>- Gain broader customer base</li> <li>- Acquire new knowledge</li> </ul>	<ul style="list-style-type: none"> <li>- Loss of control on certain projects</li> <li>- Private information leak</li> </ul>	<ul style="list-style-type: none"> <li>- Free</li> <li>- Depends upon the contract and deals</li> </ul>
<b>TV</b>	<ul style="list-style-type: none"> <li>- Mass media</li> <li>- One-way communication</li> </ul>	<ul style="list-style-type: none"> <li>- General public</li> <li>- More specified group if advertised at a certain time</li> </ul>	<ul style="list-style-type: none"> <li>- Can generate interest awareness and excitement</li> <li>- Wide reach</li> <li>- High credibility</li> </ul>	<ul style="list-style-type: none"> <li>- Minimal interaction (unless call-in show)</li> <li>- Expensive</li> <li>- Can be too broad and yield minimal impact</li> <li>- Program may not be on during a convenient time</li> </ul>	<ul style="list-style-type: none"> <li>- From \$5,000 to \$10,000 for 30-second TV spots in prime time</li> </ul>
<b>Mailing Campaign</b>	<ul style="list-style-type: none"> <li>- Mass audience</li> <li>- Two-way communication</li> </ul>	<ul style="list-style-type: none"> <li>- Specific target group</li> </ul>	<ul style="list-style-type: none"> <li>- Low cost</li> <li>- Filter out only uninterested people (returned mail)</li> <li>- Tangible</li> </ul>	<ul style="list-style-type: none"> <li>- Low yield rate (Ignorance &amp; loss)</li> <li>- Slow response time</li> <li>- Environmental implication</li> </ul>	<ul style="list-style-type: none"> <li>- Cost per physical copy</li> </ul>

<b>Interest Group</b>	- Higher participation  - Two-way communication	- Specific target group	- Quicker and higher adoption rate  - High yield rate	- Bias of opinion of one certain group	- Cost varies
<b>Targeted Outreach</b>	- Very high participation  - Two-way communication	- Specific target group	- Direct Impact  - More complete information  - Unbiased interpretation	- Time consuming  - Higher operating cost  - Biased feedback when confronted directly	- Cost varies, depending on the location price

*Trade Shows*

Trade shows take place at a large scale where businessmen and other members of the public come to network with vendors and make new connections. Workshops and white paper presentations can also be part of the trade show to convey more detailed information. There are local upcoming energy efficiency events in Michigan that the Ecology Center may consider attending, such as the Green Building Automation conference, the Energy Conference & Exhibition hosted by Next Energy, and the Great Lakes Renewable Energy Association conference. Regional trade shows the Ecology Center may also consider attending include the Northeast Energy Efficiency Summit, Greenbuild in Washington, D.C., the Midwest Energy Efficiency Alliance conference, the Residential Building Design and Construction Conference, and the Sustainable Design, Engineering and Construction Conference. Such events could help the Ecology Center gain information, public exposure, and potential partners in the building sector.

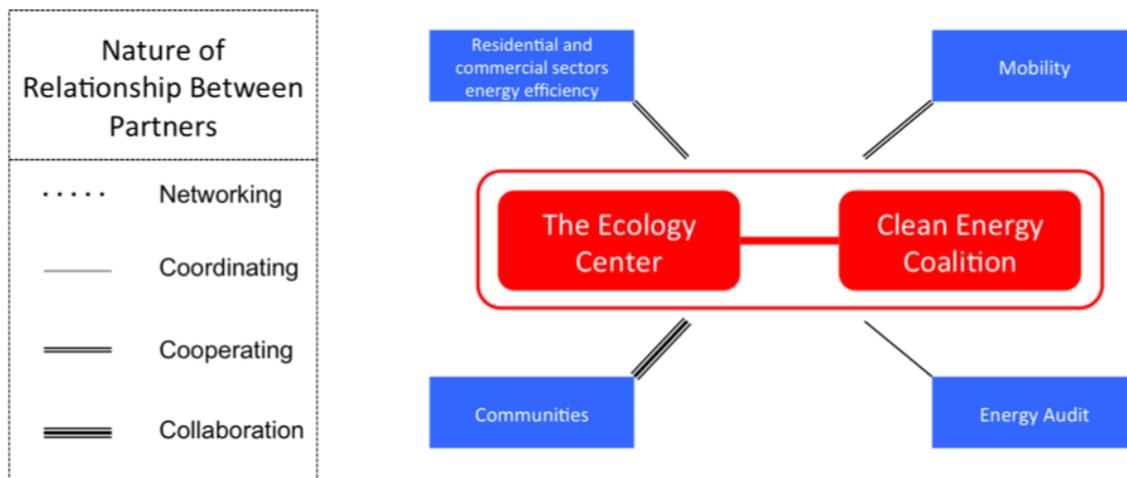
Trade shows possess several advantages that the Ecology Center should consider. The prospective customers will engage directly with an exhibitor and are more likely to be interested in the types of services the Ecology Center offers if the exhibit matches the target audience. Furthermore, show attendees are more likely to commit themselves and will want to learn about new services on the spot. Generally, attendees travel to the trade shows on their own expense, signaling their motivation to acquire new skills or purchase services. These factors could result in less wasted effort by the Ecology Center in recruiting new clients. In addition to this, exhibiting at a trade show will not only serve as a point-of-contact, but also tell the industry that the Ecology Center has the potential to deliver distinct energy efficiency related services to the public (Symonds, 2014).

### *Partnerships with Institutions*

Establishing partnerships between the Ecology Center and institutions with similar interests would allow the Ecology Center to recruit new clients and gain a fresh perspective to further strengthen their own core competencies. Prospective partners in Southeast Michigan include Clean Energy Coalition, Michigan Energy Options, EcoWork, Michigan Saves, Elevate Energy, Michigan Interfaith Power, A2Y Chamber, and electric utility companies.

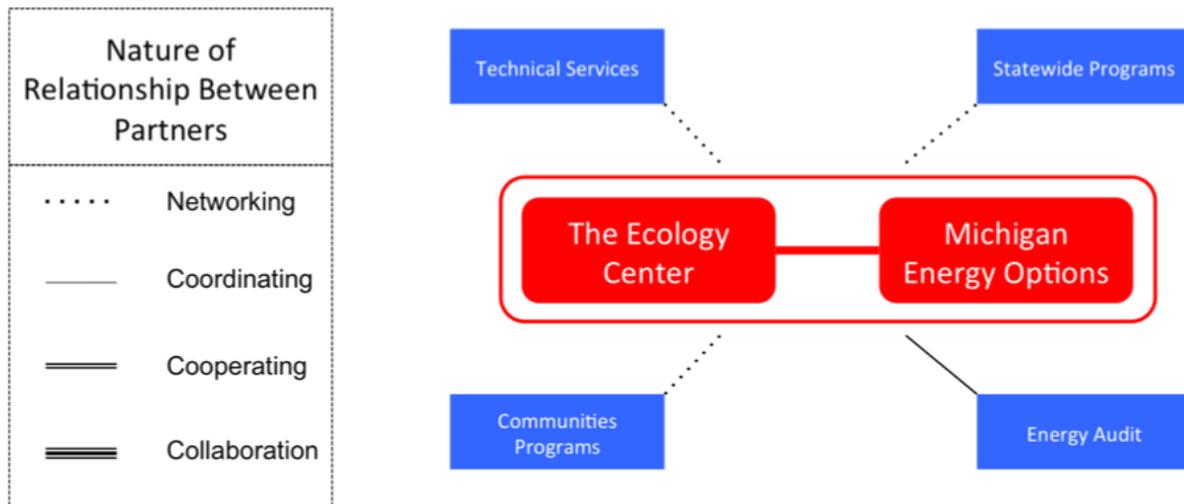
According to Wei (2014), business partnerships are one of the most effective ways for an organization to gain a competitive advantage and access complementary resources and capabilities. For example, the Ecology Center can better target prospective clients through resources available via local chambers of commerce. In addition, the Ecology Center could learn more about program areas that they do not currently specialize in, while doing the same for the partner organization and generating mutual benefits. For instance, Elevate Energy has a robust Energy Concierge Service that may complement the Ecology Center’s communication expertise.

Different levels of institutional partnerships include networking, coordinating, cooperating, and collaborating. Networking refers to exchanging of information and sharing some thought and ideas. Coordinating refers to exchanging information and altering one’s own activity so that two parties can participate in a shared event. Cooperating includes everything from networking and coordinating, plus sharing of resources of more than one party, in order for both parties to work toward common goals. Collaboration refers to the deepest level of integrated relationship between parties. It includes all previous definitions plus enhancing capacity of one another so that one party help another party to become the best on what they do (Bull, 2013). The following section examines four diagrams portraying how the Ecology Center may be able to partner with similar organizations.



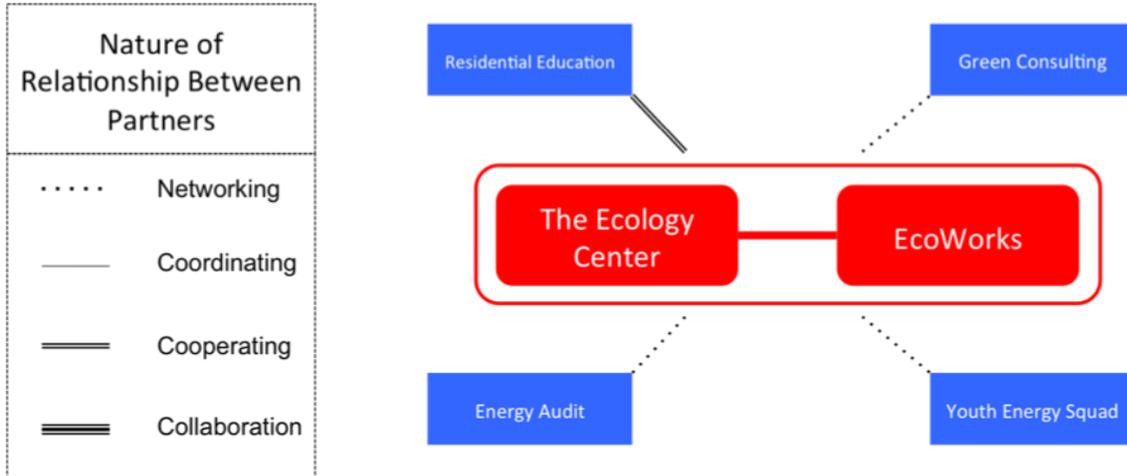
**Figure 16.** Example of relationship between the Ecology Center and Clean Energy Coalition.

**Clean Energy Coalition (CEC):** “a nonprofit, non-partisan organization dedicated to promoting clean energy technologies as a way to create healthier, energy independent communities.” The Ecology Center has expressed the desire to start working on transportation and super-charger projects for electric vehicles. As Figure 16 illustrates, this presents an opportunity to cooperate with CEC, since it already possess these resources and both governmental and private citizen connections. CEC has worked with over 40 Michigan municipalities on a variety of programs, from building efficiency to recycling programs. CEC also has professional energy audit personnel on staff, which the Ecology Center currently lacks (CEC, 2016).



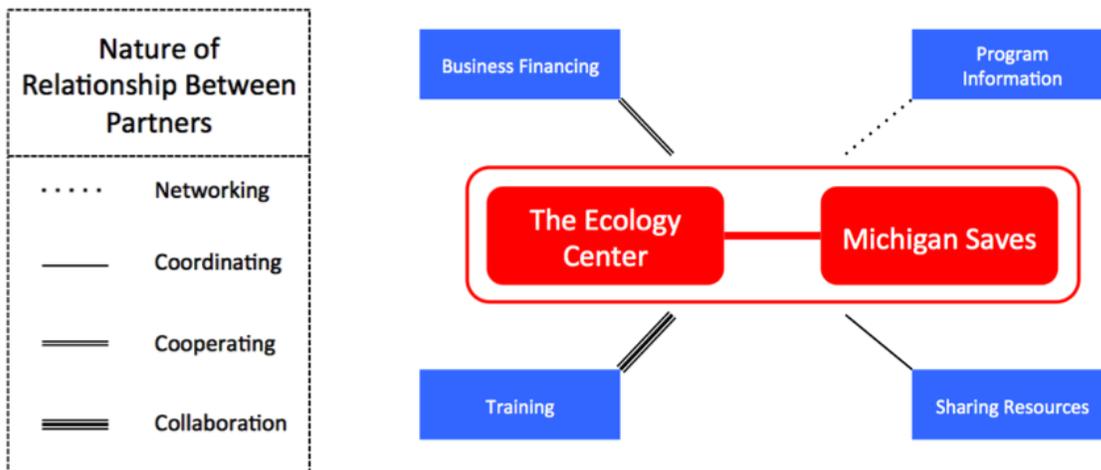
**Figure 17.** Example of relationship between the Ecology Center and Michigan Energy Options.

Figure 17 illustrates the potential relationship between the Ecology Center and Michigan Energy Options. Michigan Energy Options (MEO) is a nonprofit that “guides communities toward being more sustainable and resilient through the adoption of more energy efficiency and renewable energy.” MEO has several projects that partner with local governments and features cross-over potential via its statewide program, technical services, and community engagement capabilities (Michigan Energy Options, 2016).



**Figure 18.** Example of relationship between the Ecology Center and EcoWorks.

Figure 18 illustrates the potential relationship between the Ecology Center and EcoWorks. EcoWorks is a “Detroit-based nonprofit with over 30 years of providing services at the intersection of community development, sustainability, and social justice.” EcoWorks has found success through its residential education efforts. They offer training solutions and guidance to clients for achieving personalized energy goals, helping these participant accomplishing their goals (EcoWorksDetroit 2016)



**Figure 19.** Example of relationship between the Ecology Center and Michigan Saves.

Figure 19 illustrates the potential relationship between the Ecology Center and Michigan Saves. Michigan Saves is a “nonprofit dedicated to making energy improvements easy and affordable.” Michigan Saves possess useful resources and information management systems, that the Ecology

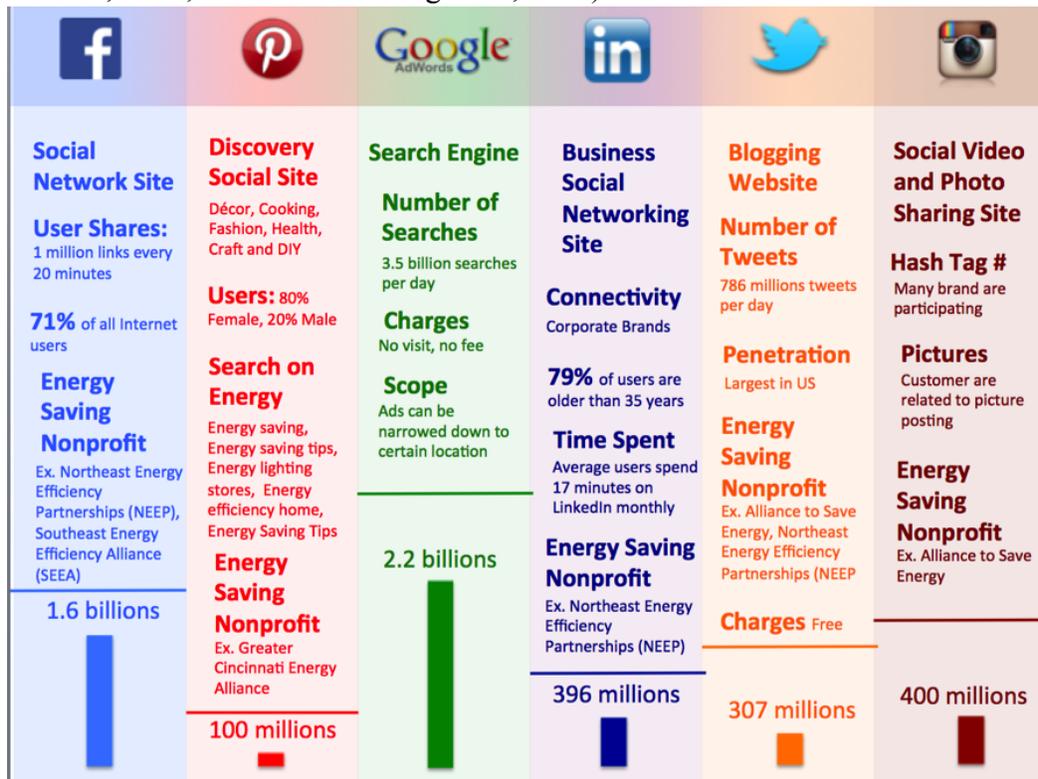
Center could consider adopting. Michigan Saves specializes in financing business and residential owners, as well as monthly contractor trainings (Michigan Saves, 2016).

### *Internet Advertisements*

Online services such as Google and Facebook are the most promising online advertising strategies since they not only yield the lowest cost, but also have the highest public exposure rates than other ads platform. They also have relatively high click-through rates versus other online advertising platforms and bear the lowest cost compare to other conventional advertising, like mailing campaigns, interest groups, direct outreach, TV ads, partnerships with other institutions, and trade conferences. Click-through rate is defined as the ratio of users who click on a link to the number of total users who view that link (Kenny, 2015). This help to measure the success of of online advertising webpage. The click-through rate for email is 0.10 percent, 0.12 percent for Facebook, and 1-3 percent for Twitter. If the ads are viewed 1,000 unique individuals, Facebook would cost only \$0.59 as opposed to \$3.50 for Twitter (Chaffey, 2015). Trade conferences and institutional collaborations could also be done simultaneously with online ads to maximize the exposure of the Ecology Center.

Internet advertising has recently become the lowest advertising cost compared to every other conventional advertising method. There are several popular internet advertising platforms available, each with benefits and drawbacks documented in Table 3. Facebook and Google Ads are the focus here, since they have the highest number of daily users and offer information resources for business advertisements.

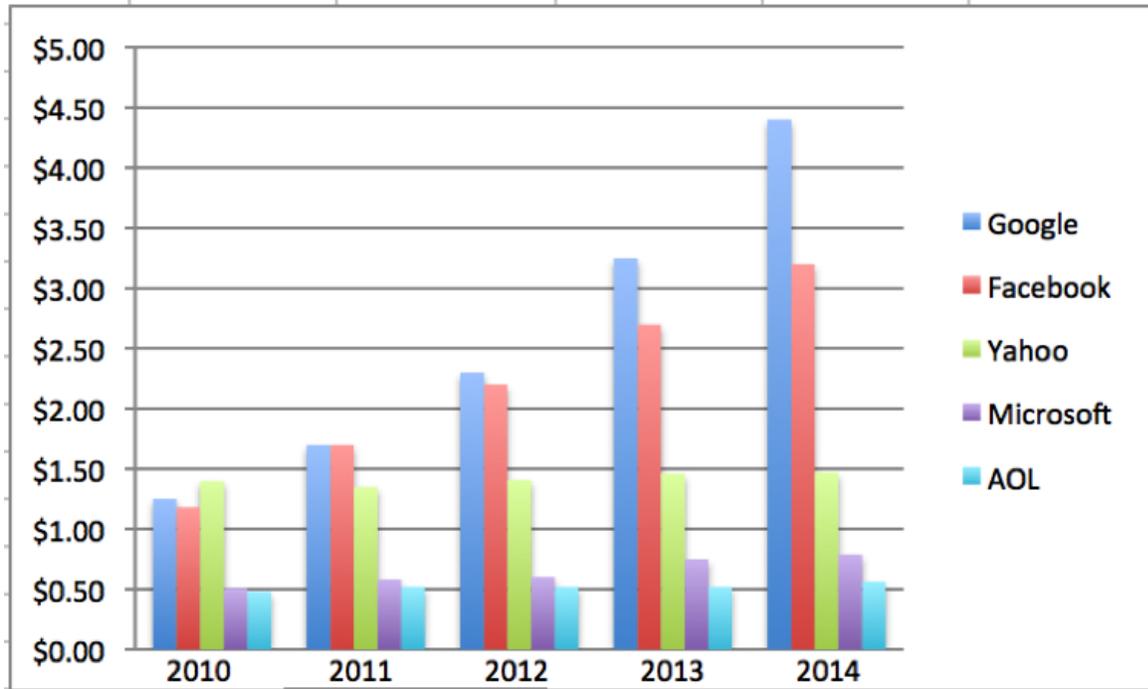
**Table 3.** Internet advertising comparison (Bennett, 2014; Statistic Brain, 2015; Google Search Statistic, 2016; Social Networking Stats, 2012).



Online ad revenue growth over the past few years indicates both Google and Facebook’s ad services are becoming very popular, taking the market share from others platform greatly (Tables 4). There is no growth in other popular online platforms, namely, Pandora, Yelp, and Twitter. Other online ad platforms experienced a significant decline in market share. Google and Facebook account for 69 percent of worldwide mobile ad revenue (Statista, 2012), making them prime methods for the Ecology Center to reach prospective clients (Figure 20).

**Table 4.** Worldwide mobile internet advertising market share

Year	Google	Facebook	Pandora	Yelp	Twitter	Other
2011	38.10%	0.00%	3.00%	2.30%	0.00%	56.60%
2012	52.40%	5.40%	2.70%	2.90%	1.60%	35.20%
2013	53.20%	15.80%	2.40%	2.30%	1.90%	24.50%



**Figure 20.** Estimated U.S. display advertising revenue, billions of dollars (Statista Infographics, 2012).

Google and Facebook could potentially allow the Ecology Center to deliver messages to target groups at a relatively low cost (Table 5). Facebook is a great tool in creating awareness and building a client base, but the ads must be monitored intermittently. Once people “like” a Facebook page, they automatically become followers and will eventually see your future ads and promotions (unless they opt out of the notifications). Facebook display ads are based on users profiles and user friends’ recommendations. Google, does not record much of the user’s profile and only knows what the users are searching for in each interaction. This leads to greater precision as users are directed to what they actually care about through their searches. Both Google and Facebook ads are newer online advertising platforms and appeal more to younger generations. Targeting through these platforms may not create the desired impacts since these younger users are not typically property owners. Despite this hurdle, these two online platforms can still be considered useful, as they will bring awareness to future clients and a general audience.

**Table 5.** Comparison of Facebook and Google ad services (Prosser, 2013; Facebook for Business, 2016; Google Ad, 2016; MandaLibre, 2014).

Trait	Facebook Ads	Google Ads
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<b>Advantages</b>	<ul style="list-style-type: none"> <li>- Higher number of “clicks”</li> <li>- Type of ads are generated based on users’ profiles</li> <li>- Users will be able to see what their friends like</li> </ul>	<ul style="list-style-type: none"> <li>- Ads are displayed on Google’s “Displayed Network”</li> <li>- Allows users to place their ads on other sites</li> <li>- Ads can be set to show in a specific location</li> </ul>
<b>Disadvantages</b>	<ul style="list-style-type: none"> <li>- Interest in seeing the ads fades away quickly</li> </ul>	<ul style="list-style-type: none"> <li>- Advertisers have no control over who sees the ads</li> </ul>
<b>Focus</b>	<ul style="list-style-type: none"> <li>- Ads are generated based on users’ interests, demography, and geography</li> </ul>	<ul style="list-style-type: none"> <li>- Keyword-based</li> <li>- Targets users who look for something specific</li> </ul>
<b>Action</b>	<ul style="list-style-type: none"> <li>- Monitor the ads and update them periodically</li> </ul>	
<b>Cost</b>	<ul style="list-style-type: none"> <li>- Average click cost of \$0.24</li> <li>- Average cost per mille cost of \$0.66.</li> </ul>	<ul style="list-style-type: none"> <li>- \$0.2 cents to \$3.00 (less common words)</li> <li>- \$3.00 to \$8.00 (commonly used words)</li> </ul>

### *Television Advertisements*

Regional television ads may suit the Ecology Center’s advertising strategy. Comcast Spotlight presents one local option. Comcast provides video-based advertising solutions for local, regional and national advertisers. The service has access to over a million subscribers through satellite and online mobile devices (Comcast Spotlight 2016).

### *Targeted Outreach Group*

Finding the appropriate interest groups to contact can be challenging. To better determine which groups are interested in energy efficiency, utility organizations such as the National Rural Electric Cooperative Association (NRECA) could provide valuable insights. NRECA represents the interests of over 900 electric cooperatives in the U.S. and publishes an online resources the Ecology Center can utilize to identify cooperatives that promote energy efficiency. Most of these cooperatives are nonprofit and could be a useful information source for the Ecology Center over the long run (NRECA, 2016).

### *Review of Outreach Messaging*

A lack of familiarity with the Ecology Center's name seemed to contribute to the lower than expected response rate to the outreach survey. According to Anseel (2010) and Tourangeau (2000), an increase in response rates may occur over time if response enhancing techniques are used in targeting recipients. Also, plain-language should be used in any mailings, though this practice was already adopted by the project.

Enhance response techniques may not be equally effective among different participants, but the improvement can be seen over the long run. The first instance of this technique is pre-notification, meaning earlier notification of the participant makes them more likely to fill out the questionnaires because they will have a sense of obligation and a request for aid directly from the researchers. A follow-up emphasizes the importance of the questionnaire and instills some form of regret or guilt in the participant to complete the questionnaires. Money incentives can also increase the response rate. Next, personalization builds a relationship with the participant, while also allowing the researchers to convey the importance of participation. Use of an identification number will preserve the participant's anonymity and thus could drive up the response rate. Lastly, institutional sponsorship (such as a university) can drive up the survey response if the participants have the past experience or knowledge of said institution. Also, working with an institution may increase the level of neutrality, confidentiality, and credibility for the survey participants (Anseel, et al., 2010).

