**Retrofitting Homes for Energy Efficiency for Low Income People:**

**A Case Study of Saratoga County**

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**Abstract**

This study analyzes the effectiveness of low-income weatherization in Saratoga County, New York, with a focus on Saratoga Springs. Based on a comprehensive examination of literature on weatherization programs at a global and national level, we create 5 hypotheses on why weatherization does not succeed to its full potential. These hypotheses are: cost/benefits, awareness, workforce capacity, split incentive, and funding.We focused on three low-income weatherization programs active in Saratoga County--LIHEAP, WAP, and EmPower--and through semi-structured interviews, observational data, and research, information on the activity of the weatherization programs in the region was collected and synthesized into a comparative analysis with past studies. Based on our findings, funding provides the greatest barrier for low-income weatherization programs to reach their potential. In conclusion, we suggest that more funding be allocated from HEAP to the WAP and for the programs to focus on a streamlined approach to weatherizing mobile homes as a way to maximize funding and houses weatherized.

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**ACRONYMS AND ABBREVIATIONS**

ARRA American Reinvestment and Recovery Act

CFL Compact Fluorescent Light

CO2 Carbon Dioxide

CO Carbon Monoxide

CRIS Comprehensive Residential Information System

DOE Department of Energy

EOC Economic Opportunity Council

ER Electric Reduction

HCR Housing and Community Renewal

HHS Health and Human Services

HP Home Performance

HUD Housing and Urban Development

LED Light-Emitting Diode

LIHEAP Low-Income Home Energy Assistance Program

NYSERDA New York State Energy Research and Development Authority

ODTA Office of Temporary and Disability Assistance

SSHA Saratoga Springs Housing Authority

TTA Technical and Training Assistance

WAP Weatherization Assistance Program

**Introduction**

*The Building Sector and Energy Efficiency*

 In the United States, 6 billion tons of materials are extracted annually for the manufacturing of building materials (Kilber, 2004). The building sector consumes 39% energy in the US, more than industry or transportation, and within that, 21% of the energy use is residential (U.S. Department of Energy, 2008). Much of the energy in both the residential and commercial sector could be saved through weatherization measures to increase the building’s energy efficiency.

If a home undergoes “deep” weatherization measures to add insulation, double or triple glaze windows, replace doors, repair pumps, or install new heating and cooling systems, it will decrease the amount of heat transfer through the building envelope--the interface between the interior of the building and the outdoors. Or, if a building replaces inefficient appliances, and undergoes “shallow” weatherization measures to reduce electricity consumption, like buying Energy Star laundry machines and refrigerators, and energy efficient light bulbs, the home will consume less (Institute for Sustainability, 2012). As of late, buildings consume 70% of the electricity load in the US, and it is their most significant factor contributing to CO2 emissions; decreasing electricity use in the building sector can make great gains in decreasing energy use nationally, even though shallow measures seem secondary to deep retrofits (U.S. Green Building Council, 2005).

*Low-Income Families and Weatherization*

When it comes to energy insecurity, low-income families are at the greatest risk. These families spend the highest percentage of their income on heating and electricity, yet receive less energy per dollar because of energy deficient housing. Low-income homeowners and renters do not have the resource options to build new or invest in energy efficient measures because they must prioritize where their money goes (Hernandez, 2013). In modern economic theory, this relates to the time value of money, where the investment today is not worth the same as the savings in the future. Because the problem of energy insecurity is a cyclical trap, there are government programs that work towards helping supply energy needs for low-income families. The incentive for these programs can come from the energy savings that occur, but also from a monetary perspective. In 2009, energy costs for low-income families in the United States were about $20 billion. Weatherization measures provide, on average, a 20% reduction in costs, with up to 55% recorded (Bird et al, 2012).