When talking about the language of the survey, the survey questions should not contain anything that is unclear which could prevent the responders from understanding. For example, syntax, sentence vagueness and presupposition can present hurdles for respondents (Tourangeau, et al. 2000). These respondents may interpret questions in various ways. Moreover, if the questions don't fit due to the pre-supposed sentences, the respondents may reinterpret the questions in ways that apply to them when there are no opt-out ("don't know") options. Lastly, lengthy or complex question can exceed the respondents' capacity to interpret and answer the question in a correct manner (Tourangeau, et al. 2000). During our focus group interviews, we noticed that some of our question did not apply to the specific respondents and there were times when we had to clarify the question meanings.

### *Final Recommendations*

For the survey response, we strongly believed that better word choices and explicitly clear sentences will lead to a greater survey response rate (Anseel, 2010). According to Tourangeau (2000), the readers will not have to face any uncertainties in interpreting the questions and their meaning. In addition, having the respondents fill out the survey questions together with the administrator can remove all the barriers and increase the respondents' confidence when there is

someone to guide them along. The capabilities of the individual administering the Toolkit is quite important and should have sufficient knowledge to undertake the survey.

Understanding the psychological influences behind energy behaviors could lead to the Ecology Center attracting more customers. Fostering an environment enriched with information and engaging learning opportunities can be rewarding for both parties and can help strengthen long-term relationships between the organization and its clients. For example, providing a one-stop service tailored to individual needs can result in greater client satisfaction and improved energy outcomes. The Ecology Center may also want to partner with other nonprofit organizations that work in the energy efficiency sector and collaborate on services that the Ecology Center may not be able to offer on their own. The Ecology Center can then refer its customers to its partner organizations in order to create a holistic experience and better fulfill its client's needs.

We believe the major online advertising methods featured here are both useful in their own way and it could be beneficial for the Ecology Center to pursue concurrent advertising platforms. Specifically, Google is most promising when used to target people who are specifically wish to perform building upgrades, as informed by their keyword searches. Facebook should be included in an advertising plan as a way to create a digital “word-of-mouth” and increase the momentum toward overcoming familiarity and trust barriers by leveraging service recommendations via friends. Despite the use of these two online ad methods, other methods should also be strategically implemented by the Ecology Center given their respective strengths.

The final section of this report provides a discussion of some of our lessons learned and further recommendations for the Ecology Center as they seek to increase the accessibility and affordability of energy efficiency upgrades for small businesses and nonprofits in Southeast Michigan.

## DISCUSSION

### *Integrating Lessons Learned from the Business Community Survey*

The Financing and Technology Toolkit (toolkit) developed through this master's project has the potential to be a prominent tool for disseminating information on energy efficiency financing programs that county and municipal offices across southeastern Michigan are eager to see put to use. The toolkit is designed to address several of the key barriers to energy efficiency adoption found in the literature; in particular, those related to capital constraints, high transaction costs, and limited information. The toolkit addresses these barriers by directly connecting institutions with their most appropriate financing and energy demand reduction technology options through a simple 20 minute survey, thereby easing the comparison process and effectively minimizing the time and resources required to perform upfront research. The results of our Business Community Survey further demonstrate that an appetite for this toolkit exists within the small business and nonprofit sectors of Southeast Michigan.

Our Business Community Survey confirmed that many of the barriers to pursuing energy efficiency within the literature applied to our geographic scope and sectors of interest. This included lack of access to external financing resources, lack of time, and the belief that energy efficiency is too expensive to pursue. Additionally, the majority of respondents indicated that information on financial incentives, current technology options, and cost estimates would be "extremely useful," particularly related to loan opportunities, with which they were the least familiar. Despite these informational needs, just under half of respondents indicated they were either unlikely to, or would never, seek professional consultation to learn more. It seems clear that many see an energy audit as a superfluous expense rather than a critical step towards identifying energy savings potential and securing funding.

Of particular interest to the design of the toolkit and Implementation Plan was the current institutional knowledge of energy efficiency opportunities, and motivations to pursuing upgrades. The Business Community Survey revealed that while 45 percent of sampled organizations have an in-house "energy champion" that promotes staff awareness around energy efficiency, fewer groups had actually formalized sustainability goals within documented plans to improve energy efficiency.

The toolkit was designed with the results of the Business Community Survey under consideration, so as to address many of the challenges specific to our region and organizations of interest. In particular, there is a heavy emphasis on loan opportunities, and an entire section that guides the community organization in developing an energy efficiency plan, thereby equipping their in-house champions and energy advocates with the necessary tools and resources. Furthermore, every organization that uses the toolkit is provided with an informational page on

energy audits and how to finance them, regardless of their survey response, so as to promote the use of this critical service.

The Implementation Plan that contains both outreach and messaging strategies for the Ecology Center similarly integrates results from the Business Community Survey so as to address the character of our target small businesses and nonprofits. In particular, through our efforts to solicit participation in our online survey, we learned that cold mailings were not an effective approach. The reasons for this are two-fold. First, those who receive and process mail are not typically responsible for building management decisions and sometimes don't even know who is responsible. Second, our student group was an unrecognizable entity as the mail sender. Considering that the Ecology Center is a better-known name in the region, we presume they will experience less trouble. Regardless, should they choose to pursue a mailing campaign to announce the availability of the toolkit, they may want to first identify specific recipients (i.e. the names of building owners, operators, and managers), and they may want to time it with an annual newsletter or other materials with familiar logos such that it occurs at a time when mail recipients are primed to read it.

The Business Community Survey also provided insight into where our target organizations seek out energy efficiency information and their motivations behind such efforts which informed our outreach and messaging considerations. For example, other than direct mailings, "learning from peers" and "special events" are also key avenues through which survey respondents seek to learn about financing options. Considering this, the Implementation Plan identifies key partners that the Ecology Center could use as a network of peers to disseminate the toolkit. In regards to messaging, the Implementation Plan encourages the Ecology Center to advertise the toolkit as a quick and simple means to save on utility bills, considering current barriers around time, but also interest in lowering energy costs. While not all audiences respond well to these incentives, some particular groups may be more inclined.

In total, this research team has integrated knowledge of the community, to the best of its ability, into the design of the Financing and Technology Toolkit as well as the Implementation Plan for the Ecology Center. We learned a great deal about the current barriers perceived by small businesses and nonprofits in Southeast Michigan, as well as the motivations behind pursuing such technology upgrades. We believe the toolkit and Implementation Plan fill an important niche to encourage the adoption of energy demand reduction technologies and behaviors. Despite this, there are two key limitations to this project outlined in the following section, that we encourage the Ecology Center to consider as they move this initiative forward.

### *Limitations of the Project*

In this section, we discuss some of the challenges related to our Business Community Survey sample size and the restricted scope of our toolkit.

**Challenges to Interpreting the Business Community Survey.** It is important to recognize, first and foremost, that our response rate was very low and the resulting sample size is quite small, which means our toolkit and Implementation Plan are designed primarily towards a biased target population. In particular, survey results are largely skewed by religious institutions and schools. Additionally, the survey reports on individuals who are already primed to be interested in energy efficiency because our incentive for participation in the survey was the potential to win a free energy audit. What may be effective avenues and messaging for these organizations, may not be as effective for property managers and health care facilities, or less environmentally-minded churches and schools. The survey response rates provide some indication of how responsive this target audience is to solicitations for participation. Importantly, though, we were soliciting them to participate in a survey, rather than to learn directly about financing options such that response rates could vary based on the activity, its complexity, and its time-intensive commitment.

While much of the survey results confirmed barriers in the literature and identified major sources of energy usage, it is important to approach the results with a critical eye. For example, responses regarding current energy use and loss indicates that a mixture of building stock improvements and retrofitting may be top priorities for stakeholders seeking to improve their energy efficiency in the Washtenaw and Oakland County region. However, this is not a definitive finding due to the respondents' likely misperceptions of their own energy usage, as well as their higher likelihood to recognize and pursue curtailment strategies above technology upgrades and investments to reduce energy demands (Attari et al., 2010). Thus, it may be valuable for the Ecology Center to critically consider potential differences in their target audiences that may not have been represented within the Business Community Survey, such as the barriers and drivers that are more specific to multi-family housing property managers or health care facilities.

**Addressing Gaps in our Geographic and Topical Scope.** The version of the toolkit presented in this report may be viewed as a prototype with an intentionally narrowed scope. The project team identified multi-family housing units, health care facilities, private education facilities, and religious institutions as small businesses and/or nonprofit organizations ripe for closer investigation in the field of energy financing. These sectors were chosen as a snapshot of the total potential audience for future iterations of the toolkit. The project's relatively brief timeline and the team's constrained capabilities prevented a more expansive integration of other sectors into the first complete draft of the toolkit. For instance, the unique needs of restaurants, small retail storefronts, and industrial facilities were not actively considered in the workbook's design.

Similarly, we only focused on financing options that were relevant to organizations located within Southeast Michigan such that similar sectors elsewhere may not learn of all possible opportunities within their respective regions.

While developing the toolkit, we noticed that grants were particularly difficult to document given their limited windows of opportunity, thus the research team decided to highlight primary grant-making agencies rather than individual requests for proposals. Since the plethora of local, regional, and national foundations was beyond the scope of this project, we emphasize the abundant potential for expansion in the financing background section of the workbook. Grants are an attractive option and are typically a more familiar source of funding for small nonprofits in southeastern Michigan. Consequently, the research team encourages the Ecology Center staff to begin with a review of their own funding relationships to see if they have funding priorities within the renewable energy or building energy retrofits sector. For example, the Illinois Clean Energy Community Foundation has awarded over \$226 million to Illinois nonprofits, municipalities, and schools to finance energy efficiency and renewable energy installations (Illinois Clean Energy, 2016).

While we attempted to be as exhaustive as possible in documenting the financing opportunities available to the target group, the constraints of the project prevented a deeper dive into more creative opportunities. In other words, while the toolkit outlines all loans, tax credits, utility rebates, and publicly funded grants available to the target audience, further inclusion of more unique financing strategies could also be considered and, potentially, included in future re-iterations of the document. In the “*Additional Energy Financing Opportunities to Improve the Toolkit*” section, we explore a few of these other options in more detail in the hopes that future project teams might embrace this research to extend the breadth of financing beyond traditional roles and definitions.

### *Research Observations*

Beyond the details of our Business Community Survey, toolkit, and Implementation Plan, there were a few lessons that we gathered from the literature that we found pertinent to further discussion below. These specifically relate to the difficulties in influencing energy-related behaviors, and the currently limited extent of energy efficiency financing opportunities available to our target audience.

**The Difficulties in Influencing Energy-Related Behaviors.** Importantly, our Implementation Plan does not include information on how to increase awareness of the environmental importance of energy conservation, nor does it explore the potential application of environmental psychology principles for altering people’s perceptions of energy consumption and how to translate public knowledge into action. Prior research has demonstrated that knowledge alone

does not lead to action (Kollmuss and Agyeman, 2002). To explore how to educate and motivate people in the context of environmental conservation, additional research on the human factors involved would have been beneficial. Educational tools like the toolkit cannot overcome these behavioral barriers alone. Person-to-person persuasion and interactions tend to carry significant weight in driving behavioral change for energy and environmental issues.

Furthermore, some efforts to improve energy efficiency may be counteracted by the behavioral response of staff within the organization. For example, the “rebound effect” may present itself after applying clean energy or energy efficiency upgrades. In other words, individuals aware that the technologies they have in their building inherently use less electricity may ultimately cause a behavioral shift toward additional consumption, thereby negating the energy-saving benefits of the technology installation. The rebound effect is generally expressed as a ratio of the lost benefit compared to the expected environmental benefit when holding consumption constant (Grubb, 1990). People may consume more energy, either consciously or unconsciously, after learning they are using clean energy or energy-saving appliances. Future iterations of the toolkit could better integrate the behavioral sciences to strengthen the product’s capacity for change.

**Limited financing opportunities.** Throughout our research phase it became evident that loans are the predominant option for financing energy efficiency and renewable energy upgrades. While many loans were advertised as advantageous because they offered interest at below market rates, or more lenient lending requirements, not all organizations or companies are able or willing to take on debt. It is also difficult to access loans for the “soft costs” of energy efficiency, including hiring an auditor and paying for installation and monitoring (EPA, 2007). Furthermore, loan principles are often depressed when lenders do not consider future energy savings as potential income for the loan applicant (Markowski, Evens, and Schwartz, 2014).

While some financing options could be combined to maximize potential savings, loans can rarely be combined. Many large scale loans require liens; in other words, the primary lender needs to be assured that they will be the first to receive a return from collateral liquidations even if the loan defaults. Lenders are unwilling to share first lien status and are unlikely to agree to a step down to second lien for another loan. In fact, the Federal Housing Authority, Freddie Mac, and Fannie Mae, dictate that any loans they back must not be combined with “subordinate” loans (Markowski, Evens, and Schwartz, 2014). This is the primary reason many organizations find themselves currently ineligible for Property Assessed Clean Energy (PACE) financing. If they already carry large debt in the form of a mortgage or other loan, they likely already have a lien on the property which cannot be collected by the PACE lending agency. The challenge is compounded in particular sectors, like that of multi-family affordable housing, when refinancing only occurs in long cycles, and where subsidized affordable housing cannot gain access to additional funding for energy efficiency (Markowski, Evens, and Schwartz, 2014). Considering

the challenges associated with debt financing, in combination with their prominent nature as the most salient financing opportunity for small businesses and nonprofits, we thought it was critical to mention some of the other more creative financing strategies below.

#### *Additional Energy Financing Opportunities to Improve the Toolkit*

In this section we review some of the other creative financing options that could be considered in future iterations of the toolkit.

**Technology Leasing and Installment Purchase Agreements.** The research for this project has emphasized direct purchasing of upgrades but it is also possible to lease certain technologies. Operating leases are when the lessor retains ownership of the technology and expects it returned at the end of the lease period. Monthly lease payments are typically covered under the operating expenses of the lessee, meaning 100 percent of the payments can be tax deductible. It is important, however, that energy savings are greater than these payments (EPA, 2007). Capital leases (also known as installment purchase agreements), conversely, typically have a higher payment. Capital leases are a way to spread out the cost of upgrades through time because each payment results in the lessee earning additional equity in the technology such that it is completely owned by the lessee by the end of the lease agreement. These leases can be an inexpensive alternative to loans where little or no upfront capital is required. They are also easier to secure for the soft costs of installation and labor. As an additional benefit, leases are often managed directly by the equipment manufacturer and tend to be simpler to initiate than full scale loan applications from a third-party banking institution (EPA, 2007).

**Bond Financing.** Bonds are typically sold by public institutions as a means to raise capital. Issuance of a bond, however, requires approval through public ballot measures, often making them difficult to secure initially (EPA, 2007). While bonds entail copious paperwork and legal oversight, they still serve as an opportunity for some groups and should not be forgotten in the compilation of financing options. Due to the high transaction costs, bonds are typically reserved for very large-scale projects.

**Energy Savings Performance Contracting.** The Energy Savings Performance Contract (ESPC) system is used to finance energy efficiency projects in large building complexes. In such a model, a private Energy Service Company (ESCO), which specializes in energy management systems and technologies, enters into a contract with the property owner (Customer). The terms of the contract define its length, who will pay for and own any of the installed energy efficient upgrades, who will maintain and monitor the use of those upgrades, and how the energy savings will be shared between the ESCO and the Customer. The flexibility of the contract terms leads to several possible variations on this financing model. One of note is the Managed Energy Service Agreement (MESA), in which the ESCO individually finances and owns the energy

efficient and renewable energy generation improvements to the property while also monitoring the energy use of property operations thus providing a management service (Wilson Sonsini Goodrich & Rosati, 2012).

Since the ESCO finances all the upgrades and assumes all of the risk associated with projected energy savings, the MESA contract structure can be attractive to small businesses and nonprofits because it is low risk for them and requires no initial out-of-pocket expenses. Additionally, any payments made to the ESCO fall within the operating category on the balance sheet rather than impacting their debt load (International Institute for Sustainable Development, 2013).

From the perspective of the ESCO itself, the entire MESA financing scheme depends heavily on the potential energy savings to be earned from the energy efficiency upgrades to the property. Essentially, no project is approved unless the savings generated by the energy efficient measures will cover all of the costs associated with the project as well as generate sufficient revenue to pay back loans and pocket profit (J.P. Morgan, 2012). Since the ESCO makes a profit through these savings, they need to be substantial and worthwhile to invest in a long-term and large-scale property improvement project. This is probably the largest barrier to applying a performance contract financing model to small businesses and nonprofits that tend to occupy smaller properties with lower potential energy savings.

Indeed, municipalities and government entities have been the first to embrace this financing scheme as a customer mostly because they occupy these types of large property complexes but also because these types of actors do not expect large returns on such a project and can accept the generally longer timeframe for return on investment (Harris Williams and Company, 2010). In 2010, the U.S. federal government was the largest single end-user of ESCO services accounting for 22 percent of the industry's revenue in the country (Harris Williams and Company, 2010). ESCO project costs can be lessened, however, through the aggregation of multiple small projects which means there might be potential for this financing scheme if the Ecology Center facilitates collaboration across multiple groups and properties.

**Energy Generation Buyback.** Although not explicitly mentioned in the renewable energy technologies section, money is not only saved on the reduced consumption of utilities, but may also be earned through a buy-back program. DTE Energy, for example, buys home-owner generated electricity back from properties which serves as another means to recuperate the costs of installments. The interconnection process is currently very complicated, however, DTE Energy's materials on expectations and requirements are opaque to say the least. The Ecology Center should be aware that if survey participants are interested in this approach, they can learn more on DTE Energy's website by searching for "DTE Energy interconnection process." DTE Energy offers a hotline to guide applicants through this process (DTE Energy, 2016).

**Crowdfunding.** An as yet unrealized source of financing is crowdfunding for energy efficiency. Historically, crowdfunding raised capital for projects in return for company perks. Green VC keeps a long running list of platform sites that tailor their services towards sustainability and “green-minded” projects (Green VC, 2016). The last few years has witnessed the evolution of several new online platforms aiming to aggregate public funding and link it to investible projects that promise a return on that investment. Indeed, in 2012, a German company BetterVest launched as the first crowdfunding platform to specifically finance energy efficiency projects. Operating similarly to an ESCO, all investors gain a proportion of the energy savings for a predetermined amount of time to pay back their investments plus interest (Climate-KIC, 2016). BlocPower, a US based organization, is now aggregating and rating larger building blocks to open up opportunities for crowdfunding investment. BlocPower’s team does the leg work of pulling together several smaller projects and inefficient buildings and shuffles them into separate asset classes with different credit ratings reflecting different investment risks. Investors receive a return through earning a portion of the energy savings (Schiller, 2015). While the crowdfunding field is still nascent, it is worth consideration for organizations or businesses because it requires little upfront capital, but operates at a project scale smaller those typically required by performance contracts.

**On-Bill Financing and Repayment.** On-bill financing allows property owners to repay a loan received for an energy efficiency upgrade via their utility bill rather than a separate loan payment. It essentially lowers the transactions costs of the loan by utilizing a privately managed and established utility billing infrastructure. On-bill financing is also superior to loans because it is technically considered a utility charge and, therefore, cannot require a lien on the property. In effect, on-bill financing offers additional sources of funding to organizations and businesses who already have large loans or debt (Markowski, Evens, and Schwartz, 2014).

On-bill financing is similar to PACE in that the requirement to pay stays with the property, whose value increases along with the building improvements (Beverluis, 2014). Under a 2014 Michigan state law sponsored by (Public Act 408), loans would originate from the municipality, utility company, or third-party nonprofit or bank lenders. Most states require legislation to allow on-bill repayment through utility metering. While examples of on-bill financing are rare, Holland, MI is working with Michigan Saves to launch a municipal on-bill financing program with a goal of accepting applications by summer 2016. The new program carries a benefit over the regular Michigan Saves loans because it does not require a high credit score for eligibility (Michigan Saves, 2016).

**Development Incentives as an Offset for Energy Efficient Buildings.** As an alternative to directly raising funds, small businesses and property owners might also be able to use incentives

within a township's zoning code to offset the costs associated with energy efficiency upgrades. While some zoning and planning tools are used to constrain development, this is not always the end goal. Development can bring in wealth, improve accessibility of goods and services, and provide much needed affordable housing. Zoning tools and local policies can be applied to encourage development of a particular type, or in a particular place to meet community needs. Typically, goals include increased affordable housing, more commercial space, or a more energy efficient building stock.

The city of Ann Arbor, for example, offers premium incentives for particular commercial, residential, and downtown districts. Typically called a "density bonus," developers may exceed the maximum allowable floor to area ratio if certain energy standards are met. This community ties it to LEED certification levels and the number of energy and atmosphere credits certain building structures or systems will generate (Ann Arbor, Michigan, Municipal Code § 5:65.2.c). This is not the only option, however, as Flagstaff, Arizona uses the Home Energy Rating System Index (HERS) (Flagstaff, Arizona, Municipal Code § 10.30.70.040). It is valuable to consider whether a participant seeking energy efficiency would be able to offset additional construction costs with the incentives provided by their particular municipality. Furthermore, for regions that do not participate in such programs, the U.S. Department of Energy offers an outstanding guide to types of ordinances that would help lead to energy efficient communities. If the Ecology Center is interested in pursuing policy and planning adjustments at a local level, this would be a strong first resource.

### *Tying into Local Energy Policies*

In this concluding section, we review how the toolkit also has the potential to advance the energy efficiency goals and objectives of municipalities and other governmental bodies within the study region.

The City of Ann Arbor has been especially active on this front, in part due to their desire to achieve quantitative climate mitigation goals over the next several decades. There is ample motivation and opportunity to lower Ann Arbor's energy costs. Natural gas and electricity costs city-wide total \$140 million annually (excluding the University of Michigan, a leading local consumer). This energy is not generated locally and represents revenue that leaves the city's economy entirely. Implementing even basic energy efficiency measures could reduce energy consumption by 10 percent and result in the retention of up to \$14 million by the local economy (Ann Arbor, 2012).

Additional cost saving opportunities exist through Ann Arbor's affordable housing program. The city is responsible for dictating the construction standards of these buildings. Improving building standards would not only have a positive impact on energy consumption rates, but it

would also lead to better, healthier living spaces for low-income citizens in need of such housing.

The city published a comprehensive Climate Action Plan in 2012 (Plan) to guide current and future policymakers on how to greatly reduce local GHG, so that Ann Arbor can do its part in curtailing the effects of climate change while also addressing some of the concerns over city-wide energy costs. The Plan is targeting a 90 percent reduction in CO<sub>2</sub>e (carbon dioxide equivalent) emissions for the city by the year 2050, using a year 2000 emissions baseline (Ann Arbor, 2012). The most significant set of potential emission reductions are projected to come from the Plan's "Energy and Buildings" section, with an emphasis on performance, energy sourcing, and community-scale renewable energy generation. The 25 actions detailed in this section account for 381,607 MTCO<sub>2</sub>e (megatons of carbon dioxide equivalent) in estimated reductions in GHG emissions, over eight times greater than the next largest category of reductions documented in the Plan.

Ann Arbor's leaders seem to be well aware of the untapped potential the buildings sector holds for climate mitigation. According to the Plan, energy use by buildings accounts for 77 percent of the city's total emissions. Furthermore, 80 percent of the city's buildings were constructed before 1976 and tend to be less efficient than newer structures. Retrofits figure to weigh heavily on future efficiency improvements as a result of the city's makeup; Ann Arbor currently has over 31 million square feet of commercial, industrial, and institutional buildings (excluding the University of Michigan), while residential buildings consist of 36 million square feet (Ann Arbor, 2012).

The Plan's two keystone initiatives for its buildings sector are efficiency retrofits and adjusting city ordinances and codes to facilitate the Plan's goals. The Plan promotes a variety of energy efficiency measures and increased renewable energy deployment. Recommended measures include the weatherization of residential buildings, energy efficiency retrofits for affordable housing units, incentivizing energy audits and conservation measures, promoting and incentivizing efficient lighting technologies and "smart" management devices, and providing financial incentives to developers to exceed the city's minimum building energy performance standards. Additional incentives appeal directly to the commercial and industrial building sectors by advancing the use of green roofs and combined heat and power units (Ann Arbor, 2012).

Oakland County has also embraced energy efficiency through several initiatives over the years. In 2009, Oakland County received a nearly \$5 million Energy Efficiency and Conservation Block Grant (EECBG) from the U.S. Department of Energy as part of the Federal Recovery Act. The three-year grant was intended to lower energy consumption in county-owned buildings and

facilities. Funds were used to hire contractors and consultants to perform energy audits and retrofits to further the local government's energy efficiency goals. Additional clean energy upgrades were made to the county airport's facilities. The county also utilized the funds to market their "OakGreen" initiative, effectively integrating public outreach and participation into what would have otherwise been primarily a public sector initiative (Oakland Co., 2016).

OakGreen was a county-run program meant to educate and motivate businesses, schools, government offices, and residents to reduce energy costs and adopt more environmentally sustainable practices. OakGreen also featured a monetary incentive (sponsored by private-sector partners) to encourage action by offering a chance to win a year's coverage of utility expenses for participants that could reach particular energy reduction goals (Oakland Co., 2012). In addition to the challenge itself, the county sought to connect stakeholders with energy financing resources, such as EPA's Energy Star program for efficient appliances, LEED certification for buildings, and funding through the U.S. Department of Energy and Michigan Department of Energy, Labor, & Economic Growth. Retrofits were a focus for leveraging the funds. Finally, OakGreen attempted to connect interested parties with contractors and vendors in the energy sector, with an emphasis on local products and services (Oakland Co., 2011).