Weatherization and retrofitting can bring great gains to alleviate persons from energy insecurity: it can decrease their utility bill amount while also increasing the comfort of their home. In New York, through programs like the Weatherization Assistance Program (WAP) and Empower NY, low-income people can have their homes weatherized for free, while the Low Income Home Energy Assistance Program (LIHEAP) can provide low-income people with subsidies to alleviate high heating bills. All three of these programs help low-income people with energy insecurity, but the problem of energy insecurity is large, and oftentimes, these programs cannot address the problem’s full scope.

**Literature Review**

In retrofit literature we found that there are five main hypotheses that explain why retrofitting has not been implemented to its potential in the residential sector. Retrofitting is a seemingly simple way to conserve energy and resources in homes, but the complications with its implementation are many. Specifically for low-income people using no-cost programs, the hypotheses for the programs not reaching their full potential are: costs/benefits, awareness, workforce capacity, split incentive, and funding. We often use the terms, “retrofitting” and “weatherization” interchangeably because both refer to building modifications to reduce consumption and increase energy efficiency, but “weatherization” refers to modifications specifically to create resistance against weather, while “retrofitting” is a broader term for building modifications.

***Costs/Benefits***

Costs and benefits for retrofitting are complex and depend upon many factors, like the type of retrofit done, the behavior of the resident before and after weatherization, the contractor’s experience and diligence, and the engineer and economist’s savings estimates.

 In retrofitting studies and literature, there are often two types of retrofitting: shallow and deep. For shallow, the energy reduction measures are chosen for low-cost installation and ease. Specific renovations involve changing lighting (CFLs and LED lamps), using low-flow shower heads, insulating tanks of hot or warm pipes, cleaning condenser coils on the fridge, reducing pool pump operation hours, and using smart plugs for home entertainment (Parker et al. 2014). It can also include simple behavioral changes to the homeowner or tenant, like reducing laundry loads, reducing thermostat and water heater temperatures, and eliminating standby electricity (Dietz et al, 2009). Studies may also include adding insulation in shallow category retrofits, while other studies may not refer to terms “shallow” and “deep” at all to differentiate (Institute for Sustainability,2013). Shallow renovations don’t need a high skill-set to perform and on a large scale, they could make an important difference in the US’s national energy consumption and GHG emission, but they may not save each individual house much money.

 Deep retrofits involve modifications to the home and have the potential to save the individual homeowner more money. Some specific changes include modifying or replacing a home’s heating and cooling system, replacing air source heat pumps, repairing ducts, adding learning thermostats, adding double or triple glazing to windows, installing heat pump water heaters, installing renewable energy systems, and replacing ceiling insulation where deficient. These changes are more expensive and require more time from the contractor but generally produce greater energy reductions than shallow retrofits (Parker et al., 2014; Walker and Theobald, 2014; Institute for Sustainability, 2013; Curtin, 2012).

 In a study specific to deep weatherization in a Minnesota 60-unit affordable housing complex, air-handling units, geothermal heating and cooling, high performance windows, and low-water clothes washers were installed, and insulation to exterior walls and roof assembly was added and provided positive health, energy, and economic benefits, reducing energy use by 48% one year post-installation (Breysse et al., 2011). This shows that deep weatherization measures have the capacity to make great changes, especially in affordable housing complexes, a building where weatherization can be standardized, implemented in a single place, and on a large scale.

 Deep retrofit changes have been most beneficial and successful when catered to the unique characteristics of individual homes. A mobile home dwelling should have very different energy conservation techniques over a multi-family housing unit. Single-family units even have unique infrastructures that would necessitate certain retrofit techniques in order to provide the most efficient results (Institute for Sustainability, 2013; Solar Research Energy Institute, 1990). If a building is not properly retrofitted for its unique nature, it will not have great positive energy conservation results. And if expected savings are less than predicted because of bad retrofit implementation, technical difficulties, unexpected high costs, and the residents are unhappy, retrofit policies and programs will not be receiving the optimal benefits in the economic, environmental, and social sphere (Sunikka-Blank and Galvin, 2012).

 Residents need to be involved in the retrofitting process because they need to have competence (knowledge and skills) to use the technology efficiently. They also must have an incentive for making behavioral changes. Residents will often not change certain habits to conserve energy out of comfort and convenience. Often, deep retrofits require upkeep or at least, an understanding of the new system (Walker and Theobald, 2014; Metcalf and Hassett, 1999). In a 2013 report from the UN, the most successful retrofits were integrated with the lifestyles and needs of the residents themselves so that the changes did not seem invasive or complicated (Institute for Sustainability, 2013). Local workers, auditors, and contractors need to have a working and wide understanding of various retrofitting techniques and social queues in order to yield the most efficient results.

 Residents also many not want to change their behaviors once their home is more comfortable. Studies attribute lower energy savings after large-scale retrofitting measures to the “rebound” effect, in which residents after retrofitting use more energy for comfort and convenience. They may use more energy because they know their bill is cheaper. Or, now that their home is drier and more comfortable, they may want to turn the thermostat up to a comfortable temperature (Azevedo et al. 2013; Fowlie et al, 2014).

 Another challenge to acquiring confident benefit estimate to the effectiveness of retrofitting has to do with “prebound” effects. A study conducted in Germany by Sunikka-Blank and Galvin (2012) describes the “prebound” effect, in which less energy is consumed than expected: low-income families use less energy than calculated because they have less money and are more sparing and conscious with energy use. Also, middle to upper class people may have larger houses that require more energy to heat and power, even if the house is more energy efficient in general. These findings challenge the national policies that use energy conservation in the low-income building sector as an accessible and effective way to lower greenhouse gas emissions.

 It has often been the case that auditors and engineers have over-estimated the energy and money saved from deep and shallow retrofits. Metcalf and Hassett conducted a study in 1999 using data from the annual Residential Energy Conservation Survey (RECS) in 1984, 1987, and 1990 and monthly energy billing data to estimate the savings from home improvement investments. Their analysis found that the median rate of return on common shallow and deep energy retrofit investments promoted by energy auditors, like adding attic insulation, buying more efficient appliances, using energy savings light-bulbs, was only 9.7%, and considerably lower than engineering estimates that because of their bias, often put the return at 50% or higher.

 Hirst (1987) found that actual energy savings from Bonneville Power Administration’s interim residential weatherization program in the Pacific Northwest, which performed free energy audits and administered zero interest loans for installations recommended by auditors was only 43% of that predicted during the energy audits of these 3,000 or so homes that were retrofitted under this program. Hirst (1987), along with Metcalf and Hassett (1999) weaken the energy paradox argument by Jaffe and Stavins (1994), that there is an inadequate diffusion of cost-effective energy-conserving technologies because it is possible that the technologies are not as effective as they were estimated to be. Low, middle, or even upper class homeowners may be confused and uncertain if they should invest in something that seems to be over-promoted by auditors as more energy saving and cost-effective than it actually is.

 But, these challenges do not mean that retrofitting programs should not be present, especially since both studies promote their opinion that the reasons for low energy savings could be due to the specific area studied and the difficulties in getting consistent and confident estimations of actual energy saved after large-scale retrofits. For Hirst (1987), all of the homes retrofitted used electricity instead of gas and many of them used wood-stoves for heat. Homes that use gas instead would yield different energy conservation results from a program described in Hirst (1987). So his study in the Pacific Northwest and the results it yielded may not be indicative of modern retrofitting programs around the country, like Breysse et al. (2011) in Minnesota that found high-energy savings with the retrofit of an affordable housing unit. As was stated above, retrofits need to be catered to the homeowner and have an educational component so that the homeowner can be active in saving energy and tending to their home. If they are not, or if the retrofit is not done well, energy savings will not be as high as is ideal.

 In order to support the actual benefits of retrofitting, more field data has to be gathered after the weatherization has been done, as is also suggested by Fowlie, Greenstone, and Wolfram (2014). Because the energy saving benefits are dependent on each home, home location, and person, more information must be present to understand the actual energy and economic savings of retrofitting in order to calculate if benefits are worth the cost.