The bottom-line for all the program types listed above is that they require money to implement, a resource typically in short supply for small business owners and nonprofit ventures. This makes government financial incentives crucial in encouraging these types of investments. Unfortunately, Ann Arbor in particular seems to lack a comprehensive, malleable policy information tool. This knowledge gap stands to become even more pronounced as the number of programs diversifies and the targeted network of stakeholders expands. While Ann Arbor's government may have a vision for how it will reach its climate mitigation goals, it has had difficulty raising awareness of its financing programs within the business community.

Our project's findings suggest a better means of communicating the eligibility criteria and benefits of these programs is necessary if communities are to reach their full emissions reduction potential. The Ecology Center is already a core partner with the City of Ann Arbor in developing and implementing local energy policies. The toolkit will have a clear path toward assisting with this knowledge dissemination challenge on multiple fronts going forward. The toolkit could serve as a model and a resource for local organizations, program managers, and policy makers in how to recruit eligible, yet tough to reach property owners.

There is often a limited window for retrofitting residential and commercial buildings, such as when they are renovated, remodeled, or require other major work. The toolkit may also prove vital in streamlining the process of connecting stakeholders with program administrators within

these constrained timelines. These windows are prime opportunities to encourage property owners to invest additional dollars to integrate efficiency technologies into their buildings.

The toolkit stands to be the first in a line of interlocking, upgradeable pieces designed to help local government reduce its carbon footprint by influencing the usage patterns of businesses and homes. It was designed with flexibility in mind and future editions could be easily updated to include any sweeping policy changes related to energy efficiency city-wide. The toolkit's modularity allows it to evolve alongside the region's energy and climate policies and hopefully continue to bridge any gaps between the public and private sectors on the utilization of energy financing programs.

## CONCLUSION

To achieve the overarching goal of improving the accessibility of energy efficiency financing for small businesses and community organizations in Southeast Michigan, our master's project team produced a Financing and Technology Toolkit, and an Implementation Plan for the Ecology Center that outlines how to encourage small businesses and nonprofits to utilize the toolkit. The development of these products was informed by our Business Community Survey, alongside an extensive literature review and policy and marketing research.

As we close off this report, the research team has a few final thoughts for the Ecology Center. We would first like to emphasize the importance of maintaining the currency of the toolkit. A review of how to maintain it is outlined in detail within the toolkit itself (Appendix 4) but we believe that its nature as paper-based, without automation provides ongoing challenges to keeping the product relevant and will require continued investment to maintain.

We would also temper enthusiasm for the toolkit with a realistic understanding of the current mindset of small businesses and nonprofits. The results of the business community survey confirm findings in the literature related to curtailment activities and efficiency upgrades. Some respondents are more likely to participate in energy curtailment actions rather than performing energy upgrades, largely because they believe them more likely to be cost-effective. In other words, many of these organizations may not be primed to learn about energy efficiency or energy generation because they incorrectly believe that curtailment alone will save them more money. This is a critical barrier that the Ecology Center needs to recognize and consider. Specifically, being able to effectively communicate that energy efficient and renewable energy upgrades are beneficial and offer much greater potential in utility bill savings will bode well for future outreach efforts.

Finally, at the onset of this project the goal of the Ecology Center was not to become a full-service energy concierge service, but to continue operating in a manner similar to a third-party consultant that provides guidance on energy costs and barriers. While the current toolkit has the capability to assuage these barriers for this project's sectors of focus, users of the toolkit may still get discouraged and view its intentions as yet another burdensome step. As a purely informational tool, the toolkit does not actually arrange audits, acquire the financing options, and connect users with contractors. Instead, it provides third-party advice, but it is still largely left up to the user to make contact and arrangements with the other appropriate parties necessary to complete a project. Thus, moving towards a more complete concierge service might be a consideration for the Ecology Center in the future.

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**Appendix 1: Business Community Survey (administered through Qualtrics).**

Q1 Thank you for your willingness to participate in this survey! Upon completion you will be asked whether you would like to be entered into our drawing to win a free energy consultation for a property unit or business space. As part of the study, we will ask you questions about energy usage at your business or organization and current motivations and barriers related to improving energy efficiency in the work place or on your rental property/ies. Your responses will inform our efforts to make energy efficiency more accessible and affordable for small businesses and community organizations in Michigan. Your individual responses will be kept confidential and the results of the survey will be reported in the aggregate only. If you have any questions or concerns related to this survey, please contact us at: [energysurvey.umich@gmail.com](mailto:energysurvey.umich@gmail.com) We expect the survey to take about 15 minutes to complete. Your participation in this study is entirely voluntary. Again, thank you for your time.

By checking this box I assert that I have read the above and agree to participate in this survey (1)

Q2 How would you describe “energy efficiency” in one or two sentences? (We’re happy to have your best guess if you don’t know).

Q3 Please use your personal understanding or definition of energy efficiency to answer the remaining questions on the survey. Does your organization have a written or unwritten long term plan for energy efficiency?

- Yes (1)
- No (2)

Q4 Please describe this plan for energy efficiency in a few sentences.

Q5 Please indicate to what extent you believe the following factors contribute to energy use or loss within your building or buildings.

	Not applicable within our building (1)	Small energy usage (2)	Intermediate energy usage (3)	Significant energy usage (4)
Water heating (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lighting (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Building heating or cooling during office hours (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Building heating or cooling "after hours" (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Appliances (like kitchen instruments) (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electronics and computers (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Poor-quality building insulation (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heavy or industrial-sized equipment (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Staff or tenants leaving on lights, appliances or electronics when not in use (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q6 We'd like to know what impacts your organization's interest in energy efficiency projects, products, and/or upgrades. Please indicate how important each of the following factors are in encouraging your organization or business to improve energy efficiency in the work place or on your rental property/ies.

	This doesn't relate to us at all (1)	This is of little importance to us (6)	This is important to us (4)	This is very important to us (5)
Energy efficiency will reduce our electricity or heating bills, or our tenants bills (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lower electricity or heating bills will help us lower our product or service costs (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We need to prepare for rising energy prices in the future (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
An energy efficient building/ office improves tenant/staff health and safety (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being energy efficient improves our company image or reputation (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being energy efficient keeps us competitive in the market (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There are financial incentives for being energy efficient (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We care about the environment and being energy efficient is the right thing to do (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Focusing on energy use in the workplace will have a positive impact on our staff's home energy use (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Q7 Do you have a champion for energy efficiency within your organization?

- Yes (1)
- No (2)

Q8 What types of things does this champion do to encourage energy efficiency in the workplace or on your rental property/ies?

Q9 Now we'd like to know what efforts your organization has already made or is likely to make towards improving energy efficiency. Please rate how likely you are to implement each of the following actions to improve energy efficiency at your organization or on your rental property/ies.

	We will NEVER do this (1)	It is UNLIKELY we will do this (2)	It is LIKELY we will do this (3)	We have ALREADY DONE this (5)
Turn off all lights, electronics, and appliances when not in use (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Launch a staff or tenant awareness campaign to educate and encourage less energy use (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Alter our operating hours so that we use less energy (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seek professional consultation to learn how to best reduce energy use (i.e. have an energy audit or HERS property assessment) (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increase frequency of property/HVAC upgrades (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q10 In the previous question, you indicated one or more of the actions as likely or already completed. Which of the following reasons best explains this higher likelihood of implementing one of the previously listed actions to improve energy efficiency?

- It's a cost effective option (1)
- It's easy to implement (2)
- It will likely be successful in lowering energy use (3)
- It will likely be supported by staff or leadership of organization (5)
- Other (4) \_\_\_\_\_

Q11 Please rate how likely you are to implement each of the following technological or structural adjustments to improve energy efficiency at your organization or on your rental property/ies.

	We will NEVER do this (1)	It is UNLIKELY we will do this (2)	It is LIKELY we will do this (3)	We have ALREADY DONE this (5)
Switch to renewable energy sources or more efficient fuels (i.e. solar or wind) (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Generate our own electricity (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Upgrade appliances and light bulbs to be more efficient (i.e. Energy Star certified) (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Retrofit building insulation and/or windows (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Retrofit building with more efficient HVAC (heating ventilating and air conditioning) technologies (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Relocate to a "greener" building (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q12 In the previous questions, you indicated one or more of the actions as likely or already done. Which of the following reasons best explains your higher likelihood of implementing one of the previously mentioned technological or structural adjustments to improve energy efficiency?

- It's a cost effective option (1)
- It's easy to implement (2)
- It will likely be successful in lowering energy use (3)
- It will likely be supported by staff or leadership of organization (5)
- Other (4) \_\_\_\_\_

Q13 We are curious about potential barriers that you see or foresee in improving energy efficiency in your organization or on your rental property/ies. Please rate the significance of each of the following factors in acting as a barrier to improving energy efficiency.

	Not applicable to us (2)	A minor barrier to action (3)	A moderate barrier to action (12)	A very significant barrier to action (13)
We lack top management commitment to sustainability (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Energy efficiency is not a part of the office culture (25)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We don't have the time to take on this type of project (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We are renters and don't have the authority to upgrade our building (13)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We share our space and do not have complete control over these types of building decisions (14)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We are part of a larger institution or have a parent organization that makes those types of decisions for our individual location (18)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Energy efficiency is too expensive or does not provide a good return on investment (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We lack access to external financial resources to fund improvements (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<p>We lack information about how to improve energy efficiency or how to finance these improvements (such as with loans, tax credits, government subsidies etc.) (8)</p> <p>We believe we should wait because more efficient technologies will become cheaper later or legal energy efficiency standards and building codes will change (1)</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Q14 We want to know more about the availability of information regarding energy efficiency. Suppose your organization decided to implement an energy efficiency project or install energy efficient upgrades.

Please rate how useful the following types of information would be in designing and planning for your project.

	This would be USELESS (1)	This would be SLIGHTLY useful (3)	This would be MODERATELY useful (5)	This would be EXTREMELY useful (6)
A list of financial incentives, funding, or cost-sharing opportunities (e.g. available grants or subsidies) (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
An estimate of costs associated with implementation (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
An outline of direct recommendations from our utility service provider (DTE Energy) (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ratings on energy-saving effectiveness for particular actions or technologies (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A how-to guide for implementing an energy efficiency project at work (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
An overview of current federal, state, and local policies related to energy efficiency technologies and financing (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Guidance on selecting an appropriate project scale (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
An overview of how to monitor energy usage and available energy management technologies (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

A description of energy auditing opportunities and local services (8)	○	○	○	○
-----------------------------------------------------------------------	---	---	---	---

Q15 Where would you seek out this information? (Please check all that apply)

- Internet search (1)
- I know of specific databases that provide this information. (Please name if you can recall) (2)
- \_\_\_\_\_  
I know of specific agencies that provide this information. (Please name if you can recall) (3)
- I would ask similar organizations or peers (4)
- I don't know (5)

Q16 Please describe any other currently inaccessible data or information you would want or need in order to implement an energy efficiency project.

Q17 Let's talk a little bit about how to pay for energy efficiency upgrades or changes. We want to know about your awareness of financing opportunities for energy-saving projects and how you have funded past, or intend to fund future, energy efficiency projects. For each of the following financing opportunities (loans, rebates, etc.) please use column one to indicate your familiarity with it as a financing mechanism for energy efficiency projects, and use column two to name specific programs if you can recall any.

	2) Name of Program	1) Familiarity Level			
	Program name (1)	Never heard of this (1)	Heard of this but wouldn't use it (2)	Heard of this and plan to use it (3)	Have already used this (4)
Loans Specific to Energy Efficiency Upgrades (1)		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Utility Rebates (2)		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tax Credits or Exemptions (3)		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grants (5)		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Free or Donated Technologies (e.g. free light bulbs, etc.) (7)		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q18 In the last question, you mentioned you were aware of one or more financing opportunities. As best as you can recall, how did you learn about these financing opportunities? (Please select all that apply):

- I don't remember (7)
- Direct marketing materials were mailed or emailed to me (1)
- Internet search (provide search terms if you recall): (2) \_\_\_\_\_
- I learned about them at a special event (please explain): (3) \_\_\_\_\_
- I found educational materials on the subject (i.e. a research paper or book) (4)
- I read about it on our utility provider's website (5)
- Social Media (9)
- I learned from talking to peers or co-workers (6)
- Other (please explain) (8) \_\_\_\_\_

Q19 As we wrap up the survey, we'd like to capture a bit more information about your business or organization. Which of the following best describes the primary role of your organization? (Please select one)

- School or educational institution (1)
- Religious institution (2)
- Health care center (3)
- Rental agency or real estate (property management included) (4)
- Other (5) \_\_\_\_\_

Q20 Does your rental organization participate in the Housing Choice Voucher program (Section 8), or provide low income housing?

- Yes (1)
- No (2)
- We do not rent housing units (3)

Q21 Please select the county in which your organization is, or your properties are, primarily located.

- Oakland (1)
- Washtenaw (2)
- Other (3)

Q22 Does your organization or business own or lease your current location?

- Tenant renting from an agency/and or property owner (1)
- Property owner (2)

Q23 Are there any specific challenges you face as a renter that impacts your ability to undertake energy efficiency projects?

Q24 Is this organization owned or led by someone who fits one or more of the following descriptions?

- Woman (1)
- Minority (2)
- Veteran (4)
- Person living with a disability (5)
- None of the above (3)

Q25 Are there any barriers/challenges that you face as a woman-owned, minority-owned, veteran-owned, or person living with a disability-owned (or led) organization that impacts your ability to undertake energy efficiency projects?

Q26 Please use this space to provide any final comments about your organization or the content of this survey.

Q27 One final question. We will use these survey responses to develop a tool kit that will help small businesses and community organizations navigate the many financing opportunities available to them to

fund energy efficiency projects and upgrades. We would like to know your interest in continued participation.

- Please check this box if we may contact you with any follow up questions regarding your responses to this survey (1)
- Please check this box if you are interested in participating in our pilot test of this financing tool kit (2)
- Please check this box if you would like to enter our drawing for the free energy consultation. We plan to draw the winner this fall and will contact you by January 2016 if you have won (3)

Q28 Please provide your email address so that we can follow-up with any of the choices you indicated above.

**Appendix 2:** Postcard invitation to participate in our online Business Community Survey



SCHOOL OF  
**NATURAL RESOURCES & ENVIRONMENT**  
UNIVERSITY OF MICHIGAN

Energy Research Team  
c/o Tony Reames  
440 Church St.  
Ann Arbor, MI 48109



**YOU'RE INVITED!**



Hello!

We are five students managing a collaborative research effort between the University of Michigan and the Ecology Center exploring **how to make energy efficiency more accessible and affordable** for the valuable small businesses and organizations that serve our community.

**Your business has been selected to participate in our survey!**

Your participation will enter you into a drawing for an opportunity to **win a free energy consultation** for your business or organization.

To complete the survey, please enter the following webpage address into an internet browser on the computer and follow the on screen instructions:

<http://bit.ly/umichenergy>

Thank you kindly for your participation.

If you have any questions or if you experience any problems with the web survey, please don't hesitate to contact the research team by email at:

[energysurvey.umich@gmail.com](mailto:energysurvey.umich@gmail.com)

### Appendix 3: Telephone Scripts for Follow-up Survey Recruitment

#### INTRO

Hello, I'm \_\_\_\_\_, a student researcher at the University of Michigan. I'm following up on a post card we sent you the other week.

(I'm looking for someone who might have read the postcard to discuss it's contents or I'm happy to just start afresh with why I'm calling)

#### PAUSE

The post card was encouraging you to complete a survey on energy efficiency. Our research hopes to make EE building upgrades more affordable and accessible for businesses and organizations in your area.

**We believe your input is important, would you be willing to take the survey?** It should take less than 15 minutes and can be completed, online, at your convenience.

IF NO - ok thanks a bunch

IF YES - Great! The survey is online, can I email you the link? No? I can give you the link over the phone.

*IF Super YES - Great! The survey is online, can I email you the link? If you have any associates in your field or have colleagues that would be interested in taking the survey please forward the link to them: [j.mp/umenergysurvey](http://j.mp/umenergysurvey) **\*\* (only use this link in the follow up email if they confirmed over the phone they will email to colleagues)***

IF MAYBE - If you complete the survey you will be entered to win a free energy audit for your organization.

#### CLOSING

We look forward to your input/ feedback

IF LEAVING VOICEMAIL - SAY EVERYTHING AND INCLUDE THE LINK!

IF EMAILING - EMAIL FROM GROUP EMAIL ADDRESS:

sign-in: [energysurvey.umich@gmail.com](mailto:energysurvey.umich@gmail.com)

pwd: ecologycenter

Other concerns/ Answers to their Questions

*- I can provide you with an email address to contact if you want more information about the survey*

*- I will not ask for your name, address, or other personal information that can identify you. The answers that you give are completely confidential.*

*- I assure you I am not trying to sell you anything nor we will sell your email address. -We will only use your email for emailing you the survey link for this study  
-make sure if they give you an email address, you ask whom to address it to.*

**Main SURVEY LINK HERE: [bit.ly/umichenergy](http://bit.ly/umichenergy)**

**Snow Ball link ONLY: [j.mp/umenergysurvey](http://j.mp/umenergysurvey)**

**OUR GROUP EMAIL: [energysurvey.umich@gmail.com](mailto:energysurvey.umich@gmail.com)**

### **Script Addendum (Version 2)**

#### **INTRO**

Hello, I'm \_\_\_\_\_, and I'm a student over at the University of Michigan, How are you today?

#### **PAUSE**

*\*Acknowledge their response whether it was good or bad (for example "great! me too." or "I'm sorry to hear that.")\**

I sort of have a weird request for you today. I'm calling because I'm following up on a post card my research team sent over to you folks the other week. I'm looking to speak with whomever might have received it and glanced at its contents, or I'm happy to start afresh and explain what my research team is looking for.

#### **PAUSE**

*\*Most responses at this point hesitate, and then say, yea why don't you start afresh because I don't remember receiving a postcard. I chuckle in a friendly manner and then say...\**

Sure, not a problem! I know we all get too much mail that's exactly why I'm calling.

So my research team is working in partnership with the Ecology Center in Ann Arbor. The Ecology Center is trying to create some time of product that will help community organizations/small businesses such as yourselves receive access to money for energy efficient building upgrades.

As part of that project, my research team is surveying a sampling of community members to get a better sense of your interest in pursuing building upgrades, maybe some barriers you have faced in accessing funds so far, and how the ecology center could best help you.

I'm looking for someone from \_\_\_\_\_ (insert company name here)\_\_\_\_\_ that would be willing to take our online survey, who could maybe answer some of those questions. It should take no more than 15 minutes to complete.

#### **PAUSE**

\*It's hard to write a script from here because people's responses are usually really different. Answer any questions they have as best you can, reemphasizing the 15 minutes, and online components.\*

**\*If they know exactly who should take the survey but it's not them**, ask if you could email the link with a brief description to the person you are talking to, or whether you could get the email address of the "right person" and then email that person. \*

\*If they're not really sure who should take the survey, or who could answer the questions, propose the following solution.\*

So I have the web link right here and could give it to you over the phone or email it to you if that's easier. You're welcome to glance at the survey and have a go at answering the questions yourself, or you can look at the questions to get a better sense of who would be a good respondent. We'll be asking questions about your energy use, so possibly someone who makes decisions about the building or pays the utility bills could work but that's not mandatory. Again we're really just trying to solicit as much community participation in the survey as we can so that the product we create is useful for you folks.

IF NO - ok thanks a bunch

IF YES

Great! Thank you. We believe your input is really important in helping us and the Ecology Center make a useful product so we appreciate your time. It shouldn't take more than 15 minutes and, if you open up the link and think the contents don't apply, no worries about just closing it up.

*IF Super YES*

*Great! Thank you. We believe your input is really important in helping us and the Ecology Center make a useful product so we appreciate your time. If you have any associates in your field or have colleagues that would be interested in taking the survey please forward the link to them: <http://j.mp/umenergysurvey> **\*\* (only use this link in the follow up email if they confirmed over the phone they will email to colleagues)***

I'll send the survey link over right away. We look forward to your input/ feedback.

Have a great day!

## **Appendix 4: Financing and Technology Toolkit**

# SEEKING ENERGY EFFICIENCY AND RENEWABLE ENERGY UPGRADES: A FINANCING & TECHNOLOGY TOOLKIT



## ACKNOWLEDGEMENTS

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## *Purpose of this Workbook*

The purpose of the Decision Matrix (DM) workbook is to provide a comprehensive gateway for interested parties to discover and utilize financing programs for energy efficiency and renewable energy projects. Local, state, and federal government agencies encourage small business owners and non-profit organizations to take advantage of the energy financing programs available, however, the accumulation of these programs from both government and utility offices has created a complicated mix of programs and resources scattered across numerous departments and websites.

The DM is designed to address the underutilization of energy financing programs through education and customized information sharing for those small businesses and organizations currently left in the dark. The workbook walks users through the process of identifying and selecting the

financing programs that represent the best fit for their business or organization. The workbook's near-comprehensive listing of programs available in Southeast Michigan helps provide users with as many options as possible, while also informing them about the benefits and criteria inherent to each program. A set of appendices supplements the core workbook with detailed readouts on individual programs and technologies cited in the DM.

Taken as a whole, the user will complete the DM's exercise with a list of energy financing options for their building, an improved understanding of how each program potentially fits into their organizational goals, and basic knowledge of the steps necessary to pursue those programs.

---

## *Research & Development Methodology*

The energy financing programs and technology options presented in this suite of tools were researched, reviewed, and documented by the authors. Initial scoping began through the DSIRE policy database. DSIRE is an initiative funded by the US Department of Energy and operates out of the N.C. Clean Energy Technology Center at N.C. State University. It is the most comprehensive publicly available source that reviews both regulatory and incentive programs across the country at the federal, state, and local level that support the adoption of renewable energy and energy efficiency measures. An initial list of financing options was generated through this resource.

While DSIRE provided broad scope, it was light on details, and further challenged by infrequent updates such that the information was not completely reliable. Research through online search engines was therefore used to supplement information gleaned from DSIRE. While this did not add many additional programs to the DSIRE list, it was useful in helping to identify and remove expired programs. Some program websites further mentioned other financing opportunities such that a snowball-type effect was used to generate the complete list of programs. Existing and past programs managed by federal, state, county, and municipal government offices were accounted

for, as well as financing offered by utility companies active within the state of Michigan. From the initial list, each program and associated agency website was scoured to collect in-depth information on the program logistics, timeline, qualifiers and other components (see Table 1 below). This entailed detailed review of agency-held databases, governmental websites, NGO publications, and utility company websites.

Programs were then categorized as either tax incentives, grants, loans for residential properties, loans for commercial or industrial properties, or rebates. Key distinguishing factors for each category were identified and used to frame an Excel spreadsheet. Once key factors were identified, information for each program was then sorted into the Excel spreadsheet for comparable review, and websites were revisited to capture missed information.

This spreadsheet was used to develop the DM as survey questions targeted distinguishing criteria as a means to eliminate program options through the survey process. Once the DM was formally outlined, information on each program was re-shuffled into the appendix of this workbook as educational materials for survey participants.

## *Maintenance*

This DM workbook may be viewed as a prototype with an intentionally narrowed scope. The project team identified multi-family housing units, health care facilities, private education facilities, and religious institutions as small businesses and/or non-profit organizations located within Oakland and Washtenaw counties ripe for closer investigation in the field of energy financing.

Similarly, the list of programs is meant to be comprehensive for this target audience,

but due to gaps in available program information and the continuously shifting nature of public policy, the authors acknowledge this list may not capture all active programs at a given time. The intent is for this tool to be updated periodically as programs come online and retire.

There are two steps for updating these materials. The first is reviewing and collecting new information, and the second is making changes to the survey, scoring, and appendix materials.

**Table 1: Key pieces of information to review and include when updating this workbook.**

Information Category	Examples of Typical Options
Eligible recipients or sectors	Owners, renters, individuals, for-profit or non-profit, commercial, industrial, municipal or residential
Building or property requirements	Building age, type of use, number of units, whether it must be or cannot be owner-occupied
Other applicant qualifiers or disqualifiers	Low-income
Eligible efficiency or renewable technologies	Solar, wind, weatherization materials, HERS*-identified
Program expiration dates	--
How to apply	Access to forms, deadlines
Contact and website information	--
Benefits of program over other options (reasoning)	For example, what differentiates PACE from other loans (the payback mechanism and timeline)
Expected savings	Average grant, rebate, or loan amount
Other program information	Whether the loan is first lien secured (meaning it won't work with other loans like a mortgage or PACE), loan term

\*Some programs will finance any upgrade as long as the Home Energy Rating System auditor identified it as "cost-effective," meaning the cost of the upgrade will be recuperated through energy savings.

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### *Reviewing Information*

◇ **Return to Program Sites.** Each financing program outlined in the appendix has a corresponding website. The authors encourage the Ecology Center to intermittently visit these sites to ensure the programs are still in place. Rebates, loans, and tax incentives tend to operate on an annual schedule, and so visits would only need to occur annually. Grants have a less predictable schedule and so program websites should be reviewed monthly or bi-monthly. Retired programs should be removed from the active list of program options but reserved in case the program is renewed at a later date.

◇ **Explore DSIRE.** The DSIRE database allows visitors to sort financing options by their last update, which can be used to find any new additions.

◇ **Consider new legislation.** The authors encourage the Ecology Center to lean on their policy professionals to note new or upcoming state or federal policies that may lead to additional financing options.

### *Updating the Materials*

If any new programs have been implemented, they will have a unique set of requirements that need to be integrated into the DM and updaters should proceed with the following steps:

◇ **Make an information page.** Use the current appendix materials and Table 1 above as a reference for the type of information that should be included on the new program's appendix page.

◇ **Add to coding documents.** Add the program name to the **Program Code List**, along with its appendix page number and a new code number. Then review the **Survey Form** questions and add the new code number into the **Response Guide** for any questions whose answers *disqualify* the participant from the program. For example, if the program is specific to renters, add the program's code number to question 2b on the **Response Guide** because that identifies property owners who are disqualified for that specific program because they are not renters.

◇ **Adjust the survey if need be.** If there are other critical disqualifiers for the new program not yet addressed by the survey, add a final question and code it to the Response Guide.

## How to Use this Workbook

### *Pieces and Parts*

The following materials are necessary for the administrator:

- ◇ **Survey form**
- ◇ **Response guide**
- ◇ **Program code list**
- ◇ Appendix of financing opportunities
- ◇ Appendix of technology upgrades

The core component of this workbook is the **survey form** used to collect data from individuals participating in the exercise. The questions are divided into three sections covering the organization and building characteristics, specific energy needs faced by the organization, and additional preferences dealing with financing and project options. The **response guide** and **program code list** are your personal worksheet materials for the exercise. They help convert survey responses into recommendations. We will review how to use these three pieces in more depth in “The Process” section below.

This list of tailored program recommendations is supported by two appendices that explore the programs in greater detail, as well as a broad sample of the energy efficiency and generation technologies required to implement them. The appendices are meant to be paired with the administrator’s knowledge to add depth to the recommendations borne from the exercise. The appendices can also help answer any follow-up questions the participants may have,

which will be useful for individuals who are unfamiliar with energy technologies and the roles they play in building energy management.

### *The Process*

The following text serves as an introduction and guide for individuals administering the survey and scoring portions of the toolkit. The guidance is designed to serve as a starting point and is not comprehensive. Adjustments to these steps are encouraged to better tailor the exercise to each administrator and participant. There are four key steps involved in the process as follows:

- ◇ Preparing the participant and yourself
- ◇ Performing the survey
- ◇ Scoring
- ◇ Developing recommendations and refining options

#### **Preparing the participant and yourself.**

The section in this workbook entitled “Introduction for Participants” provides general information on pursuing energy efficiency and renewable energy, what to expect from this survey process, and how they can best prepare. Once you have scheduled a time to meet with the participant or speak with them over the phone, be sure that they receive this “For Participants” sheet via email or mail in advance so that they are ready to answer your questions.

Administrators should also be familiar with the financing programs in the toolset, in order to help and guide participants through their needs. The quality of the recommendations afforded to the participant will ultimately come down to your ability to understand and interpret the results, while supplementing this analysis with your own expertise to refine the list of programs based on the information provided in the survey.

**Performing the survey.** To start, thank the participant for their interest and for coming to the Ecology Center (EC) to learn more. Provide expectations about time to completion, and the types of questions within the survey. Here are some tips that may be mentioned to the participants to get them started:

- ◇ “I’m here to help you through the survey, and clarify questions or terminology. It’s only \_\_\_\_ questions and should take about \_\_\_\_ minutes to complete.
- ◇ “The more information you provide, the better we can narrow down your funding options and identify the best fit, but it is acceptable to skip any questions that you do not know the answer to”

The survey questions can be answered in person or over the phone but we do not recommend leaving participants alone (i.e. simply emailing them the survey document to complete on their own time) as they may have questions throughout the process. The administrator can be responsible for record-

ing the participant’s survey responses or the participant can fill out the survey form directly.

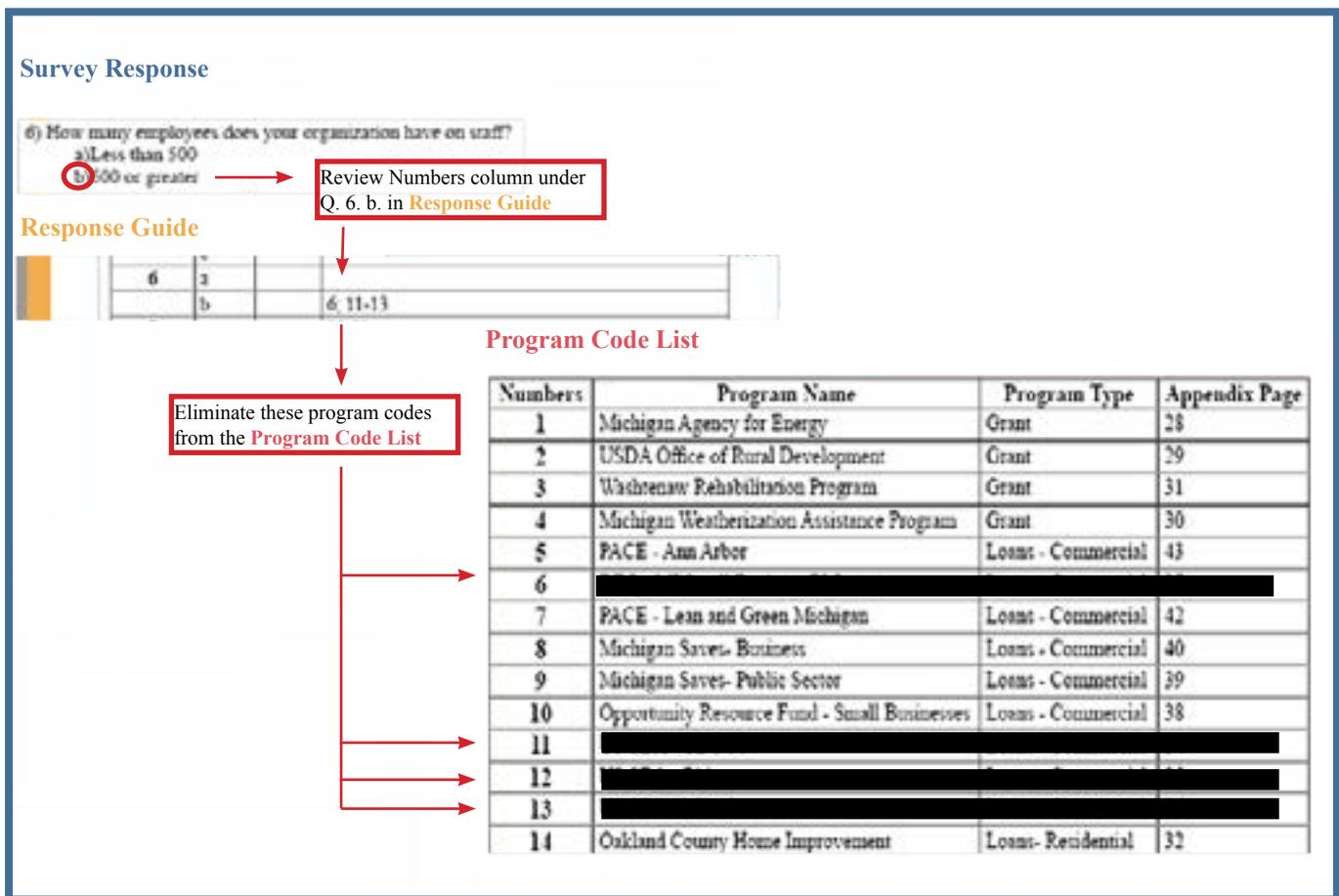
Participants are with you voluntarily and it is the administrator’s job to make them feel comfortable, as some of the questions may be new, unclear, or even intimidating to some participants. Likewise, it is ok if you (the administrator) do not have all the answers, as it is probable that you will encounter questions that will require further research and correspondence following the exercise. ***If you encounter a question you are uncertain about or if the participant is unable or does not wish to answer, you may skip the question.*** Do not press the participant for an answer if they appear uncomfortable with the question, but do attempt to guide them toward an answer if it appears they would benefit from clarification or additional framing questions. Be aware that the more complete the survey is, the better refined the recommendations can be.

**Scoring.** After completing the survey portion, pause the exercise (the participant does not need to be present for this stage). The scoring process will eliminate all programs that the participant does not qualify for or is uninterested in, leaving only the relevant programs for the participant to view.

For every marked response on the **survey form**, refer to that question on the **response guide** and note the program code(s) asso-

ciated with it under the (Numbers) column. Then identify the matching numbers in the **program code list**, these numbers will appear in a similarly labeled (Numbers) column. Strike those program codes from the **program code list** (a dark pen may make it easier to refer back to the results). The num-

bers and associated programs you strike out are the programs the participant will either be uninterested or ineligible for these programs based on their survey responses. You only need to strike a program from the list once, no further action is needed for recurring codes (Figure 1).



**Figure 1:** Process for scoring from the Survey to Response Guide to Program Code List.

---

After translating all of the responses in this way, a narrowed down list of programs will remain on the code list (those not crossed off). These remaining programs will constitute your core recommendations to the participant. The appendix page numbers on the **program code list** correspond to pages in the appendices that you can print from your digital copy of the toolset.

Print the pages for financing opportunities and technology upgrades that are most appropriate for the participant, as they will be highly useful in explaining the recommendations in greater detail and in answering participant questions. Be sure to review your own survey records for potential errors prior to returning to the participant.

You will also be required to check whether the participant's organization or business address is located within a rural area as defined by the USDA. If this is so, you should also include the appendix page that discusses the USDA Rural Development Program. To check this eligibility, visit the USDA's website tool here: <http://eligibility.sc.egov.usda.gov/eligibility/welcomeAction.do?NavKey=home@1>

**Developing Recommendations and Refining Options.** During the recommendations stage, it is important to recognize that the options presented may not be a comprehensive list, but represents the best available fit for the target audience and region. As an administrator, be sure to reflect on the

survey responses as a reminder of what the participants' needs are and what their organization does. Utilize the toolset materials and relevant information brought by the participant in order to address participant questions on programs as thoroughly as possible.

Offer to walk through the programs and technologies using the appendices. Encourage the participant to raise any questions they may have and to examine the programs presented. Emphasize the sections of the appendix pages detailing next steps and how to proceed with securing financing.

Once you have discussed the financing options in sufficient detail, review next steps for the participant. The "For Participants" document has a list of steps that are necessary to secure energy efficiency or renewable energy upgrades. Review that diagram, highlight the first two steps to show they've already completed some work, and talk over the next stage (most likely getting an energy assessment of the property). Discussing additional considerations, like those below, may help the participant further narrow their preferences:

- ◇ Balance sheet considerations
- ◇ Timeline of project
- ◇ Goals of the organization
- ◇ Budget constraints, and how much debt they are willing to take on

Participants may have already completed some of the steps toward financing, making

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it important to help the participant identify where they stand in the process. Below are a few suggestions of things to discuss about each next step:

◇ **Step One: Setting Goals.** Are you trying to lower your electricity bill? Gas bill? By how much? In what timeframe would you like these efficiency measures installed? By when do you need a return on your investment? Ask yourself and your organization representatives about scale, and timeframe.

◇ **Step Two: Gathering Information.** This is where this activity presumes you are. It's ok if you've already skipped ahead, or have yet to set goals, but this is the purpose of this survey. To provide you with more information about your upgrade options, how to evaluate the technologies that are out there, where to find professional support, and how to finance it all.

◇ **Step Three: Assess the Energy Patterns of the Property.** Learn where you're currently spending your energy budget and what would be the most cost-effective solutions specific to your organization and property.

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◇ **Step Four: Secure Financing and Contractor Work.** The order of these operations might depend on your funding source so return to step two for more guidance so you have a solid plan of action.

◇ **Step Five: Follow-up Monitoring.** Return to your goals. Are they being met with these upgrades? Do you want to go further? Do you want to share your success story with others?

Finally, thank the participant for their interest and participation in the exercise and provide contact information for them to follow-up as needed. Information about the Ecology Center and efforts to reduce energy use in buildings may be useful to share and would provide additional context and resources for the participant. This discussion could include an overview of upcoming policy work, new financing options supported by the Ecology Center, and ways for the participant to get involved if they are interested.

# INTRODUCTION FOR PARTICIPANTS

Congratulations on your decision to seek out energy efficiency for your workplace or home! There's are several steps ahead but we at the Ecology Center are here to help. Please review this document before meeting with the Ecology Center representative, and be sure to bring along any questions you may encounter.

The diagram below lays out the process for pursuing energy efficiency financing, from start to finish. Each of these stages (prepare, partake, and plan) builds upon the last to move you closer to acquiring financing for a long-term upgrade to your building's energy-saving capabilities. The exercise you'll be participating in is designed to be a launch pad for your ideas and steer your organization toward the most suitable efficiency programs.



## *Understanding the Process*

Energy efficiency may be the star of the exercise, but there is a wider spectrum of clean energy options available to your operations. Adopting “energy-smart” behaviors, such as powering down equipment after-hours or turning off lights not in use, can lead to accumulated savings that require no capital to implement. Another pillar of clean energy is the use of renewable sources, like solar, wind, or geothermal. Renewables represent a greater upfront investment and require special siting considerations, but can pay for themselves over time through lower utility bills. Generating your own electricity through renewables can be great for the environment and your budget. When combined with energy efficiency retrofits, these three options can make any operation more sustainable, while freeing up revenue for other priorities.

The exercise with the Ecology Center is meant to provide information and clarity on potential avenues for financing energy efficiency and/or renewable energy projects for any buildings your organization or business may use. The exercise is simply a series of questions about your organization and its current energy use. The survey will help us learn about your organization’s unique characteristics, goals, and current resources. This will lay the groundwork for developing recommendations based on the energy financing programs your organization may qualify for and how to receive the greatest value from the options available.

To get started, you are encouraged to gather the materials listed around the “prepare” wheel in the diagram above. Be sure to bring those materials to your meeting with the Ecology Center, as depicted in the “partake” wheel. The administrator will guide you through the exercise’s survey and is available to answer any questions you may have along the way. At its conclusion, the exercise will present various financing options deemed to be the best fit for your organization.

Once you have finished reviewing your financing options, the Ecology Center representative will talk with you about next steps to create a plan of action for your energy efficiency upgrades, as shown in the final wheel.

The overall purpose of this exercise is to empower you and your organization to take the first steps toward acquiring the supplemental funding necessary to meet your energy efficiency and renewable energy goals.

### **Have Any Feedback? Want to Know More?**

The authors of this workbook and the Ecology Center welcome any and all feedback you may have about your experience. If you have any thoughts on what worked, how we can improve the exercise materials and overall process, or have additional questions about this or other resources for your organization, we would appreciate hearing from you. Please feel free to send any questions or comments to [info@ecocenter.org](mailto:info@ecocenter.org) or call (734) 663-2400. Thank you!

# SURVEY FORM

## *Tell Us About Your Organization and Building*

- 1) Where is your organization located?
  - a) County
    - i. Washtenaw
    - ii. Oakland
    - iii. Other
  - b) City
    - i. Ann Arbor
    - ii. Other
  
- 2) Do you rent/lease or own the building you hope to improve?
  - a) Rent or Lease
  - b) Own
    - i. Is the property owner-occupied?
      - a. Yes
      - b. No
  
- 3) Is the property that you plan to upgrade for residential or commercial purposes (i.e. will/does anyone reside on the property)?
  - a) Residential
    - i. How many units are on the property?
      - a. Single family or one-unit only
      - b. 2-4 units
      - c. 5+ units
  - b) Commercial
  
- 4) Which sector best describes your organization - who you are representing today?
  - a) For-profit
  - b) Non-profit\*
  - c) Public/municipal
  - d) Unaffiliated individual (if d, skip to question 7)
    - i. Are you a US veteran, reservist, or other type of military personnel?
      - a. Yes
      - b. No

\*Formally registered with tax-exempt status as a 501(c)(3) or 501(a)

## SURVEY FORM

5) Which category best describes your organization's operations?

- a)Property Management
- b)Education
- c)Religious
- d)Health/Social Care
- e)Other

6) How many employees does your organization have on staff?

- a)Less than 500
- b)500 or greater

7) What utility provider services the property?

- a)DTE Energy
- b)City of Chelsea
- c)Other

8) Do you serve low-income\*\* families or communities? (If unaffiliated individual, do you qualify as low-income?)

- a)Yes
- b)No

\*\*“Low-income” definition varies across programs. For Washtenaw County’s Owner-Occupied Housing Rehabilitation, it’s families earning 80% or less of the Area Median Income. For Washtenaw County’s weatherization program, it’s 200% of the federal poverty level or 60% of State Median Income, whichever is higher for the previous 3 months, with an additional criteria for family income. Usually whether the participant receives or services people who receives SNAP/EBT benefits is a useful indicator.

9) What is the age of the building you hope to improve?

- a)New or not yet constructed
- b)Less than 10 years old
- c)10 years or older

# SURVEY FORM

## *What Are Your Energy Needs and Goals?*

10) What motivated your organization to utilize this energy finance information tool?

**Select all that apply.**

- a) Interest in reducing energy use / improving efficiency
- b) Interest in renewable energy generation
- c) General desire to learn about available options
- d) Other: \_\_\_\_\_

11) Have you had an energy audit performed on your building?

- a) Yes
  - Year: \_\_\_\_\_
- b) No

12) Would you consider an energy audit as an option for identifying energy savings?

- a) Yes
- b) No

13) Do you feel your electricity bill is unusually high for the types of activities your organization performs?

- a) Yes
- b) No
- c) Uncertain
  - What information would you need to answer more confidently?  
\_\_\_\_\_

14) Have you noticed any air leaks or spaces around your building that are consistently hotter or colder than other areas? If so, where? Examples of problem spots may include windows, door frames, floor boards, attic spaces, etc.

- a) Yes
  - Details: \_\_\_\_\_
- b) No

15) Do you feel the heat and/or air conditioner has to run frequently to achieve the desired room temperature?

- a) Yes
- b) No

## SURVEY FORM

16) Does your organization use any specialized appliances or equipment? Examples may include kitchen appliances, server farms, medical imaging equipment, refrigerators, etc.

a) Yes. If yes, what are the major items currently in use?

•Items: \_\_\_\_\_

b) No

17) Are you satisfied with the current performance of your hot water heater or steam boiler?

a) Yes

b) No

i. How old is the device?

a. 0-8 years

b. Older than 8 years

18) Are you interested in installing alternative energy technologies such as solar, a small-scale wind turbine, or geothermal?

a) Yes

i. What made this energy generating option stand out to you?:

\_\_\_\_\_

ii. Are you familiar with the costs and siting guidelines for this technology?:

\_\_\_\_\_

b) No, I am not interested

c) No, but I would like to learn more

19) Does your organization have any all-electric vehicles in its motor pool?

a) Yes

b) No

*What is Your Project Budget and Timeline?*

20) Are you unwilling to consider any of the following energy finance options:

a) Program types:

i. Loans

ii. Grants

iii. Tax Credits

iv. Rebates/discounts

b) No, all of the above are potential options for my organization

## SURVEY FORM

---

21) Do you or your organization have a mortgage out, or any other material liens, on the property that you hope to upgrade (many programs will not issue funds to buildings with this status)?

- a) Yes
- b) No

22) Has your organization recently claimed bankruptcy (many programs will not issue funds to organizations that have)?

- a) Yes
  - b) No
-

## RESPONSE GUIDE

Question	Sub 1	Sub 2	Numbers
<b>1</b>	a	i	14
		ii	3; 5; 16
		iii	3; 5; 14; 16
	b	i	
		ii	5
	<b>2</b>	a	
b			
		i-a	29
		i-b	3; 9; 11-12; 14; 17; 22; 26-27
<b>3</b>	a		6; 8-12; 30; 33-34; 39
		i-a	5; 7; 19-20; 28
		i-b	3; 5; 7; 14; 17-20; 26; 40; 58
		i-c	3; 14; 16-18; 21-22; 26-27; 40; 58
	b		3-4; 14; 16-29; 31; 36-37; 40; 58
	<b>4</b>	a	
b			3; 6; 9; 11-14; 17-18; 22; 26-27; 36-37; 39-40; 57-58
c			3; 5-8; 10-14; 16-18; 22; 26-27; 29-31; 36-40; 58
d			1; 5-13; 29-30; 33-34; 39; 57
		i-a	
		i-b	17
<b>5</b>	a		11-12
	b		11-12
	c		11-12
	d		
	e		
<b>6</b>	a		
	b		6; 11-13
<b>7</b>	a		30-31
	b		33-37
	c		30-31; 33-37
<b>8</b>	a		
	b		3-4; 10; 14; 20
<b>9</b>	a		3-5; 7-9; 13-14; 16-21; 23-28; 34-37; 58
	b		20; 36-37
	c		

# RESPONSE GUIDE

Question	Sub 1	Sub 2	Numbers
<b>10</b>	a		
	b		
	c		
	d		
<b>11</b>	a		
	b		
<b>12</b>	a		
	b		
<b>13</b>	a		
	b		52 - 56, 62, 63, 66
	c		
<b>14</b>	a		
	b		48-50, 64
<b>15</b>	a		
	b		48-50, 64
<b>16</b>	a		
	b		51, 65
<b>17</b>	a		45
	b	i-a	
		i-b	
<b>18</b>	a	i	
		ii	
	b		52-56, 62, 63
		c	
<b>19</b>	a		
	b		56
<b>20</b>	a	i	5-29
		ii	1-4
		iii	39-40; 57-58
		iv	30-37
	b		
<b>21</b>	a		3; 5; 7-8; 11-12; 15; 17-29
	b		
<b>22</b>	a		11-12; 27
	b		

## PROGRAM CODE LIST

<b>Numbers</b>	<b>Program Name</b>	<b>Program Type</b>	<b>Appendix Page</b>
<b>1</b>	Michigan Agency for Energy	Grant	28
<b>2</b>	USDA Office of Rural Development	Grant	29
<b>3</b>	Washtenaw Rehabilitation Program	Grant	31
<b>4</b>	Michigan Weatherization Assistance Program	Grant	30
<b>5</b>	PACE - Ann Arbor	Loans - Commercial	43
<b>6</b>	DEQ - MI Small Business P2 Loans	Loans - Commercial	37
<b>7</b>	PACE - Lean and Green Michigan	Loans - Commercial	42
<b>8</b>	Michigan Saves- Business	Loans - Commercial	40
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<b>15</b>			
<b>16</b>	a2energy Loan Fund for Rental Housing	Loans- Residential	49
<b>17</b>	EEM - Veterans Affairs	Loans- Residential	53
<b>18</b>	EEM - FanM - Basic	Loans- Residential	52
<b>19</b>	EEM - FanM - Green Rewards	Loans- Residential	46
<b>20</b>	EEM - FanM - Green Preservation Plus	Loans- Residential	45
<b>21</b>	EEM - FanM - HomeStyle Renovation	Loans- Residential	44
<b>22</b>	FHA - Energy Efficiency Mortgage	Loans- Residential	51
<b>23</b>	FHA - HUD Title 1 Home Improvement	Loans- Residential	47
<b>24</b>			
<b>25</b>	Michigan Housing Authority - Commercial Property Improvement Program	Loans- Residential	48
<b>26</b>	Michigan Housing Authority - Residential Property Improvement Program	Loans- Residential	55
<b>27</b>	Michigan Saves Home Energy	Loans- Residential	56
<b>28</b>	Michigan Saves Multifamily	Loans- Residential	41
<b>29</b>	Opportunity Resource Fund - Housing Development	Loans- Residential	50
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## PROGRAM CODE LIST

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<b>38</b>			
<b>39</b>	Federal Business Energy Investment Tax Credit (ITC)	Tax Credit	64
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<b>41</b>	Install CFLs	Lighting	74
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<b>44</b>	Upgrade HVAC system	Heating/Cooling	78-79
<b>45</b>	Upgrade boiler	Heating/Cooling	82
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<b>48</b>	Improve building shell	Insulation	84
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# PROGRAM CODE LIST

<b>Numbers</b>	<b>Program Name</b>	<b>Program Type</b>	<b>Appendix Page</b>
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<b>65</b>	Upgrade oven/range	Appliances	89
<b>66</b>	Tesla Powerwall	Transition	77

## How to Use this Appendix

### MICHIGAN SAVES - PUBLIC SECTOR

For properties owned, operated, and occupied by public sector entities, this installment purchase agreement option allows access to energy efficiency upgrades that can then be paid for with operating dollars reserved for the annual utility expenses.

Installment purchase agreements are unique from typical leases because payments increase your equity in (or ownership of) the technology. At the end of the loan term, you technically own the installed upgrades.

Since the projected energy savings are greater than the cost of the equipment, over time, installments are financed through utility bill savings.

Michigan Saves is designed to help government and municipal entities enter into an installment purchase

agreement. They act as a resource and partner throughout the loan and contracting process.