***Awareness***

There are many low-income homeowners and tenants who are not conserving energy in their homes and are not aware that they can be. For low-income families who do not have the economic option to build a green home, undergo a deep retrofit with personal funds, or live in a more energy efficient household, no-cost home energy retrofitting should be made visible to them (McAllister, 4).

Although it seems beneficial to increase awareness for programs through reaching out, calls, and advertisements, these measures and increased awareness for weatherization programs may not always increase the number of applications. In Fowlie, Greenstone, and Wolfram 2014 study, *Do Energy Efficiency Investments Deliver? Evidence from the Weatherization Assistance Program*, it was found that the increase in rate of program application for households encouraged to apply for WAP with extensive application assistance was only 11 percentage points from the control group mean of 2 percent. The study used home visits, robo-calls, personal calls, and follow-up appointments to encourage the homeowner. Early results showed that the encouragement failed to have a substantial impact on applications, but additional money and effort gone towards encouragement did raise application rate over time.

 The study suggests that encouragement could increase application rate over time by a greater margin if the encouragement method becomes more efficient. Since it was their first time conducting such an encouragement method for the WAP in specific, it would be worthwhile to duplicate and modify it to make it more effective. The study does not fully denounce the positive impacts that increased awareness and encouragement on the ground could have on low-income residents to apply and go through with weatherization programs (Fowlie, Greenstone, and Wolfram, 2014). But, behavior associated with lack of desire to utilize a program that is completely free is worth more consideration.

***Workforce Capacity***

A basic problem with weatherization programs, and one of the most damaging, is limited workforce capacity at the local level. Workforce capacity refers to the number of qualified to workers that are able to perform weatherization measures. In 2008, approximately 380,000 individuals were employed in Energy Efficiency Service Sector positions in the United States (Goldman, 2010). This could be one of the most restricting factors because the number of houses retrofitted depends on how many workers are available to do the work. The directors of the programs need to be able to organize and prioritize all the applicants, and the ground crew needs to be trained in specific weatherization procedures in order to correctly assess the property and install the upgrades. Moving into the future, there needs to be a focus on the expansion in the workforce of sub grantee organizations and subcontractors that have retrofit expertise (Bamberger, 2010).

The Recovery and Reinvestment Act of 2009 was a significant factor in adding to Energy Efficiency Service Sector jobs. According to Cleary et al, “Weatherization and building retrofits will provide the greatest number of green jobs. For residential weatherization, most jobs require low- to moderate-skills preparation, while in commercial and industrial retrofitting, there is a wider range of educational and training needs.”

The research brief goes on to state, “Since demand is fairly consistent for Energy Efficiency (EE), all state or regional workforce agencies might consider preparing workers for retrofitting and weatherization occupations.” While there has been some push from the federal government towards increasing the amount of “green jobs”, the growth hasn’t been as significant as predicted. It was estimated that the Energy Efficiency Service Sector workforce comprises approximately 3% of the building and construction workforce (Goldman et al, 2010). Therefore, low-income weatherization jobs can be seen as another avenue to supply more “green jobs” for American people.

***Split Incentive***

When it comes to the accountability for a building’s energy efficiency, it is a direct correlation between efficiency and expenses for the homeowner. But in the case that the home is being rented, the landlord is detached from many of the energy related expenses, and does not feel compelled to make any changes. This poses a problem, called the ‘split incentive’, which reduces the number of applicants for weatherization. Nearly all residents of multifamily housing are renters (93%), which creates a disconnection with the ability to make decisions on changes to the structure of the building (Pivo, 2014).

 The other component of the split incentive is in regards to a temporal challenge. Often times the homeowner does not know how long they will be living in the house, and so the cost of any investment into the home may not be worth the short amount of time they enjoy the benefit (Bird et al, 2012).