#### How to get started:

Find a Michigan Saves approved contractor to walk you through the process steps which include:

- ◊ Have an energy assessment on the property or pick from a pre-scored menu of qualified energy improvements (<http://michigansaves.org/business-improvement>)

- ◊ Complete the loan application

- ◊ Have upgrades installed

Approved contractors can be found <http://michigansaves.org/homeowners>

*Did You Know? "Installment Purchase Agreements" are tax-exempt for public sector entities. They're also not technically considered debt financing because of the way the agreements are structured. Funded through operating expenses, this puts less pressure on your capital expense budget.*

#### Get More Information

Find more information here:  
<http://michigansaves.org/program/psef>

#### At a Glance

##### Average Loan Amount

\$5,000 – 1,000,000

##### Eligible Recipients:

Government or municipal entities (including public schools, hospitals or libraries)

##### Type

Installment Purchase Agreement

##### Term

~3-5 years depending on the useful lifespan of the upgrades.

##### Terminology

**Operating Expense:** Costs incurred and paid out within a single operating period which is usually about one year (e.g. salaries, and utility bills).

**Capital Expense:** Costs incurred that will be paid back over several operating cycles (e.g. long-term debt, or fixed assets). Capital dollars are difficult to secure since they often require voter approval, and are usually already committed to other future projects.

##### NOTE

There is a \$250 application fee for this program

##### Funds:



Icons under the *Funds* section indicate the type of energy technologies and upgrades this particular program can finance. The options are efficiency (denoted by the green house) and renewable energy generation (denoted by the green lightning).

Icons by the page number indicate the type of funding that is available. The options are grants, loans, tax credits, or other financing opportunities, respectively:



# ENERGY ASSESSMENTS

## At a Glance

### *Average Cost of Energy Audit*

- ◇ \$0.05 - \$0.25 / Square foot;
- ◇ \$500 for a residential unit
- ◇ \$5,000 for a school

### *What They Look Like*

The size, style, and age of your building, currently installed systems, and potential health and safety concerns. They will check for leaks, assess insulation, window materials and construction, and appliance efficiencies, and evaluate how the building's systems interact with the external climate.

### *Why bother?*

Energy assessments help you learn where you are losing money on energy costs, how you compare to similar organizations or households, what you can do cheaply to save money and energy, and how to plan for long term energy conservation. Not only does the audit provide information tailored to the unique conditions of your property, but an official one is often a required first step in securing financing.

### *Finance Tip*

There are several free online resources for you to perform an initial self-assessment. DTE Energy also offers a rebate for home energy audits, while the Michigan Agency for Energy manages the RETAP program which provides free audits to select businesses and non-profits. Many loans will even allow you to include the cost of the audit in the total principle.

Once you have decided to explore energy efficiency or renewable energy upgrades, it's time to get an energy assessment (also called an energy audit). A trained professional who understands how heat, moisture, air, and energy flow through the building, will visit your property and identify possible leaks and opportunities for energy savings. This doesn't necessarily mean you will need to cut back in your company's operations, it just means there may be gaps or weaknesses in the building that can be upgraded so that you can capture all of the energy that you pay for and put it to good use! Afterwards, you can expect to receive information about recommended cost-effective upgrades, and estimates of the expected savings.

The cost of an audit depends on:

- ◇ Use of the property (whether it is residential, industrial, or commercial),
- ◇ Building size, and
- ◇ Quality or level of audit

There are different levels of an audit that determine how detailed they will be, and which funding you can then qualify for. Home energy audits tend to require fewer technical resources or capacity than commercial or industrial buildings. The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), a leading name in the energy efficiency field, has outlined standard actions required for certain levels of detail

associated with audit Levels I-III. Find out more about the different levels here: <http://microgrid-solar.com/the-difference-between-ashrae-level-1-2-3-energy-audits/>

**How to Get Started** (You have a lot of options to consider!)

- ◇ Start by learning more about the typical energy uses of your type of business: <https://dteenergy.bizenergyadvisor.com/>, or
- ◇ Try a self-assessment: [https://www.energystar.gov/index.cfm?fuseaction=home\\_energy\\_yardstick.showgetstarted](https://www.energystar.gov/index.cfm?fuseaction=home_energy_yardstick.showgetstarted), or
- ◇ Use a form to guide your walk-through: <http://www.energy.wsu.edu/Documents/audit1.pdf>, or
- ◇ Use the Retired Engineer Technical Assistance Program (RETAP): [http://www.michigan.gov/energy/0,4580,7-230-72052\\_4848---,00.html](http://www.michigan.gov/energy/0,4580,7-230-72052_4848---,00.html), or
- ◇ Find a comprehensive energy assessor on your own: <https://www.newlook.dteenergy.com/wps/wcm/connect/dte-web/home/save-energy/residential/contractors/find+a+contractor>

**Did You Know?** *Cost-effective" in auditor speech means that the cost of the upgrades can be covered by the utility-bill savings as a result of the upgrades. Most loans require that upgrades are cost-effective so that the cost of the equipment is paid back through the savings on your utility bill.*

### **Get More Information**

<http://energy.gov/energysaver/do-it-yourself-home-energy-audits>  
<http://www.actonenergy.com/portals/0/business/forms/Energy-Audits-Handout.pdf>

Grant availability is highly variable and dependent on both the annual budget appropriated to the grant-making agency, and its funding priorities. Counter to popular belief, grants aren't really "free money," because they entail additional staff time and work in both initial applications and follow-up.

Grant money is a typical source of funding for many non-profit groups. If you are not registered with 5091(c)(3) status (a

tax-exempt charitable institution), consider partnering with such a non-profit in your energy efficiency project to expand access to grant funding opportunities.

We recommend checking the websites of grant-making agencies and foundations frequently to stay updated on current opportunities.

**FINANCE TIP:** Private foundations are not described in this workbook. If you have 501(c)(3) status, consider reviewing your funders list and their funding priorities to see if any also finance energy curtailment programs, or efficiency, or renewable energy upgrades.

## *Grant Vocabulary*

- ◇ Funding priorities – If you are considering applying for a grant from a certain foundation, be sure to read through their "funding priorities" to learn about the types of projects and programs they are most passionate about. If energy efficiency is not mentioned, they may not be worth the application effort.
- ◇ RFP – Some grant-making agencies or foundations release a 'request for proposal' when they are ready to provide funding. As an applicant, it is advisable to review the RFP carefully for information about deadlines, qualifications, and contents requested or required with your submitted materials.
- ◇ Rolling grants - Refer to opportunities that persist throughout the year such that applications are accepted at any time and funds are disbursed on an ongoing basis.
- ◇ Letter of intent/interest - Sometimes referred to as an LOI, some granters require an initial letter to be sent before submitting the full suite of application materials. This is a great opportunity to initiate contact with an organization, especially when you are not sure if your project qualifies under their funding priorities.
- ◇ Loan to grant – Some loan programs offer a transition to grant status once outcomes have been demonstrated and verified. Be sure not to reject a loan option if this opportunity exists.
- ◇ Reporting requirements – Many grant making authorities require proof that funds were used appropriately, and that they lead to the desired outcomes. This is similar to some of the loans that require ongoing monitoring of upgrades to ensure that efficiency levels were achieved.



## At a Glance

*Average Grant Amount:*  
\$10,000-50,000

### *Eligible Recipients*

- ◇ Municipalities
- ◇ Universities
- ◇ For-profit
- ◇ Non-profit enterprises

### *Funds*



The Michigan Energy Office funds a variety of programs or projects related to energy efficiency and renewables on a rotating basis depending on their annual plan, budget, and foreseeable community needs. This changes annually and so would need to be checked regularly.

Support from the Energy Office is available in the form of a grant or loan so the request for proposal should be read through carefully.

### How to get started:

Visit their website for current funding opportunities: [http://www.michigan.gov/energy/0,4580,7-230-72052\\_72054\\_73823---,00.html](http://www.michigan.gov/energy/0,4580,7-230-72052_72054_73823---,00.html)

### Get More Information

[www.michigan.gov/energy](http://www.michigan.gov/energy)



This arm of the USDA offers more than 50 financial assistance programs in rural communities. This can include, loan guarantees, grant payments and/or direct technical assistance. These programs do not last consistently so check the website regularly for updates. The majority of programs offer money through a request for proposal (RFP), while some loan guarantees are on a rolling basis.

Relevant grant programs to keep an eye on include:

- ◇ Rural Business Development Grant
- ◇ Rural Energy for America Program (REAP) - Renewable Energy Systems and Energy Efficiency Improvement

USDA Office of Rural Development loans and grants are unique in that applicants must be located within a rural community defined as any areas other than:

- ◇ A city or town that has a population of greater than 50,000 inhabitants; and
- ◇ The urbanized area contiguous and adjacent to such a city or town, as defined by the U.S. Bureau of the Census using the latest decennial census of the United States.

### How to get started:

First, be sure to verify that your property is located within a rural community: <http://eligibility.sc.egov.usda.gov/eligibility/welcomeAction.do?NavKey=home@1>

Then check the website regularly to see if there are any RFPs relevant to energy efficiency or renewable energy upgrades: <http://www.rd.usda.gov/programs-services>

### Get More Information

[www.rd.usda.gov/mi](http://www.rd.usda.gov/mi)

## At a Glance

### *Average Loan Amount*

\$1,500-50,000

### *Eligible Recipients*

Commercial or for-profit entities, nonprofit groups, single and multi-family housing, individuals, schools, state and local governments, and tribal governments

### *Other Restrictions*

Operations must be located in a “rural community.” Ineligible areas can be searched for on the USDA website for clarification

### *Funds*



# MICHIGAN WEATHERIZATION ASSISTANCE PROGRAM (WAP)

## At a Glance

### *Average Loan Amount*

Free upgrades can lead to a savings of up to \$300 /yr on your utility bills

### *Eligible Recipients*

Low-income individual homeowners and renters

### *Funds*



The state of Michigan provides free weatherization upgrades to properties that house low-income individuals or families. These weatherization upgrades are permanent and can include energy conservation measures like attic and wall insulation and ventilation, air leakage reduction, dryer venting, and energy efficient lighting. Property servicers can also perform free consultations to discuss ways that you can reduce both energy use and your electricity bill.

The state does not actually implement WAP. They only distribute funds to community organizations (Local Weatherization Operators), like Washtenaw County Employment, Training and Community Services to run the WAP

## How to get started:

Find WAP operators by county through the Michigan State government website: [http://www.michigan.gov/mdhhs/0,5885,7-339-71547\\_5531\\_7211-58707--,00.html](http://www.michigan.gov/mdhhs/0,5885,7-339-71547_5531_7211-58707--,00.html)

## Get More Information

Washtenaw County: <http://www.ewashtenaw.org/government/departments/community-and-economic-development/housing-and-community-infrastructure/Weatherization/Weatherization%20FAQs>

Oakland County: <http://www.olhsa.org/complete-services>



# WASHTENAW REHABILITATION PROGRAM

**W**ashtenaw County's Property Rehabilitation Program is designed to help low-income homeowners bring their aging buildings up to health and safety codes. In fact, no payback to the loan is expected except at sale, rental, refinance, or transfer of the property which allows some financial leniency.

Loan can be used to pay for energy audits, upgrades to lighting, windows, HVAC systems, water saving devices, and Energy Star appliances.

## How to get started:

Call 734-622-9036 for more information or to apply (Note these is high demand for this program and a long waiting list).

### Get More Information

<http://www.ewashtenaw.org/government/departments/community-and-economic-development/housing-and-community-infrastructure/housing-rehab/owner-occupied-housing-rehab/owner-occupied-housing-rehab>

## At a Glance

### *Average Loan Amount*

Up to \$15,000

### *Eligible Recipients*

Individual low-income homeowners

### *Type*

Property improvements and appliance purchases

### *Property Requirements*

◇ 1 unit

◇ Must be owner-occupied

### *NOTE*

*income of individual is capped at 80% of poverty line.*

### *Funds*



# OAKLAND COUNTY HOME IMPROVEMENT PROGRAM

## At a Glance

*Average Principle Amount*  
\$7,000- \$18,000

*Eligible Recipients*  
Individual low to moderate-income homeowners

*Type*  
Property improvements and appliance purchases.

*Property Requirements*  
◇ 1 unit  
◇ Must be owner-occupied

*Ineligible*  
Condominiums, mobile homes, rental units, accessory buildings

*Funds*



This program is designed to help low and moderate-income homeowners bring their aging buildings up to health and safety codes. In fact, no interest accrues, and no payback to the loan is expected except at sale, rental, refinance, or transfer of the property which allows some financial leniency.

Loan can be used to pay for upgrades to lighting, windows, HVAC systems, water saving devices, and building envelope upgrades like insulation and roofing, but loan recipients cannot have more than one loan in any 5-year period.

## How to get started:

Application form can be found at the Oakland County Community & Home Improvement Division or here: [https://www.oakgov.com/advantageoakland/media-center/Documents/chi\\_hiploanapp.pdf](https://www.oakgov.com/advantageoakland/media-center/Documents/chi_hiploanapp.pdf)

## Get More Information

<https://www.oakgov.com/advantageoakland/communities/Pages/housing.aspx>



# LOANS

Loans can sometimes be very attractive since they offer access to large amounts of funds. The catch, of course, is that you or organization needs to be willing and able to take on debt. Loans will have varying interest rates, and insurance premium requirements depending on your down payment, credit rating, principle, and other factors.

Larger federal, state, or county governments don't offer loans directly to the public but will offer "loan guarantees" under a particular program. Essentially, loan guarantees make it easier or cheaper to secure a loan. Knowing the program name will help as you try to discuss options with your banker/lender, but it's important that individual lending restrictions may vary. Ideal lending conditions lead to loan payments that are less than the cash savings associated with upgrades.

The types of loans outlined within this document include:

- ◇ EEMs – Energy Efficient Mortgages are larger scale, longer term loans to be used

when you are purchasing property or refinancing your current mortgage. They allow the cost of energy efficient upgrades to be incorporated into the principle.

- ◇ Property Improvements and Equipment Purchases – These types of loans are dispersed separate from the mortgage, and are typically smaller amounts for shorter terms. Some specifically require that building upgrades are energy efficiency whereas others do not.
- ◇ PACE – Called "property assessed clean energy," these loan programs provide the full upfront costs for energy efficiency upgrades which are paid back, over time, through an increased property tax.
- ◇ Other – Not all loans are directly tied to property upgrades. Some are more generalized funds that could be used for building upgrades if you so choose. This includes loans for small business operations, rural development, and special opportunities.

## Loan Vocabulary

- ◇ Lien – First-lien lenders are the first to recoup their loan costs if the loan goes into default or the collateral is liquidated. Liens are placed on the property as a form of security to lower the risk to the lender.
- ◇ Principle – The amount of money borrowed from the lender
- ◇ Term – the length of time that a loan agreement covers
- ◇ Loan guarantees – Commitment from a third party or governmental authority to pay out debt to a lender if the loan goes into default.

**FINANCE TIP:** This document is not an extensive list of all the programs or organizations that offer generalized loans. Traditional loans can be unattractive because they require a shorter payback period, high or unpredictable interest rates, and strict credit requirements. If nothing fits here, trying looking toward your community economic development council for ideas on other resources.

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*Did You Know? Rarely can one combine loan options. Most loans must be first-lien secured meaning they cannot be used in conjunction with other things that are first-lien secured.*

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## At a Glance

*Average Principle Amount*  
\$ 100,000 - 5,000,000

### *Eligible Recipients*

- ◇ *Independently owned* and operated for profit businesses
- ◇ Not dominant in its field
- ◇ With 500 full-time employees or fewer

### *Type*

Property Improvement

### *Term*

10-20 years

### *Disqualified Businesses*

Rental real estate, charitable, religious, government-owned corporations, consumer and marketing cooperatives

### *Funds*



The US SBA guarantees these loans to finance property improvements with the hope that small businesses will be able to expand and develop more job opportunities for their communities. Loans can be used for:

- ◇ The purchase of improvements,
- ◇ The construction of new facilities or modernizing, renovating or converting existing facilities, or
- ◇ The purchase of long-term machinery and equipment that have a minimum 10 yr life expectancy.

There are a few other requirements that you should be aware of when considering a CDC loan. You must be able to demonstrate that the project makes sound business sense, that the business can repay the loan from projected operating cash flows, and that the business has a tangible net worth less than \$15 million and an average net income less than \$5.0 million after taxes for the preceding two

years.

Since these loans can be quite large, they must be both first and second-lien secured. Furthermore, the property owner must occupy a proportion of the property for its own business uses (60% if it is a new building, and 51% if it is an existing property). Finally, the business owner must show "good character" as a law abiding citizen with a good credit history.

### **How to get started:**

- ◇ There is a lot of paperwork required to secure this type of loan (including your resume!). Step by step details can be found at the SBA website: <https://www.sba.gov/content/cdc504-loan-application-process>
- ◇ There are three to four certified CDC lenders in the Southeast Michigan area.

### **Get More Information**

<https://www.sba.gov/category/navigation-structure/loans-grants/small-business-loans/sba-loan-programs/real-estate-and-eq>



Similar to the CDC loan, this is a more generalized loan guaranteed by the US SBA to encourage economic growth and development. Its benefit above a CDC loan is that it only needs to be first-lien secured meaning other lending agencies may be willing to consider second-lien status. Loans may be used:

- ◇ To purchase equipment, machinery, furniture, fixtures, supplies or materials,
- ◇ To purchase real estate, including land and buildings, or
- ◇ To construct a new building or renovate an existing building

There are a few other requirements that you should be aware of when considering a 7(a) loan. You must be able to demonstrate that the project makes sound business sense,

that the business can repay the loan from projected operating cash flows, and that the business has a tangible net worth less than \$15 million and an average net income less than \$5.0 million after taxes for the preceding two years.

Furthermore, the property owner must occupy a proportion of the property for its own business uses (60% if it is a new building, and 51% if it is an existing property). Finally, the business owner must show "good character" as a law abiding citizen with a good credit history.

### How to get started:

- ◇ There is a lot of paperwork required to secure this type of loan (including your resume!). Step by step details can be found at the SBA website: <https://www.sba.gov/content/sba-loan-application-checklist>

**FINANCE TIP:** Bank processing fees start to accrue once your principle reaches or exceeds \$150,000 for a 7(a) loan. Lenders sometimes have these caps above which fees occur so take that into consideration when looking at the loan options.

### Get More Information

<https://www.sba.gov/7a-loan-program>

## At a Glance

### Average Loan Amount

\$ 50,000 - 5,000,000

### Eligible Recipients

- ◇ Independently owned and operated for profit businesses
- ◇ Not dominant in its field
- ◇ With 500 full-time employees or fewer

### Type

Property Improvement

### Term

10-25 years

### Disqualified Businesses

Rental real estate, charitable, religious, government-owned corporations, consumer and marketing cooperatives

### Funds



## At a Glance

### *Loan Amount*

\$ 13,000

### *Property Requirements*

- ◇ Independently owned and operated for profit businesses (or not-for-profit child care centers)
- ◇ Not dominant in its field
- ◇ With 500 full-time employees or fewer

### *Type*

Equipment Purchase

### *Term*

~6 years

### *Disqualified Businesses*

Non-profits are generally ineligible

### *Funds*



The intention of this loan is to afford the start-up and expansion costs for small businesses. Different from the CDC and 7(a), these loans are disbursed through qualified non-profit lending community organizations. Loans may be used for:

- ◇ Working capital
- ◇ Inventory or supplies
- ◇ Furniture or fixtures
- ◇ Machinery or equipment

Since these are technically considered start up loans, some lenders may require you the go through a business training program

### **How to get started:**

Michigan lenders and more information can be found at: <https://www.sba.gov/content/microloan-program>



# DEQ - MI SMALL BUSINESS POLLUTION PREVENTION (P2) LOANS

The Michigan Department of Environmental Quality can provide up to 50% of a loan principal in partnership with a qualified lender, to help small businesses finance upgrades that will lead to pollution prevention. This program promises slightly lower interest rates than the market. Qualified projects include those that:

- ◇ Eliminate or reduce waste at the business location
- ◇ Lead to sound reuse or recycling of waste streams from the property, or
- ◇ Conserve water or energy on-site.

The challenge with this loan option is that loan recipients are required to be the middle coordinator between the DEQ, the lending agency, and the contractors. The process entails several coordinated efforts to succeed and can be considered quite difficult.

## How to get started:

There are two key steps for initiating a project.

- ◇ The first is to speak with a DEQ staff to either identify eligible projects or to verify that the project you had in mind would qualify for this loan. For this optional pre-loan service, contact Chad Rogers, Small Business P2 Loan program manager, at (517) 284-6872 or (800) 662-9278.
- ◇ The other useful step would be to speak with your lender to learn more about your loan and credit worthiness before moving much farther into this program.

## At a Glance

### *Average Principle Amount*

\$ 300,000– 400,000

### *Eligible Recipients*

- ◇ Independently owned and operated for profit businesses
- ◇ Not dominant in its field
- ◇ With 500 full-time employees or fewer

### *Type*

Property Improvement

### *Term*

~ 5 years

### *Disqualified*

- ◇ Government or municipal entities, non-profits

### *NOTE*

You cannot receive more than 1 loan in any 3-year time period.

### *Funds*



### Get More Information

[http://www.michigan.gov/deq/0,1607,7-135-3307\\_3515\\_4144---,00.html](http://www.michigan.gov/deq/0,1607,7-135-3307_3515_4144---,00.html)



## At a Glance

### Average Loan Amount

\$ 10,000 – 250,000

### Eligible Recipients

Small for profit and non-profit private businesses

### Type

Equipment purchase or property improvement

### Term

~ 5 years

### Funds



The Opportunity Resource Fund is a small and localized program that aims to support organizations in Southeast Michigan communities that service low-income families and individuals. OppFund has a unique series of social criteria when judging loan recipients.

Applicants must meet at least two of the following:

- ◇ Exhibit community control or local self-determination
- ◇ Demonstrate alternative business practices (co-ops, worker-owned, land trust)
- ◇ Provide employment for low-income and/or low-wealth individuals
- ◇ Empower the disadvantaged, including woman- and minority-owned businesses
- ◇ Reinvest in decaying area or reduce blight
- ◇ Use ecologically sensitive approaches
- ◇ Leverage other resources
- ◇ Provide opportunities for partnership, collaboration, and/or cooperative endeavors

This loan program can be especially attractive to organization that might not have the standard collateral necessary to secure a typical loan. For example, eligible forms of security include equipment, accounts receivable, and personal guarantees.

### How to get started:

- ◇ OppFund invites qualified organizations to contact their staff through the website: <http://oppfund.org/small-business-loans/>
- ◇ They will then receive an application package and learn current timelines for submissions and approvals.



# MICHIGAN SAVES - PUBLIC SECTOR

For properties owned, operated, and occupied by public sector entities, this installment purchase agreement option allows access to energy efficiency upgrades that can then be paid for with operating dollars reserved for annual utility expenses.

Installment purchase agreements are unique from typical leases because payments increase your equity in (or ownership of) the technology. At the end of the loan term, you technically own the installed upgrades.

Since the projected energy savings are greater than the cost of the equipment, over time, installments are financed through utility bill savings.

Michigan Saves is designed to help government and municipal entities enter into an installment purchase

agreement. They act as a resource and partner throughout the loan and contracting process.

## How to get started:

Find a Michigan Saves approved contractor to walk you through the process steps which include:

- ◇ Have an energy assessment on the property or pick from a pre-sorted menu of qualified energy improvements (<http://michigansaves.org/business-improvement>)

- ◇ Complete the loan application

- ◇ Have upgrades installed

Approved contractors can be found: <http://michigansaves.org/homeowners>

*Did You Know? "Installment Purchase Agreements" are tax-exempt for public sector entities. They're also not technically considered debt financing because of the way the agreements are structured. Funded through operating expenses, this puts less pressure on your capital expense budget.*

## Get More Information

Find more information here:

<http://michigansaves.org/program/psef>

## At a Glance

### Average Loan Amount

\$5,000 – 1,000,000

### Eligible Recipients

Government or municipal entities (including public schools, hospitals or libraries)

### Type

Installment Purchase Agreement

### Term

~2-5 years depending on the useful lifespan of the upgrades.

### Terminology

**Operating Expense:** Costs incurred and paid out within a single operating period which is usually about one year (e.g. salaries, and utility bills).

**Capital Expense:** Costs incurred that will be paid back over several operating cycles (e.g. long-term debt, or fixed assets). Capital dollars are difficult to secure since they often require voter approval, and are usually already committed to other future projects.

### NOTE

There is a \$250 application fee for this program

### Funds



# MICHIGAN SAVES - BUSINESS

## At a Glance

*Average Loan Amount*  
\$2,000 – 1,500,000

*Eligible Recipients*  
For profit and non-profit private businesses

*Type*  
Equipment purchase or property improvement

*Term*  
1-3 years

*NOTE*  
There is a \$250 application fee for this program

*Funds*



**F**or properties owned or occupied by for-profit and non-profit businesses, Michigan Saves helps reduce the costs associated with energy upgrades. They act as a resource and partner throughout the loan and contracting process and can often help you secure below-market interest rates. Funds can be used for: lighting, heating and cooling systems, insulation, refrigeration, and other equipment.

◇ Have an energy assessment on the property or pick from a pre-sorted menu of qualified energy improvements (<http://michigansaves.org/business-improvement>)

◇ Complete the loan application

◇ Have upgrades installed

Approved contractors can be found: <http://michigansaves.org/homeowners>

### How to get started:

Find a Michigan Saves approved contractor to walk you through the process steps which include:

**FINANCE TIP:** 30% of your loan principle through michigan saves can be applied towards “soft costs,” like labor, installation, and the pre-installment audit.

**Get More Information**  
<http://michigansaves.org/program/bef>



For private multi-unit property owners, Michigan Saves helps reduce the costs associated with energy upgrades. They act as a resource and partner throughout the loan and contracting process and can often help you secure below-market interest rates. Funds can be used for: lighting, heating and cooling systems, insulation, refrigeration, and other equipment.

## How to get started:

Find a Michigan Saves approved contractor to walk you through the process steps which include:

- ◇ Have an energy assessment on the property or pick from a pre-sorted menu of qualified energy improvements (<http://michigansaves.org/business-improvement>)
- ◇ Complete the loan application
- ◇ Have upgrades installed

Approved contractors can be found: <http://michigansaves.org/homeowners>



**FINANCE TIP:** 30% of your loan principle through Michigan Saves can be applied towards “soft costs,” like labor, installation, and the pre-installment audit.

**Get More Information**  
<http://michigansaves.org/program/mef>

## At a Glance

*Average Loan Amount*  
\$2,000 – 2,500,000 per property

*Eligible Recipients*  
Residential property owners

*Type*  
Equipment Purchase Agreements

*Term*  
1-4 years

*Property Requirements*  
4 or more units

*NOTE*  
There is a \$250 application fee for this program

*Funds*



## At a Glance

### *Average Loan Amount*

\$200,000 – 250,000

### *Eligible Recipients*

For profit and non-profit private businesses

### *Type*

PACE – Tax Assessment

### *Term*

10 - 20 years

### *Disqualified*

Government or municipal buildings, single-family homes.

### *NOTE*

If applying to upgrade a residential property, it must have 5 or more units

### *Funds*



Similar to the installment purchase agreements in the public sector, PACE financing allows access to energy efficiency upgrades for businesses and industries without requiring up front capital. Funding can be used for an extensive list of energy efficiency, water efficiency, and renewable energy installations.

It works by having a special tax assessment performed on the property. Businesses then pay back the loan through this increased tax on the property in annual installments.

Lean and Green Michigan operates in a patchwork fashion across the state depending on whether your local government has enacted enabling legislation to allow itself to process this special tax assessment. The Lean and Green Michigan program, like Michigan Saves, performs a lot of

the necessary steps to see if PACE is a good option for you, and to launch the process.

### **How to get started:**

Check to see if you are currently located in one of the participating jurisdictions by reviewing the map found here: <http://leanandgreenmi.com/index>

If so, contact Lean and Green to move forward with identifying next steps: [http://leanandgreenmi.com/property\\_owners](http://leanandgreenmi.com/property_owners)



The City of Ann Arbor operates its own PACE program wholly separate from the Lean and Green Michigan PACE program. If you are located in Ann Arbor and considering a PACE financing scheme, you should seek out this program.

Commercial or industrial properties within Ann Arbor city limits are qualified to participate.

Similar to the installment purchase agreements in the public sector, PACE financing allows access to energy efficiency upgrades for businesses and industries without requiring up front capital. Funding can be used for an extensive list of energy efficiency, water efficiency, and renewable energy installations.

PACE programs are also attractive because they promise lower interest rates than the market average, and a longer time to pay back the loan.

### How to get started:

Download the application:  
<http://www.a2gov.org/a2energy/commercial/Pages/pay-for-it-all.aspx#pace>

### Get More Information

<http://www.a2gov.org/a2energy/commercial/Pages/default.aspx>

## At a Glance

### *Average Loan Amount*

\$10,000 – 350,000

### *Eligible Recipients*

For profit and non-profit private businesses that own commercial, residential, or industrial property within the city limits of Ann Arbor

### *Type*

PACE – Tax Assessment

### *Term*

~10 years

### *Disqualified*

Government or municipal buildings, single-family homes

### *NOTE*

If applying to upgrade a residential property, it must have 5 or more units

### *Funds*



## At a Glance

*Average Principle Amount*  
10-50% of property value

### *Eligible Recipients*

Individual homeowners, for-profit or nonprofit investor, or a local government agency

### *Type*

Energy Efficient Mortgage

### *Term*

10-30 years

### *Property Requirements*

- ◇ 1-4 units
- ◇ **Must be owner-occupied if 2-4 units**

### *Disqualified*

Manufactured homes

### *Funds*



One of several Energy Efficiency Mortgage loan guarantees offered by Fannie Mae, these programs are largely differentiated by the sector of society that owns the property, and the number of residential units on the property (note that the property must provide residential housing to qualify for any EEM).

EEMs can apply when you are either purchasing a particular property, or when you'd like to refinance a mortgage. They are attractive because they allow you to bundle the costs of energy efficiency improvements into the principle. Essentially, you can get a slightly bigger loan with the same qualifications and down payment.

The extra principle must be used for energy efficiency measures although Fannie Mae does not have specific restrictions on what that

entails except that upgrades must be permanently affixed to the real property and add value to the property.

### **How to get started:**

- ◇ You must first complete a HERS assessment so that a professional has identified which cost-effective energy options can be pursued.
- ◇ Since this is a loan guarantee, you will then need to speak with qualified lenders about your interest in this particular EEM. Keep in mind that lending requirements might vary by lender so shop around for what works best for you. You can find a Fannie Mae-approved lender here:
  - ◇ <https://www.fanniemae.com/multifamily/affordable-lenders>

### **Get More Information**

<https://www.fanniemae.com/content/factsheet/homestyle-renovation-factsheet.pdf>



One of several Energy Efficiency Mortgage loan guarantees offered by Fannie Mae, these programs are largely differentiated by the sector of society that owns the property, and the number of residential units on the property (note that the property must provide residential housing to qualify for any EEM).

EEMs can apply when you are either purchasing a particular property, or when you'd like to refinance a mortgage. They are attractive because they allow you to bundle the costs of energy efficiency improvements into the principle. Essentially, you can get a slightly bigger loan with the same qualifications and down payment. The extra principle must be used for energy efficiency measures.

For Green Preservation Plus, Fannie Mae has outlined a detailed list of upgrades that reduce electricity, heating/cooling, and water use (See <https://www.fanniemae.com/content/faq/green-preservation-plus-faqs.pdf>). At least half of

the improvements to the property must be categorized as "High Performance Improvements," while the remainder can be general property improvements to increase the livability of multi-family affordable housing.

### How to get started:

- ◇ You must first complete a HERS assessment so that a professional has identified which cost-effective energy options can be pursued (unless the property has 50 or fewer units at which an initial audit is not required).
- ◇ Since this is a loan guarantee, you will then need to speak with qualified lenders about your interest in this particular EEM. Keep in mind that lending requirements might vary by lender so shop around for what works best for you. You can find a Fannie Mae-approved lender here: <https://www.fanniemae.com/multifamily/affordable-lenders>

## At a Glance

### *Average Principle Amount*

A 5% increase above typical loan principle

### *Eligible Recipients*

Multifamily housing property owners that service low-income communities

### *Type*

Energy Efficient Mortgage

### *Term*

10-30 years

### *Property Requirements*

- ◇ 5 or more units
- ◇ Must meet low-income and rent restrictions during loan term
- ◇ Must be 10 years or older

### *Funds*



### Get More Information

[https://www.fanniemae.com/content/fact\\_sheet/grnrefiplus.pdf](https://www.fanniemae.com/content/fact_sheet/grnrefiplus.pdf)



## At a Glance

### *Average Principle Amount*

Up to 50% of project costs can be covered

### *Eligible Recipients*

Multifamily housing property owners

### *Type*

Energy Efficient Mortgage

### *Term*

10-30 years

### *Property Requirements*

◇ 5 or more units

### *Funds*



One of several Energy Efficiency Mortgage loan guarantees offered by Fannie Mae, these programs are largely differentiated by the sector of society that owns the property, and the number of residential units on the property (note that the property must provide residential housing to qualify for any EEM).

EEMs can apply when you are either purchasing a particular property, or when you'd like to refinance a mortgage. They are attractive because they allow you to bundle the costs of energy efficiency improvements into the principle. Essentially, you can get a slightly bigger loan with the same qualifications and down payment.

The extra principle must be used for energy efficiency measures. With Green Rewards, this includes energy and water efficiency equipment/systems; electricity generating systems such as solar power; and,

improvements needed to achieve a Green Building Certification. Importantly, these must lead to a more than 20% annual savings in energy or water use for the property.

### **How to get started:**

- ◇ Although not explicitly stated for this program, it is likely that you will need a HERS assessment so that a professional has identified which cost-effective energy options can be pursued
- ◇ Since this is a loan guarantee, you will then need to speak with qualified lenders about your interest in this particular EEM. Keep in mind that lending requirements might vary by lender so shop around for what works best for you. You can find a Fannie Mae-approved lender here: <https://www.fanniemae.com/multifamily/affordable-lenders>

### **Get More Information**

[https://www.fanniemae.com/content/fact\\_sheet/green-rewards-termsheet.pdf](https://www.fanniemae.com/content/fact_sheet/green-rewards-termsheet.pdf)



# FEDERAL HOUSING AUTHORITY - HUD TITLE 1 HOME IMPROVEMENT

The Federal Housing Authority "Title 1" program guarantees loans for light or moderate property rehabilitation as well as the construction of nonresidential buildings. The guarantee lowers the interest rate below market norms. There is no specific requirement that property improvements must be energy efficient which provides a bit of leeway if you are seeking a loan to cover a series of building upgrades.

## How to get started:

Since this is a loan guarantee, you will need to speak with qualified lenders about your interest in this particular loan.

**FINANCE TIP:** Even though the FHA does not require an energy audit to get a property improvement loan it might still be a good idea. While the cost of the audit raises the total project costs, an audit professional will help you identify only "cost-effective" upgrades, or those where the costs will be covered by your utility bill savings.

## Get More Information

[http://portal.hud.gov/hudportal/HUD?src=/program\\_offices/housing/sfh/title/ti\\_about](http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/sfh/title/ti_about)

Keep in mind that lending requirements might vary by lender so shop around for what works best for you.

You can find an FHA-approved lender in your area, by calling HUD's Customer Service Center toll-free: (800) 767-7468 (TTY: (800) 877-8339) for a list of lenders in your state.

Or visit: [http://www.fha.com/fha\\_loan\\_city?state=MICHIGAN](http://www.fha.com/fha_loan_city?state=MICHIGAN)

## At a Glance

### *Average Loan Amount*

- ◇ For 1-4 units; up to \$25,000
- ◇ For 5 or more units; \$12,000/unit capped at \$60,000

### *Eligible Recipients*

Individual homeowners and residential property owners

### *Type*

Property Improvement

### *Term*

5-20 years

### *Property Requirements*

- ◇ Any unit number
- ◇ Must be residential

### *Funds*



# MICHIGAN HOUSING AUTHORITY - COMMERCIAL PROPERTY IMPROVEMENT PROGRAM

## At a Glance

### *Loan Amount*

- ◇ For 1 unit: up to \$25,000
- ◇ For 2 or more units: \$12,000/unit capped at \$60,000

### *Eligible Recipients*

Residential property owners

### *Type*

Property Improvement

### *Term*

5-20 years

### *Property Requirements*

- ◇ There must be some equity in the property.
- ◇ Any unit number

### *Funds*



The Michigan Housing Authority provides a loan guarantee to participating lenders providing for slightly lower lending and interest rates. There are no official requirements that the property upgrades be energy efficient but improvements must “substantially protect or improve the basic livability of the property.” This includes major system repairs, but allows for some energy efficient upgrades.

### **How to get started:**

- ◇ You will first need a state-licensed contractor to independently review either your property or your upgrade plans to document detailed cost-estimates. Certified energy auditors are often also licensed with the state so check with them first.
- ◇ There are then a series of documents that you need to provide proof of qualifications. This includes cost estimates for

the upgrades, income verification, copies of two year's prior tax returns, proof of homeowner insurance, recent property appraisal, proof of ownership, copy of current lease and mortgage statements, proof of number of units, and copy of leases on all rental properties.

- ◇ To find a participating lender who can help you through this paperwork, visit: [http://www.michigan.gov/documents/mshda/PIP\\_Lender\\_List\\_County\\_417648\\_7.pdf](http://www.michigan.gov/documents/mshda/PIP_Lender_List_County_417648_7.pdf)

### **Get More Information**

[http://www.michigan.gov/mshda/0,4641,7-141-45866\\_49317\\_50740---,00.html](http://www.michigan.gov/mshda/0,4641,7-141-45866_49317_50740---,00.html)



# A2ENERGY LOAN FUND FOR RENTAL HOUSING

The a2energy loan fund is designed to support rental housing properties in Washtenaw County by providing low-interest loans that specifically finance energy efficient improvements. Improvements must be verified as cost-effective through a HERS assessment, and can include many property upgrades including insulation, air sealing, HVAC upgrades, and select ENERGY STAR products.

## How to get started:

You need to clear a pre-approval process first which evaluates the property's utility bills and your credit history. To initiate this process, you need to complete a contact

form. A link to the form, and further information on the pre-approval process can be found: <http://www.a2gov.org/departments/systems-planning/Sustainability/green-rental/Pages/a2energy-Loan-Fund-for-Rental-Housing.aspx>

Once you're pre-approved, you will need to:

- ◇ Schedule an energy audit.
- ◇ Obtain a bid or bids from Michigan Saves-authorized contractor(s) to perform the work.
- ◇ Complete a Loan Application
- ◇ Schedule the upgrade installation

**FINANCE TIP:** This loan program offers interest rate reductions for affordable housing, multiple upgrades, and property owners who match at least 50% of the loan amount. Consider if you can leverage this to get a better lending rate.

## Get More Information

<http://www.a2gov.org/departments/systems-planning/Sustainability/green-rental/Pages/a2energy-Loan-Fund-for-Rental-Housing---More-Details.aspx>

## At a Glance

*Average Principle Amount*  
\$8,000/property; capped at \$12,000 per loan applicant

### *Eligible Recipients*

Residential property owners

### *Type*

Equipment purchase or property improvement

### *Term*

1-3 years

### *Property Requirements*

- ◇ 1-4 units
- ◇ **May NOT be owner-occupied if only 1 unit**

### *Disqualified*

Properties not located in Washtenaw County

### *Funds*



## At a Glance

### Average Loan Amount

\$10,000 – 1,200,000

### Eligible Recipients

Small non-profit (and some for-profit) property owners

### Type

Property improvement, or Energy Efficient Mortgage

### Property Requirements

- ◇ Any unit number
- ◇ May NOT be owner-occupied

### Funds



The Opportunity Resource Fund is a small and localized program that aims to support organizations in Southeast Michigan communities that service low-income families and individuals. OppFund has a unique series of social criteria when judging loan recipients.

Applicants must meet at least two of the following:

- ◇ Exhibit community control or local self-determination
- ◇ Demonstrate alternative business practices (co-ops, worker-owned, land trust)
- ◇ Provide employment for low-income and/or low-wealth individuals
- ◇ Empower the disadvantaged, including woman- and minority-owned businesses
- ◇ Reinvest in decaying area or reduce blight
- ◇ Use ecologically sensitive approaches
- ◇ Leverage other resources
- ◇ Provide opportunities for partnership, collaboration, and/or cooperative endeavors

This loan program can be applied to new construction or existing properties and does not have specific requirements for the types of energy efficient upgrades. In fact, the loan can be used for “all phases of affordable housing development,” including property

purchases, pre-development expenses (like legal fees, or appraisals), and construction costs.

Eligible projects may include:

- ◇ Multi-family rental housing
- ◇ Supportive housing for people with disabilities
- ◇ Single-family homeownership
- ◇ Lease-purchase housing
- ◇ Mixed use developments  
(There is a separate application for these projects)
- ◇ Cooperatives, land trusts for residential uses
- ◇ Transitional housing – more than 90 days on up to two years, SRO or family units that include supportive services (not group “shelters” or emergency arrangements)
- ◇ Special needs housing including group homes for the disabled or elderly

### How to get started:

Find more information, and complete the initial form online:

<http://oppfund.org/housing-development-loans/>



The Federal Housing Authority Energy Efficient Mortgage program guarantees loans that help lower the interest rate below market norms. EEMs can apply when you are either purchasing a particular property, or when you'd like to refinance a mortgage. They are attractive because they allow you to bundle the costs of energy efficiency improvements into the principle. Essentially, you can get a slightly bigger loan with the same qualifications and down payment. This flexibility in credit requirements can be particularly good for first time home buyers.

The extra principle must be used for energy efficiency measures, and FHA requires that these upgrades be guaranteed to be cost-effective through a HERS assessment.

FHA offers two types of loan guarantees:

- ◇ 203(b) - For properties

requiring less than \$5,000 in improvements, and

- ◇ 203(k) "rehab" loan - For properties requiring extensive repairs (more than \$5,000 in improvements).

### How to get started:

- ◇ You must first complete a HERS assessment so that a professional has identified which cost-effective energy options can be pursued.
- ◇ Since this is a loan guarantee, you will then need to speak with qualified lenders about your interest in this particular EEM. Keep in mind that lending requirements might vary by lender so shop around for what works best for you.

Find an FHA-approved lender through the HUD FHA website: [http://portal.hud.gov/hudportal/HUD?src=/program\\_offices/housing/sfh/eem/energy-r](http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/sfh/eem/energy-r)

## At a Glance

*Average Principle Amount*  
Up to 5% of property value

*Eligible Recipients*  
Individual homeowners

*Type*  
Energy Efficient Mortgage

*Term*  
15-30 years

*Property Requirements*  
◇ 1-4 units  
◇ Property MUST be owner-occupied

*Disqualified*  
Condominium units

*Note*  
You may only have one FHA-guaranteed loan open at any time

*Funds*



**FINANCE TIP:** If your total mortgage down payment is less than 20% of the loan, you will likely be required to finance for "mortgage insurance." This can add a lot your final tally.

### Get More Information

<http://www.fha.com/downloads/FHA-Reference-Guide.pdf>



## At a Glance

*Average Principle Amount*  
Up to 10% of property value

*Eligible Recipients*  
Individual homeowners

*Type*  
Energy Efficient Mortgage

*Term*  
15-30 years

*Property Requirements*  
◇ 1 unit (can be an investment rental)

*Disqualified*  
Co-op units and manufactured homes

*Note*  
You may only finance up to four properties at any time

*Funds*



Fannie Mae offers a basic Energy Efficient Mortgage (EEM) to individual homeowners looking to finance (or refinance) the purchase of a primary, secondary, or investment property.

EEMs are attractive because they allow you to bundle the costs of energy efficiency improvements into the principle. Essentially, you can get a slightly bigger loan with the same qualifications and down payment.

The extra principle must be used for energy efficiency measures, and Fannie Mae requires that these upgrades be guaranteed to be cost-effective through a HERS assessment.

## How to get started:

- ◇ You must first complete a HERS assessment so that a professional has identified which cost-effective energy options can be pursued.
- ◇ Since this is a loan guarantee, you will then need to speak with qualified lenders about your interest in this particular EEM. Keep in mind that lending requirements might vary by lender so shop around for what works best for you.

Find a Fannie Mae-approved lender:

<https://www.fanniemae.com/multifamily/affordable-lenders>

### Get More Information

For more information: [https://www.fanniemae.com/content/fact\\_sheet/energy-improvement-feature-factsheet.pdf](https://www.fanniemae.com/content/fact_sheet/energy-improvement-feature-factsheet.pdf)



The US Department of Veterans Affairs Energy Efficient Mortgage (EEM) program guarantees loans that help applicants access up to \$6,000 in additional funds to finance energy efficient upgrades.

EEMs can apply when you are either purchasing a particular property, or when you'd like to refinance a mortgage. They are attractive because they allow you to bundle the costs of energy efficiency improvements into the principle. Essentially, you can get a slightly bigger loan with the same qualifications and down payment.

The extra principle must be used for energy efficiency measures, and VA allows a wide range of optional upgrades that reduce electricity, heating/cooling, water use to qualify (note that a new roof or shingles, vinyl siding, and air conditioning units are all ineligible).

## How to get started:

You need to be able to show a Certificate of Eligibility issued by the VA to an approved lender. Apply for this COE here: <https://www.ebenefits.va.gov/ebenefits/homepage>

Once you receive your COE, you can contact a VA-approved lender.

## At a Glance

*Average Principle Amount*  
\$3,000 - 6,000

### *Eligible Recipients*

Individual homeowners who are qualified military personnel, reservists, and US veterans

### *Type*

Energy Efficient Mortgage

### *Property Requirements*

- ◇ 1 unit
- ◇ Must be owner-occupied

### *Funds*



### Get More Information

<http://www.benefits.va.gov/WARMS/docs/admin26/handbook/ChapterLendersHanbookChapter7.pdf>





# MICHIGAN HOUSING AUTHORITY - RESIDENTIAL PROPERTY IMPROVEMENT PROGRAM

The Michigan Housing Authority provides a loan guarantee to participating lenders providing for slightly lower lending and interest rates. There are no official requirements that the property upgrades be energy efficient but improvements must “substantially protect or improve the basic livability of the property.” This includes major system repairs, but allows for some energy efficient upgrades.

## How to get started:

◇ You will first need a state-licensed contractor to independently review either your property or your upgrade plans to document detailed

cost-estimates. Certified energy auditors are often also licensed with the state so check with them first.

◇ There are then a series of documents that you need to provide proof of qualifications. This includes cost estimates for the upgrades, income verification, copies of two year’s prior tax returns, recent property appraisal, and proof of ownership.

◇ To find a participating lender who can help you through this paperwork, visit: [http://www.michigan.gov/documents/mshda/PIP\\_Lender\\_List\\_County\\_417648\\_7.pdf](http://www.michigan.gov/documents/mshda/PIP_Lender_List_County_417648_7.pdf)

## Get More Information

[http://www.michigan.gov/msda/0,4641,7-141-45866\\_49317\\_50737---,00.html](http://www.michigan.gov/msda/0,4641,7-141-45866_49317_50737---,00.html)

## At a Glance

### *Average Loan Amount*

Up to \$50,000

### *Eligible Recipients*

Individual homeowners

### *Type*

Property Improvement

### *Term*

5-20 years

### *Property Requirements*

- ◇ 1 unit
- ◇ Must be primary residence of applicant

### *Funds*



# MICHIGAN SAVES - HOME ENERGY

## At a Glance

### *Average Loan Amount:*

\$1,000 – 30,000

### *Eligible Recipients*

Individual homeowners

### *Type*

Property Improvement

### *Term*

1 –10 years

### *Property Requirements*

- ◇ 1-4 units
- ◇ Must be owner-occupied

### *Funds*



**M**ichigan Saves helps homeowners access funds to finance energy efficient home improvements such as: new windows and doors; a new furnace, and new appliances like washing machines, or ceiling fans.

The process requires the use of certified contractors who then help property owners assess the property and identify the best loan amount. Loan requirements are a little more lenient too, increasing access to funds.

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*Did You Know? Michigan Saves Home Energy loans will also help finance the remediation of environmental hazards or structural defects that create health and safety issues.*

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### **How to get started:**

Find a Michigan Saves approved contractor to walk you through the process steps which include:

- 1) Have an energy assessment on the property or pick from a pre-sorted menu of qualified energy improvements. ([http://michigansaves.org/upload/file/Residential%20Eligible%20Measures%20List\\_Jan2014.pdf](http://michigansaves.org/upload/file/Residential%20Eligible%20Measures%20List_Jan2014.pdf))
- 2) Complete the loan application
- 3) Have upgrades installed.

Approved contractors can be found: <http://michigansaves.org/homeowners>

### **Get More Information**

<http://michigansaves.org/program/help>



# DTE PRESCRIPTIVE AND CUSTOM UPGRADES (COMMERCIAL) EXPIRES NOV 30, 2016

**D**TE Energy offers a series of rebates for energy efficient upgrades made to commercial and industrial properties serviced by this utility company. For qualified equipment, DTE Energy provides payments on a one-for-one basis. This applies whether you are replacing older technology, retrofitting the building, or simply purchasing new equipment. Under the prescriptive upgrades program, you select from a list of pre-approved technologies and equipment, and your rebate is based on pre-determined rates. Under the custom upgrades program (for technologies not already listed by DTE Energy), you get paid back based on the first-year energy kilowatt-hour (kWh) savings or 1,000 cubic feet of natural gas savings.

The rebate program operates on a first come first served annual basis, as DTE Energy allocates a limited budget to the program each year. Thus applications earlier in the year are more likely to succeed and receive funding.

Additionally, these rebates are encouraged by policy that may or may not expire in any given year so the availability of these rebates is fluid and somewhat unpredictable.

## How to get started:

DTE Energy publishes an informative guide for businesses detailing the qualifications, and application process involved: <https://websafe.kemainc.com/Projects/LinkClick.aspx?fileticket=hbORYX7l-HOA%3d&tabid=3384&mid=5361> Once you've reviewed the manual and your options, follow these steps:

- 1) Complete a Reservation Application (if project is not yet complete) to ensure DTE reserves rebate funds for project (found here: <https://newlook.dteenergy.com/wps/wcm/connect/dte-web/home/save-energy/business/incentives/prescriptive+incentives>)
- 2) Complete upgrades within 90 days of reservation letter
- 3) Send in Project Completion Application for release of funds to: [saveenergy@dteenergy.com](mailto:saveenergy@dteenergy.com)  
DTE Energy's Energy Efficiency Program For Business  
P.O. Box 11289  
Detroit, MI 48211  
Fax 313.664.1950 For assistance in the process: 866.796.0512 (press Option 3), or visit the DTE Energy website to find qualified contractors to help with the process: [dteenergy.com/savenow](https://dteenergy.com/savenow)

**FINANCE TIP:** DTE Energy offers bonus discounts for Michigan-made technologies and "multi-measure" (both gas and electric) reductions. Go local!

## Get More Information

<https://newlook.dteenergy.com/wps/wcm/connect/dte-web/home/save-energy/business/incentives/compare+incentive+options>

## At a Glance

### Maximum Rebate

Project savings capped at \$250,000 for electricity and \$200,000 for gas improvements

### Eligible Recipients

Commercial and industrial property owners

### Type

Property Improvement Rebate  
Disqualified  
Residential properties

### Funds



# DTE NEW CONSTRUCTION INCENTIVE (COMMERCIAL) EXPIRES NOVEMBER 30, 2016

## At a Glance

### Maximum Rebate:

Project savings capped at \$250,000 for electricity and \$200,000 for gas improvements

### Eligible Recipients

Commercial and industrial property owners serviced by DTE Energy

### Type

Property Improvement Rebate  
Disqualified  
Residential properties

### Funds



DTE Energy provides incentives for new construction projects to encourage the inclusion of energy efficient design and technologies in new buildings serviced by DTE Energy. This program is ideal for construction projects that are still in the design phase to allow for adjustments as need be.

This program targets buildings that don't require but can aspire to LEED certification. The equipment must be new and project savings must be sustainable for a period of five years or for the life of the product, whichever is less. Also, these electricity and gas energy savings must be quantifiable, "exceeding the requirements set forth in ASHRAE Standard 90.1-2007, LEED or local building codes, whichever is more stringent."

### How to get started:

1) To determine if your project qualifies, contact DTE Energy's Energy Efficiency Program for Business staff before you start your design at

866.796.0512.

2) Review the New Construction and Major Renovation manual: <https://webtools.dnvg1.com/Projects/Link-Click.aspx?fileticket=5wHeB9FC-J5E%3d&tabid=3384&mid=5361>

3) Complete and submit the reservation application (in the manual) to ensure that DTE Energy reserves funds for the project. Take note of some ineligible projects:

- ◇ Fuel switching
- ◇ Changes in operational and/or maintenance practices or simple control modifications that do not involve capital costs.
- ◇ On-site electricity generation.
- ◇ Projects that involve peak-shifting/demanding limiting with no kWh savings.
- ◇ Projects involving renewable energy.

Visit the DTE Energy website to find qualified contractors to help with the process: [dteenergy.com/savenow](http://dteenergy.com/savenow)

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***Did You Know?** Rebate incentives may or may not be tax-deductible. The IRS has not ruled officially on rebates and suggests consultation with a tax lawyer to confirm how these could affect your tax returns.*

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### Get More Information

<https://newlook.dteenergy.com/wps/wcm/connect/dte-web/home/save-energy/business/incentives/new+construction>

**FINANCE TIP:** DTE Energy offers bonus discounts for Michigan-made technologies and "multi-measure" (both gas and electric) reductions. Go local!



# DTE IN-STORE LIGHTBULB DISCOUNT

**D**TE Energy is currently offering discounts on LED and CFL lightbulbs at specific retailers.

Find participating retailers here:  
<https://www.newlook.dteenergy.com/wps/wcm/connect/dte-web/home/save-energy/residential/rebates/lighting+discounts>

## At a Glance

### *Rebate Amount*

LED (\$3.00/bulb)  
CFL (\$0.25/bulb)

### *Eligible Recipients*

Individuals

### *Type*

In-store discount



# ENERGY SMART (COMMERCIAL AND INDUSTRIAL) PROGRAM

## At a Glance

### Maximum Rebate:

\$4,000/ electric meter

### Eligible Recipients

Commercial and industrial property owners serviced by City of Chelsea utility

### Type

Property Improvement Rebate  
Disqualified

- ◇ Residential properties
- ◇ Projects that lead to energy efficiency as a result of peak shaving, demand limiting, or changes in operating schedule

Commercial and industrial businesses in Chelsea, MI who are electricity customers of the city utility provider can enjoy rebates for prescriptive and custom energy efficient upgrades. This includes lighting, HVAC, energy controls systems, equipment, and appliances. The incentives can cover up to 100% of the costs of some prescriptive measures, and up to 50% of the costs for some custom projects.

For qualified equipment, the program provides payments on a one-for-one basis. This applies whether you are replacing older technology, retrofitting the building, or simply purchasing new equipment.

Under the prescriptive upgrades program, you select from a list of pre-approved technologies and equipment, and your rebate is based on pre-determined rates. Under the custom upgrades program (for

technologies not already listed), you get paid back based on the first-year energy kilowatt-hour (kWh) savings.

The rebate program operates on a first come first served annual basis. Thus applications earlier in the year are more likely to succeed and receive funding. Additionally, these rebates are encouraged by policy that may or may not expire in any given year so the availability of these rebates is fluid and somewhat unpredictable.

### How to get started:

- ◇ Complete a pre-approval application to ensure that enough money is reserved for your project ([http://www.mienergysmart.com/sft499/mppa\\_chelsea\\_ci\\_app.pdf](http://www.mienergysmart.com/sft499/mppa_chelsea_ci_app.pdf))
- ◇ Complete property upgrades
- ◇ Apply for cash disbursement

*Did You Know? Rebate incentives may or may not be tax-deductible. The IRS has not ruled officially on rebates and suggests consultation with a tax lawyer to confirm how these could affect your tax returns.*

### Funds



**FINANCE TIP:** Some technologies and upgrades are even available for free (like specific lightbulbs and programmable thermostats)! Call 877.674.7281 to speak with someone about these opportunities

### Get More Information

<http://www.mienergysmart.com/chelsea.html>



# DTE HOME PERFORMANCE (RESIDENTIAL)

For individual homeowners, in single-family homes, DTE Energy offers a rebate program to encourage energy efficiency upgrades like air sealing, insulation, windows, HVAC, and EnergyStar Appliances. The property must be serviced by DTE Energy. Rebates are funded through a limited annual budget and are available on a first come, first served basis.

***Did You Know?** Rebate incentives may or may not be tax-deductible. The IRS has not ruled officially on rebates and suggests consultation with a tax lawyer to confirm how these could affect your tax returns.*

**FINANCE TIP:** The more upgrades you make, the more incentives you receive from DTE Energy. Check these out:  
Silver Bonus \$150 for 3 qualifying improvements.  
Gold Bonus \$200 for 4-6 qualifying improvements.  
Platinum Bonus \$300 for 7 or more qualifying improvements

## How to get started:

Use the DTE Energy website to find a certified contractor who will help you through the application process and perform the Comprehensive Energy Assessment (<https://dte-fact-res.prod.nbt.io/>) Call 866.796.0512 for more information or visit <https://www.newlook.dteenergy.com/wps/wcm/connect/dte-web/home/save-energy/residential/incentives+and+programs/home+performance>

## At a Glance

### Maximum Rebate:

\$2,650

### Eligible Recipients

Individual homeowners

### Type

Property Improvement Rebate

### Disqualified

Homes built after 2008  
New additions, garages, enclosed porches, new construction homes, multiple rental units managed or owned by a third party, mobile homes, or commercial properties

### Funds



# DTE INSULATION AND WINDOWS (RESIDENTIAL)

## At a Glance

### *Average Rebate:*

\$15/window  
\$25-125/insulation item

### *Eligible Recipients*

Individual homeowners

### *Type*

Property Improvement Rebate

### *Disqualified*

Homes built after 2008  
New additions, garages, enclosed porches, new construction homes, multiple rental units managed or owned by a third party, mobile homes, or commercial properties

### *Funds*



For individual homeowners, in single-family homes, DTE Energy offers a rebate program to encourage energy efficiency upgrades specific to windows and insulation. The property must be serviced by DTE Energy.

This program is similar to the DTE Energy Home Performance program but allows you to skip the Comprehensive Energy Assessment and its associated costs if you are only interested in window and insulation upgrades.

The rebate program operates on a first come first served annual basis. Thus applications earlier in the year are more likely to succeed and

receive funding. Additionally, these rebates are encouraged by policy that may or may not expire in any given year so the availability of these rebates is fluid and somewhat unpredictable.

### **How to get started:**

Complete and submit the reservation application on the DTE Energy website to ensure funds are reserved for your project: <https://newlook.dteenergy.com/wps/wcm/connect/dte-web/home/save-energy/residential/incentives+and+programs/insulation+and+windows>

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*Did You Know? Rebate incentives may or may not be tax-deductible. The IRS has not ruled officially on rebates and suggests consultation with a tax lawyer to confirm how these could affect your tax returns.*

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# ENERGY SMART (RESIDENTIAL) INCENTIVES

City of Chelsea residents who are electricity customers of the city utility provider can enjoy rebates for energy efficient upgrades. This includes air conditioning, furnace, appliances, water heating, and programmable thermostats.

While supplies last, City of Chelsea residential electric customers are also eligible to receive complimentary CFLs (compact fluorescent light bulbs). Please call 734-475-1771 to find out where to obtain your free light bulbs.

The rebate program operates on a first come first served annual basis. Thus applications earlier in the year

are more likely to succeed and receive funding. Additionally, these rebates are encouraged by policy that may or may not expire in any given year so the availability of these rebates is fluid and somewhat unpredictable.

## How to get started:

Complete a pre-approval application to ensure that enough money is reserved for your project ([http://www.mienergysmart.com/sft499/resapp\\_chelsea.pdf](http://www.mienergysmart.com/sft499/resapp_chelsea.pdf))

Complete property upgrades  
Apply for cash disbursement

For more information, visit <http://www.mienergysmart.com/chelsea.html>

***Did You Know?** Rebate incentives may or may not be tax-deductible. The IRS has not ruled officially on rebates and suggests consultation with a tax lawyer to confirm how these could affect your tax returns.*

**FINANCE TIP:** Appliance recycling (including refrigerators, freezers, air conditioners, and dehumidifiers) can increase rebate dollars by up to \$75. Call 877-270-3519 to schedule a pick up.

## At a Glance

### Maximum Rebate

\$4,000/ electric meter

### Eligible Recipients

Commercial and industrial property owners serviced by City of Chelsea utility

### Type

Property Improvement Rebate

### Funds



# FEDERAL BUSINESS ENERGY INVESTMENT TAX CREDIT (ITC) – SOME TECHNOLOGY INCENTIVES WILL EXPIRE DECEMBER, 31 2016

## At a Glance

### *Tax Credit*

30% for solar, and wind  
10% for geothermal, micro-turbines and combined heat and power systems (CHPs)

### *Eligible Recipients*

Commercial, Industrial, Investor-Owned Utility, Cooperative Utilities, Agricultural

The US federal government incentivizes business investment in renewable energy generation by offering a tax credit for particular technologies. The original use of the equipment must begin with the taxpayer, or the system must be constructed by the taxpayer.

The range of qualifying technologies is broad, and include Solar Water Heat, Solar Space Heat, Geothermal Electric, Solar Thermal Electric, Solar Thermal Process

Heat, Solar Photovoltaics, Wind (All), Geothermal Heat Pumps, Municipal Solid Waste, Combined Heat & Power, Fuel Cells using Non-Renewable Fuels, Tidal, Wind (Small), Geothermal Direct-Use, Fuel Cells using Renewable Fuels, and Micro-turbines.

### **How to get started:**

You receive a credit when you report these investments on your tax documents. Consult a tax specialist for further details.

**Get More Information**  
<http://programs.dsireusa.org/system/program/detail/658>

*Did You Know? Federal and state tax laws can change regularly. Get the tax credit while it lasts!*

**FINANCE TIP:** Tax credits return money at the end of the tax year. Be sure to account for the time lag when budgeting for your energy upgrades.

### *Funds*



The US federal government incentivizes investment in renewable energy generation on residential properties by offering a tax credit for particular technologies. Existing homes and new construction qualify, and the property can be either a principle residence or second home. Technologies can include geothermal heat pumps, small wind turbines, solar energy systems, and fuel cells.

#### How to get started:

You receive a credit when you report these investments on your tax documents. Consult a tax specialist for further details as tax credits can conflict with any income received through product rebates offered by your utility company.

**FINANCE TIP:** Tax credits return money at the end of the tax year. Be sure to account for the time lag when budgeting for your energy upgrades.

#### Get More Information

<http://programs.dsireusa.org/system/program/detail/1235>  
[https://www.energystar.gov/about/federal\\_tax\\_credits](https://www.energystar.gov/about/federal_tax_credits)

## At a Glance

*Tax Credit*  
30% of qualified expenditures

### *Eligible Recipients*

Individual homeowners

### *Disqualified*

Rental properties

### *Funds*



# FEDERAL RESIDENTIAL ENERGY EFFICIENCY TAX CREDIT – EXPIRES DECEMBER 31, 2016

## At a Glance

### *Tax Credit*

Varies by the technology but in total can be up to \$500 for qualified expenditures

### *Eligible Recipients*

Individual homeowners

### *Disqualified*

Rental properties  
New properties

### *Funds*



This credit applies to certain qualified purchases of new water heaters, furnaces, boilers, heat pumps, air conditioners, building insulation, windows, roofs, and biomass technologies as well as a few other energy efficient technologies or upgrades as long as the product complies with current safety and efficiency standards as defined in the federal tax code.

Notably, \$500 is the cumulative maximum allowable credit meaning you are ineligible in subsequent years once you have hit this maximum.

For building-envelope upgrades such as insulation, roofing, and windows, homeowners can file for

up to 10% of costs excluding labor and installation (capped at \$500).

For heating, cooling, and water heating technologies, up to 100% can be filed with the tax credit. The cap for these types of upgrades depends on the technology and are outlined in detail here: <http://programs.dsireusa.org/system/program/detail/1274>

### **How to get started:**

Residential homeowners can apply for a tax credit. Consult a tax specialist for further details as tax credits can conflict with any income received through product rebates offered by your utility company.

**FINANCE TIP:** Tax credits return money at the end of the tax year. Be sure to account for the time lag when budgeting for your energy upgrades.

### **Get More Information**

<http://programs.dsireusa.org/system/program/detail/1274>  
[https://www.energystar.gov/about/federal\\_tax\\_credits](https://www.energystar.gov/about/federal_tax_credits)



The US federal government incentivizes business investment in energy efficiency by offering a tax credit for particular technologies.

Upgrades must lead to at least a 50% reduction in energy use. The rebate is higher if the 50% reduction is in comparison to an average building that meets ASHRAE Standard 90.1-2007 requirements.

Technologies can include interior lighting, building envelope, and HVAC systems.

**How to get started:**

You receive a credit when you report these investments on your tax documents. Consult a tax specialist for further details.

**FINANCE TIP:** Tax credits return money at the end of the tax year. Be sure to account for the time lag when budgeting for your energy upgrades

**Get More Information**

<http://energy.gov/savings/energy-efficient-commercial-buildings-tax-deduction>

**At a Glance**

*Tax Credit*

\$0.30-\$1.80 per square foot depending on technology and efficiency results.

*Eligible Recipients*

Commercial property owners, and state government entities in new or existing properties

*Funds*



# PHOTOVOLTAIC SYSTEMS

## At a Glance

### *Cost*

\$15,000 – 25,000  
\$2,500 – 7,000 per installed kWh  
(larger system, lower cost per  
installed watt)

### *Energy Savings*

40,000 – 50,000 kWh/year  
(10Kwh, 12h/day)

### *Payback period*

10 - 25 years

### *Lifetime*

25 – 40 years

**P**hotovoltaic cells, also known as solar panel, convert sunlight into usable electricity for a household or property.



Solar panel arrays vary in how well they capture and convert sunlight into electricity. Expected costs and resulting savings, therefore, can depend on a range of factors including:

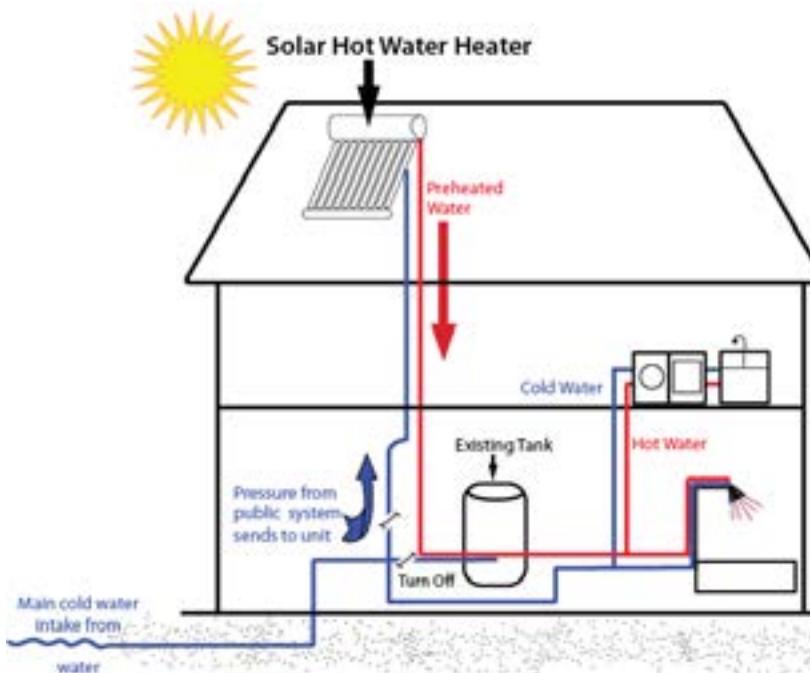
- ◇ Roof size and aspect (how much direct sunlight it receives on a daily basis)
- ◇ Quality, size, and efficiency of installed panels
- ◇ Current electricity usage on the property and how much you want to source from the panels
- ◇ Market price of electricity
- ◇ Current cost for PV installation and materials
- ◇ Lifetime of the PV panels



# SOLAR WATER HEAT

Solar water heaters function by absorbing the sun's heat and transferring them to a water tank, thus heating the water in the tank.

Solar collectors transfer the solar heat to water. Once the solar radiation is absorbed, the water is transferred directly to a storage tank.



Solar Water Heat arrays vary in how well they capture and convert sunlight into electricity. Since they depend on energy supply from solar panels, many of their costs and resulting savings relate to those of the solar panels. This includes:

- ◇ The amount of hot water you use
- ◇ Your system's performance
- ◇ Roof size and aspect
- ◇ The size of basement
- ◇ The cost of conventional fuels
- ◇ The cost of the fuel you use for your backup water heating system

## At a Glance

### Cost

\$6,000 - \$17,000

### Energy Savings

12,000 – 20,400 kWh/year

### Payback period

7 - 12 years

### Lifetime

15 years



# SOLAR SPACE HEATER

## At a Glance

### Cost

\$8000 - \$ 12000

### Energy Saving

12,000 – 16,000 kWh/year

### Payback period

8 - 10 years

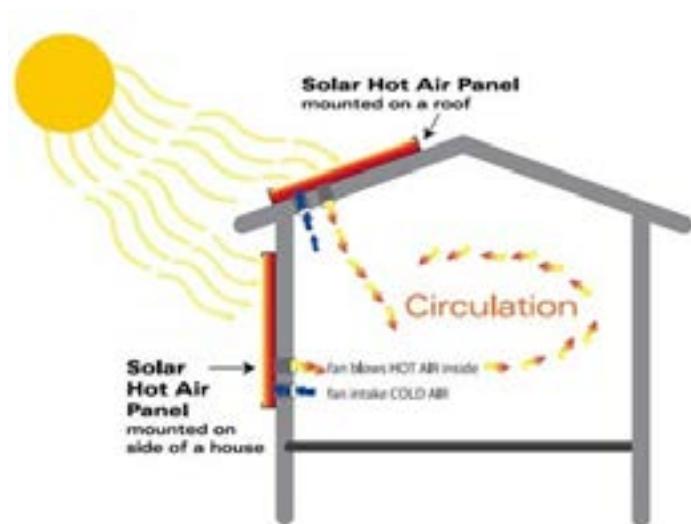
### Lifetime

15 - 20 years (most of these product have 10 year warranty)

Heating and cooling account for 56% of the energy use in a typical US home.

Active solar home heating employs solar thermal energy to heat space in the home. First, solar collectors transfer the solar heat to air. Once the solar radiation is absorbed, the air is transferred either directly to a space in the home or to a storage tank.

A single-family home with a solar water heating system installed will reduce its CO2 footprint by an average of 28%, according to the Solar Energy Industries Association.



Expected costs and resulting savings, therefore, can depend on a range of factors including:

- ◇ The amount of home space
- ◇ Your system's performance
- ◇ Roof size and aspect
- ◇ The size of basement
- ◇ The cost of conventional fuels
- ◇ The cost of the fuel you use for your backup water heating system

EnergySavers.gov recommends installing a solar heating system to provide 40%-80% of your heating needs.

It reduces the amount of air pollution and green house gas resulting from traditional heating methods. In addition, you're protected from future fuel shortages and price hikes.



# WIND POWER

Wind power is also known as wind energy. It is the conversion of kinetic energy (air flow) into electric energy by using a wind turbine and transverter. Most popular micro wind turbines' rated capacity includes 1.5kw, 3kw and 10kw. Among them, 10kw is the most efficient one to fit the need of a building with 1000 – 2000 square feet. Micro wind turbines usually require at least 7.5mph startup windspeed.

Take advantage of Michigan's high-quality onshore wind!



Expected costs and resulting savings, therefore, can depend on a range of factors including:

- ◇ The amount of home space
- ◇ The amount of space to install
- ◇ Your system's performance
- ◇ Wind velocity in your area
- ◇ The cost of conventional fuels
- ◇ Operation cost

Compared to purchasing utility power, a wind system can be a good investment because your money goes to increasing the value of your home rather than just paying for a service. Many people buy wind systems for their retirement because they are concerned about utility rate increases.

## At a Glance

### *Cost*

\$88,000 - \$105,000 (one 10kw turbine, about 22 feet height)

### *Energy Saving*

24,000 – 40,000 kWh/year (12.5 mph)

### *Payback period*

20 - 40 years

The length of the payback period—the time before the savings resulting from your system equal the cost of the system—depends on the system you choose, the wind resource on your site, electricity costs in your area, and how you use your wind system.

### *Lifetime*

30 - 50 years

### *Note*

Please confirm that your local policy and goveronemntal bodies allow you to install wind power



# SOLAR THERMAL

## At a Glance

### Cost

\$12,000 – 14,000

### Energy Savings

12,000 – 15,000 kWh/year

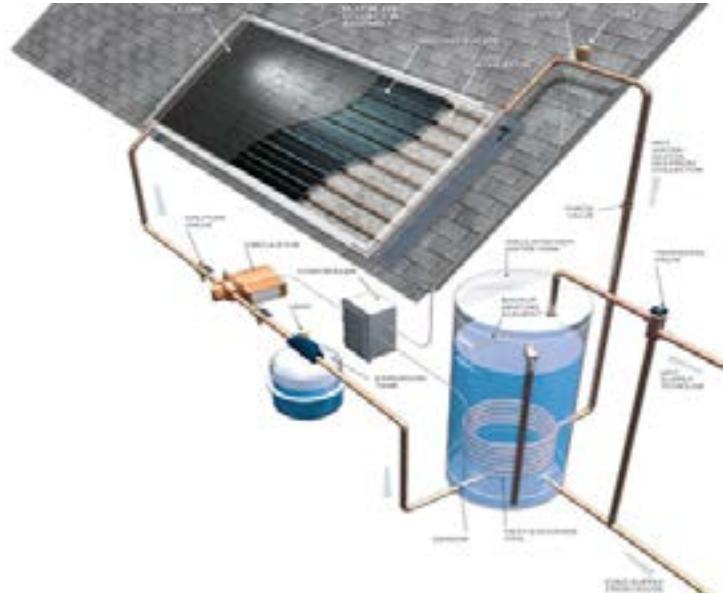
### Payback period

15 – 20 years

### Lifetime

20 years

Solar thermal technology concentrates the sunlight to create heat, and this heat is used to run a heat engine to generate electricity while solar panel converts the sunlight into electricity.



Solar thermal collectors mostly are on the roof, shade structure and absorb solar energy. These collectors are similar but differ from solar panels.

Solar fluid circulated through the collectors by a low-energy pump delivers heat to a water storage tank. Hot water is ready for use.

Expected costs and resulting savings, therefore, can depend on a range of factors including:

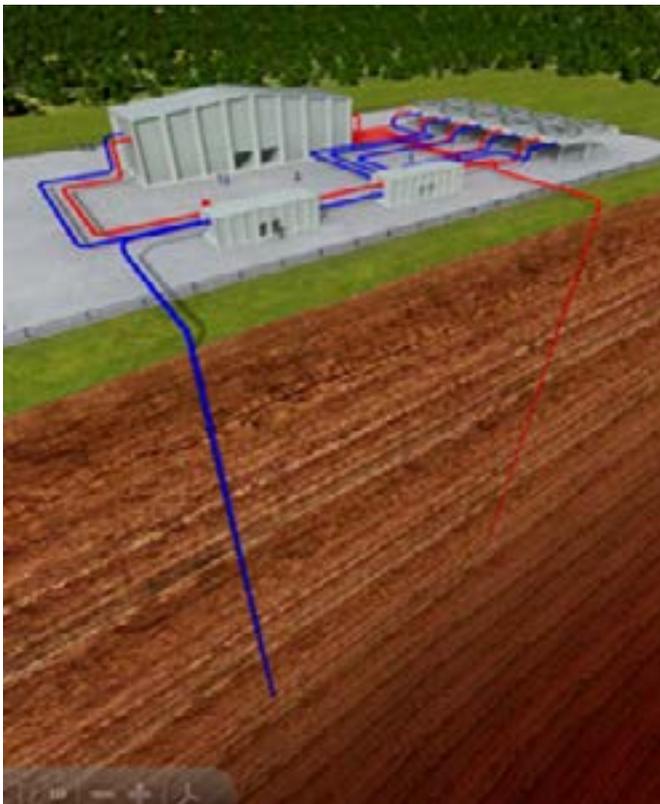
- ◇ The amount of home space
- ◇ Your system's performance (the location – how much sunlight you can collect, use gas or liquid heat engine. etc)
- ◇ Roof size and aspect
- ◇ The size of your basement for storing this device
- ◇ The cost of conventional fuels



# GEOHERMAL

**G**eothermal heat pumps, also known as ground source heat pumps, refer to systems use the ground, groundwater, or surface water as a heat source.

They take advantage of the consistent year round temperature of the ground. By pumping water through this temperate ground layer, very cold water in the winter or very warm water in the summer can be brought to a medium temperature that requires less energy to either heat or cool.



Geothermal fluid temperature is recommended to be at least 300° F.

Costs of a geothermal plant are heavily weighted toward early expenses. Well drilling and pipeline construction occur first, followed by resource analysis of the drilling information. Next is design of the actual plant. Power plant construction is usually completed concurrent with final field development.

Operating and maintenance costs range from \$0.01 to \$0.03 per kWh. Most geothermal power plants can run at greater than 90% availability.

## At a Glance

### *Cost*

\$20,000 – 30,000 (per unit, for 1000 – 2000 square feet)

### *Energy Savings*

50,000 – 60,000 kWh/year (10kWh, work 21h/day) It depends on location

### *Payback period*

10 - 25 years

### *Lifetime*

15 years



# LIGHTING

## At a Glance

### Cost

\$10 – 50 (light bulb, it depends on what types)

### Energy Savings

250 – 300 kWh/year

### Payback period

1.5 - 3 years

### Lifetime

10,000 – 25,000 hours

In the typical U.S. commercial building, lighting accounts for 20 to 50 percent of electricity use. While taking advantage of advance technology of energy-efficient lighting products, you can save up to 50% on lighting energy.

Light Emitting Diode (LED) and Compact Fluorescent Lights (CFL) bulbs.

Benefits:

◇ Eye-friendly (healthier working environment)

◇ Longer life time.

Traditional light bulbs are needed to replace every 1,000 hours.



A typical LED has a power consumption of 8W compared to 14W for CFL with the same light output. LED lightbulbs are rapidly replacing CFLs in the lighting market.

### ◇ The priority option

LEDs are a type of solid-state lighting -- semiconductors that convert electricity into light. LEDs in white light, general illumination applications are one of today's most energy-efficient and rapidly-developing technologies ENERGY STAR-qualified LEDs use only 20%–25% of the energy and last up to 25 times longer than the traditional incandescent bulbs they replace.

LED bulbs are currently available in many functions, for 40W, 60W, and 75W traditional incandescents, reflector bulbs often used in recessed fixtures, and small track lights. While LEDs are more expensive, compared to traditional ones, they still save money because they have longer life time and have very low energy consumption.

Lifetime: 25,000 hours

Annual energy cost: \$1.5 (traditional \$4.8)

### ◇ The second option

CFLs use less electricity than traditional incandescents, typical CFLs can pay for themselves in less than nine months, and then start saving you money each month. An ENERGY STAR-qualified CFL uses about one-fourth the energy and lasts ten times longer than a comparable traditional incandescent bulb that puts out the same amount of light. A CFL uses about one-third the energy of a halogen incandescent.

Lifetime: 10,000 hours

Annual energy cost: \$1.8

Base on 4 hours/day usage, and 7cents per Kwh



Another approach to save lighting energy is building up lighting control system. Automatic controls can switch or dim lighting base on operation hour, occupancy, vacancy daylight availability, and season.



Other benefit include:

More humanity working environment - before people getting in rooms, lights will be turned on automatically, and people don't need to experience bright/dark adaption.

Common options for lighting control:

- ◇ Dimmer, it dims room lights based on the amount of free and natural daylight available
- ◇ Occupancy sensor, it detects the motion of room occupants
- ◇ Daylight sensors (photocell), it is light-sensitive control that turn the lights on and off automatically based on daylight

It reduces the amount of air pollution and green house gas result from

## At a Glance

### *Cost*

\$150 - \$ 200 (not include installation)

### *Energy Savings*

2,000 – 3,000 kWh/year

### *Payback period*

1 – 2 year

### *Lifetime*

5 years



# ELECTRIC CAR CHARGING STATION

## At a Glance

### Cost

\$1,200 /per charger (Not include solar panel)

### Payback period

5 - 10 years (it depends on how much you charge)

### Lifetime

10 - 20 years

An electric vehicle charging station is also known as EV charging station. It is an element in an infrastructure that supplies electric energy for the recharging for electric vehicles.

It is an innovative cost-effective way to attract customers and show that your business is tech-savvy and green.



Other benefits:

- ◇ Attract more customers
- ◇ Provide charging services for customers
- ◇ Make some money from it

Other cost:

- ◇ Maintenance

If your business becomes popular among EV drivers or you live in a high-traffic EV hotspot, you will need to scale up your units.

Direct Current Quick Chargers, also known as Fast Chargers, it can help your customers add 50-75 miles of range in 20 to 30 minutes.

# TESLA POWERWALL

The Powerwall is a rechargeable lithium-ion battery product designed by Tesla Motors for home/small business use. It stores electricity for domestic consumption, load shifting, and backup power.

You can save money by charging in off-peak hours and using this electricity in on-peak hours.



#### Other benefits:

It can store along with solar panels, and it bridges the gap between peak solar during daytime and peak demand in the evening.

You can possibly power your building independently from the utility grid. And you don't need to worry about interrupted supply of electricity.

#### Other costs:

The fee for installation (\$500)

#### Maintenance

It is easy to install, and there is no maintenance needed.

## At a Glance

### *Cost*

\$3,000 (7kW), or 3,500 (10kW) / per unit

### *Payback period*

8 – 10 years

### *Lifetime*

10 years

# HVAC SYSTEMS

## At a Glance

### *Cost*

\$6,000 - \$ 9,000  
(one unit, for 1000 – 2000  
square feet)

### *Energy Savings*

7,000 – 8,000 kWh/year

### *Payback period*

12 - 18 years

### *Lifetime*

12 - 18 years

**H**VAC is Heating, Ventilation and Cooling.

Over 1/4 of the energy in commercial building is for Heating, Ventilation and Cooling (HVAC). If your HVAC equipment is more than 10 year old, replacing your old heating and cooling equipment with modern equipment can cut your annual energy bill by more than \$115.



### Heating:

Heaters are appliances whose purpose is to generate heat for the building.

In the past, water heating was efficient for heating buildings and was the standard in the United States. Nowadays, forced air systems can double for air conditioning and are more popular. The later one has better air conditioning effects, more efficient energy usage (save 15 -20%), and even conditioning.



Ventilating is a process of “exchanging” or replacing air in any space to provide high quality of indoor air. Ventilation includes both the exchange of air to the outside as well as circulation of air within the building.

Replacing the old one with a new one, not only save money and have better air indoor quality, but also have lower sound level which helps to create a more harmonious working environment.



## Cooling

A cooling system, provides cooling and humidity control for all or part of a building. Air conditioning are provided by drawing heat energy out of the house and transferring that heat to the outdoors, then replacing the air inside your home with cooler air.

It not only save your money on the bill, but also make the indoor environment more comfortable year around.

## At a Glance

Other tips to save energy:

◇ Clean and change your air filter regularly (clean it every month and change it every 3 month)

◇ Tune up your HVAC equipment yearly to improve efficiency and comfort

◇ Install a programmable thermostat to save cost

◇ Seal your heating and cooling ducts, it can improve energy efficient by 20%

For how to determine unit of HVAC you need, please visit:

<http://www.ebay.com/gds/What-Size-Air-Conditioning-Unit-Do-I-Need-for-My-Business-/10000000177634486/g.html>



## AIR CONDITIONERS (PORTABLE/WINDOW)

### At a Glance

#### Cost

\$1,000 - \$ 2,500

#### Energy Savings

3,000 – 4,000 kWh/year

#### Payback period

6 – 10 years

#### Lifetime

15 – 20 years

**A**ir conditioner (portable/window) is a smaller cooling device that is used to lower the air temperature, compared to HVAC system. It is popular among those small offices or single apartments.

Central air conditioner is more efficiency than room air conditioner, and the former one is more easy and convenient to control, according to Department of Energy.



If your air conditioner is old, consider buying an energy-efficient model. Look for the ENERGY STAR® and EnergyGuide labels -- qualified room air conditioners are 10% more efficient, and qualified central units are about 15% more efficient than standard models.



# FURNACES

**F**urnaces heat air and distribute the heated air through the house using ducts.



Although older furnace system had efficiencies in the range of 56% to 70%, modern conventional heating systems can achieve efficiencies as high as 98.5%, converting nearly all the fuel to useful heat for your home.

Energy efficiency upgrades and a new high-efficiency heating system can often cut your fuel bills and your furnace's pollution output in half. Upgrading your furnace from 56% to 90% efficiency in an average cold-climate house will save 1.5 tons of carbon dioxide emissions each year if you heat with gas, or 2.5 tons if you heat with oil.

## At a Glance

### *Cost*

\$800 - \$ 2,000

### *Energy Savings*

4,000 – 5,000 kWh/year

### *Payback period*

4 - 8 years

### *Lifetime*

10 years



# BOILERS

## At a Glance

### *Cost*

\$4,000 - \$ 7,500

### *Energy Saving*

6,000 - 7,000kWh/year

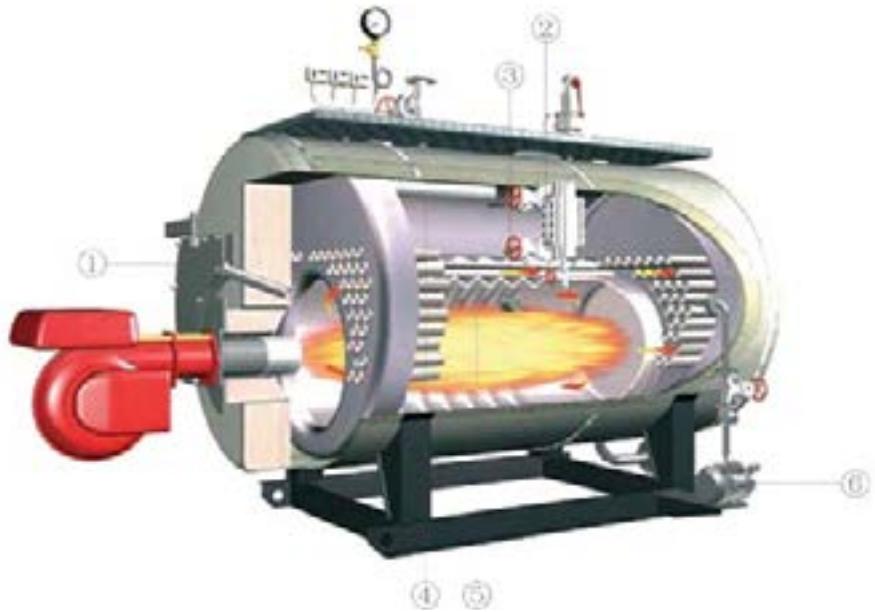
### *Payback period*

8 - 12 years

### *Lifetime*

15 years

**B**oilers heat water, and provide either hot water or steam for heating. Steam is distributed via pipes to steam radiators, and hot water can be distributed via baseboard radiators or radiant floor systems, or can heat air via a coil.



Although older boiler systems had efficiencies in the range of 56% to 70%, modern conventional heating systems can achieve efficiencies as high as 98.5%, converting nearly all the fuel to useful heat for your home.

Upgrading your boiler from 56% to 90% efficiency in an average cold-climate house will save 1.5 tons of carbon dioxide emissions each year if you heat with gas, or 2.5 tons if you heat with oil.

Energy-efficiency improvements not only save money on a new boiler, the more efficient one has a smaller unit which means you can also save some space.



# REFRIGERATOR / FREEZER

Refrigerators normally maintains a temperature of a few degrees above the freezing point of water e.g. 3 to 5 °C (37 to 41 °F), which is the optimal temperature range for perishable food storage.

Freezers operate similar to refrigerators, but they drop temperature from -23 to -18 °C (-9 to -0 °F) and are used to frozen things.

Both refrigerators and freezers run 24 hour per day. Approximately 170 million refrigerators and refrigerator-freezers are currently in use in the US. More than 1/3 of them are over 10 years old, costing consumers \$4.7 billion a year in energy costs. By properly recycling your old refrigerators and replacing them with a new one, you can save range \$35–\$300 on energy costs over its lifetime.



Other benefits:

◇ Less CFC pollution

Some old refrigerators use Chlorofluorocarbons (CFC), and the fading out CFC will dramatically damage our ozone layer.

◇ Less noise

## At a Glance

*Cost*

\$800 - \$ 1,500

*Energy Savings*

600 - 1000 kWh/year

*Payback period*

20 years

*Lifetime*

15 - 20 years



# WEATHERIZE BUILDING (SEAL YOUR HOUSE)

## At a Glance

### Cost

\$2000 - \$ 4000

### Energy Savings

3,000 – 5,000 kWh/year

### Payback period

6 – 10 years

### Lifetime

20 years

Houses that have been weatherized have had infill installed in their walls and ceiling in order to prevent heat escaping.

Air that leaks through walls, therefore, sealing leaks can use less energy to achieve the same indoor air temperature, compared to non-sealed houses.



Other cost need to consider:

Insulation takes time, and you may need to move to another place for a while.

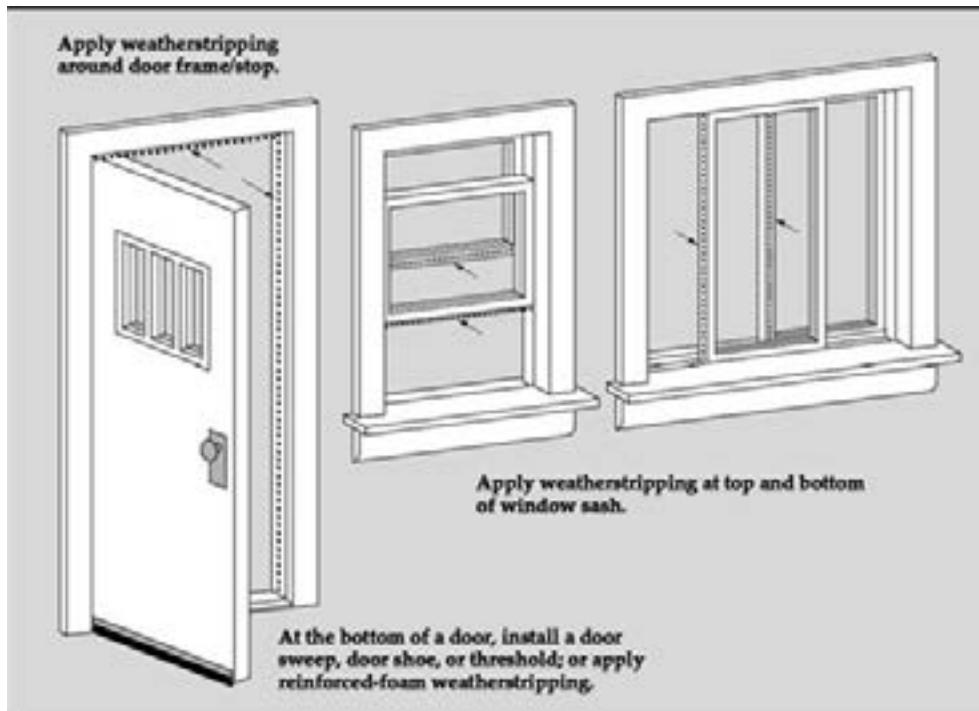
Other benefits:

- ◇ Less noise from the outside
- ◇ Better humidity control
- ◇ Less dust and insects from the outside



# WEATHERIZE DOORS AND WINDOWS

**W**eather stripping and caulking around windows and doors (preventing heat or cool loss) are small projects that can have a big impact on how much energy – and money – you can save throughout the year.



Another things can do

Do it yourself, experience please of achievement, and you can save the money for installation.

Other areas you may want to weatherize:

- ◇ Around attic stairs
- ◇ Fireplaces
- ◇ Pipes
- ◇ Outdoor spigot/faucets
- ◇ Electrical outlets and switches
- ◇ Attic and the floor above basement

## At a Glance

*Cost*

\$100 - \$ 500

*Energy Savings*

1,000 – 2,000 kWh/year

*Payback period*

3 – 4 years



# DOUBLE-PANE WINDOWS

## At a Glance

### Cost

\$450 - \$ 600 (one window)

### Energy Savings

12,000 – 15, 000 kWh/year (10 windows)

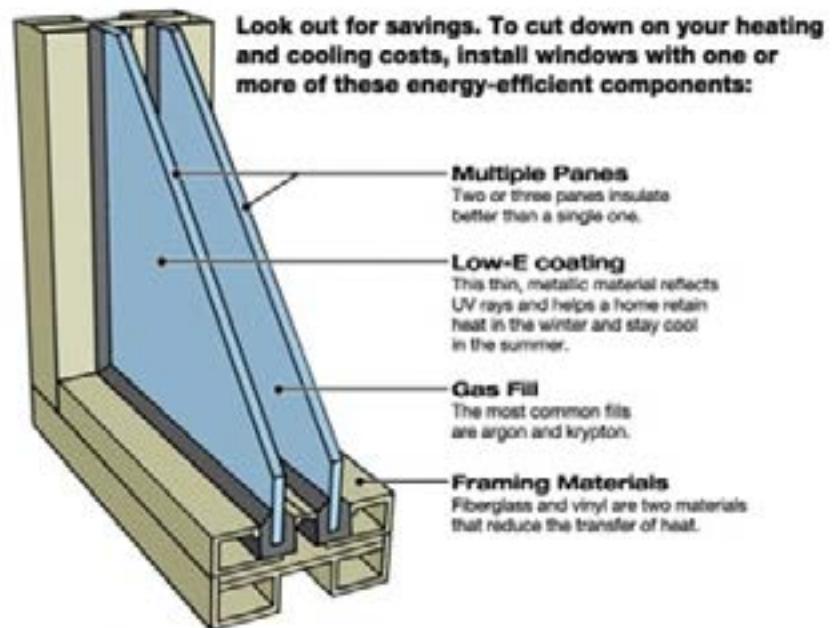
### Payback period

5 – 7 years

### Lifetime

10 years

**D**ouble-pane window is double glass window panes separated by vacuum or gas filled in between to reduce heat or cold air transfer across a part of the building envelope. Also known as storm windows in local lexicon.



Other benefits:

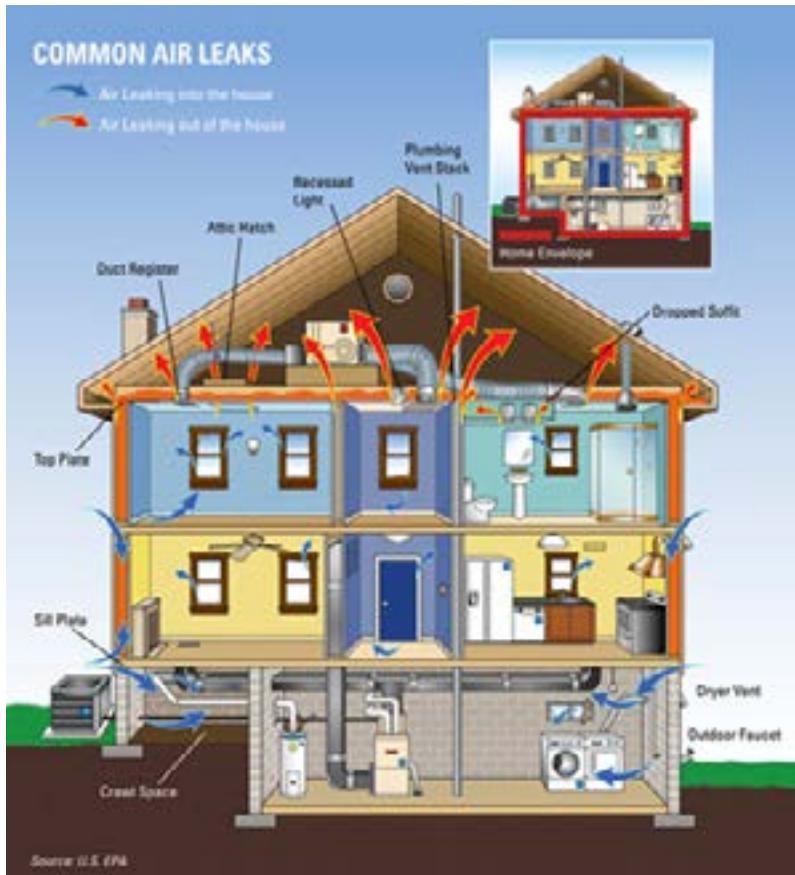
- ◇ Keep the house warm/cool enough
- ◇ Reducing noise and distraction from outside

A window's energy efficiency is dependent upon all of its components. Window frames conduct heat, contributing to a window's overall energy efficiency, particularly its U-factor. Glazing or glass technologies have become very sophisticated, and designers often specify different types of glazing or glass for different windows, based on orientation, climate, building design, etc.



# BUILDING SHELLS (INSULATION)

Building shells, some call it building envelope, includes insulation, roofing, walls slabs and foundations, all these help to prevent heat/cool from escaping from the house in order to save energy on heating and cooling. Here is focus on insulation.



Insulation, roof, wall, slabs and foundations, these elements of the building are a major investment that should be purchased on a “life-cycle costing” or return-on-investment basis, rather than lowest initial cost. Over the life of the building, the operating savings in energy alone will far outweigh the initial cost of these items.

While doing upgrade, it also adds value to the building itself, not just simply saving the money on the bill.

## At a Glance

*Cost*

\$1,000 - \$100,000

*Energy Savings*

12,000 – 15,000 kWh/year

*Payback period*

5 - 7 years

*Lifetime*

10 years



# PIGMENTED METAL ROOFS

## At a Glance

### *Cost*

\$8.50 - \$25.00 per square foot installed (it depends on what type of material you choose) 1,500 square feet for example

### *Energy Savings*

5,000 – 9,000 kWh/year

### *Payback period*

15 - 20 years

### *Lifetime*

10 - 20 years

The roof's design will determine how the heat is reflected and absorbed. Heat is emitted. Cool coating technology focuses on reflecting solar radiation, and shedding what heat is absorbed away from the surface.

Coatings colored with conventional pigments tend to absorb infrared radiation. Replacing conventional pigments with "cool" pigments (absorb less infrared radiation) can yield similarly colored coatings with higher solar reflectances. Mainly, cool coatings lower roof surface temperatures, reducing the need for cooling energy in conditioned buildings and making unconditioned buildings more comfortable.



In general, cooling energy savings can be as high as 50 percent. Additionally, a reflective roof can reduce peak cooling demand by 10 to 15 percent. As a result, building owners may be able to purchase smaller, less expensive HVAC systems.

If you are fit into these categories, you may consider pigmented metal roofs:

- ◇ High air-conditioning bills
- ◇ Large roof surface as compared to the building's overall size
- ◇ Lower levels of insulation
- ◇ Location in a hot, sunny climate



# OVEN/RANGE

An oven is an enclosed compartment in kitchen range, used for cooking, baking, and heating food.

Cooking energy efficiency represents the amount of energy absorbed by the food product compared to the total energy used by the oven during the cooking process. The idle energy rate represents the energy used by the oven while it is maintaining or holding at a stabilized operating condition or temperature.



Other suggestions:

Standard electric convection ovens have a 65 percent cooking energy efficiency and an idle energy rate of 2 kW; whereas ENERGY STAR certified electric convection ovens must meet the specification requirements of 70 percent cooking energy efficiency and an idle energy rate of 1.6 kW.

Safe environment while the more efficient one produce less smelly gas.

## At a Glance

### *Cost*

\$800 - \$ 1,500

### *Energy Savings*

1,000 – 1,500 kWh/year

### *Payback period*

11 – 15 years

### *Lifetime*

10 years



### *Pilot Testing Process for Financing and Technology Toolkit*

The test interviews took place in separate locations with different group members but generally followed the outline below.

1. Group members welcomed participant. Gave brief introduction about the toolkit and overall project.
2. Group members provided overview of how to use the decision matrix's using the Administrators guide.
3. Participants took the toolkit survey, while group members observed, took notes, and provided assistance when necessary.
4. Group member A scored the toolkit survey, while participants took a break and then answered the Mid-Interview feedback questions asked by group member B.
5. After survey was scored, group members explain what programs the participant was eligible for and provided detail information about each of those programs via a handout in person or a follow up email.
6. Group members asked final feedback questions & close out interview.
7. Pilot-test Questions

#### Mid Interview Questions:

1. Was the survey readable/ understandable? Do any terms or sections or questions stick out as confusing?
2. What are your thoughts on the preparation materials? How long did it take you to get those together?
3. Comments on layout or visuals?

#### Post Interview Questions:

1. Are these tools relevant to you? Are things missing that you know of?
2. Did this interaction help you? How useful was the administrator? What about the scheduling? Would you prefer to do this on your own time? Would it be easier or more useful to have done it by yourself?
3. Are there any technologies you would expect to see that aren't listed?
4. Does this entire process apply to you? Did it capture your business/demographic appropriately?