 Often times the split incentive problem is the most prevalent with multi-family buildings because they are designed with a low budget, and if over-costs occur, energy efficiency is likely to be the first aspect that is dropped (Hynek et al, 2012). This sets up a scenario in which there is a dense population of low-income families in one energy-deficient space, yet the landlord does not experience any of the negative monetary impacts.

 Solving the split incentive problem has the potential to bring significant economic benefits. A study in Minnesota found that if the refrigerators of rental properties in the state were to be replaced with efficient ones, it would save around $3.7 million per year (Nissen and Mitchell, 2012). Clearly, within the distinction between renter and owner, there exists a source of great savings of both energy and money that the government should be aware of.

***Funding***

Energy efficiency,

“offers an enormous ‘win-win’ opportunity: through aggressive energy conservation policies, we can both save money and reduce negative externalities associated with energy use” (Allcott, 2012)

Despite numerous barriers, if energy efficiency was implemented in the United States in a sizable scale it could lead to savings of more than $1.2 trillion (Creyts et al, 2009). Utilizing energy more efficiently offers vast, low-cost energy resources for the US economy and will produce negative net costs thus saving money. In 2007 the average US household spent $1,900 on natural gas, electricity, and heating oil. A low income household of four people with an average annual income of $50,628 spends close to $2,000 on electricity is hard to afford (WAP income eligibility table source). That is why these welfare programs help these people pay their expenses. These inefficiencies create an Energy Efficiency Gap, which is, “a wedge between the cost-minimizing level of energy efficiency and the level actually realized” (Allcott, 2012). Imperfect information on fuel costs and cost benefits of these implementations and investment inefficiencies have been seen causing doubt as to how well these programs would work. Information regarding future changes in fuel availability and fuel prices is one of the simple problems yet causes major setbacks to these programs abilities to come up with accurate future funding plans (Brown, 1982). The overall funding on a year to year basis for these programs has been referred to as seesaw funding. It swings hundreds of millions of dollars from year to year due to the shifts and changes in the annual federal budget. This results in major setback for the programs, their employees, and their clients (Holladay, 2013). The unpredictable nature of the funding for these programs results in uncertainty about the future of the programs.

**Research Design**

Most of the literature regarding weatherization only takes into account one program in their analysis. Because of this, there is an inherent limitation in the scope of the studies. To get a better comprehensive and comparative understanding, we examined the three different programs relating to weatherization in New York State: Low-Income Weatherization Assistance Program (LIHEAP), The Weatherization Assistance Program (WAP), and EmPower. Of the three programs, only EmPower is unique to New York. For each program, we delineated the analysis into the variables of: data tracking, services, and constraints.

Saratoga County was the micro-focus for our program analysis. Although the name “Saratoga” carries with it images of wealth-mineral springs, horse-racing, and Victorian estates--it is not wholly glamorous or wealthy. Because it poses a distinct situation of wealth disparity, it proved to be an interesting place for our study.

It also has a high percentage of program-eligible households: Saratoga County has a total of 100,681 housing units, and while some of those are modern and well insulated, 21,274 of the families within them are eligible for the Weatherization Assistance Program based on their 2015 State Plan (Congressional Research Service, 2012); this means that about ⅕ of Saratoga County’s total housing units are eligible for low-income weatherization assistance and house families that are at or below 60% of the state’s median income. Most of these 21,274 homes are probably energy inefficient: drafty and old, have outdated appliances, lack insulation, or have inefficient heating and cooling appliances. They are wasting energy and quite possibly putting the homeowner or tenant in a place of energy insecurity.

Located in Upstate NY, the County also has cold winters and a high percentage of heating days. Heating consumes the greatest percentage of energy in NY’s residential sector; so potential savings from weatherization can be great compared to other, more moderate climates.

**Methods**

To gain a deeper understanding weatherization and weatherization-related programs in New York, we conducted a series of semi-structured interviews. Firstly, we interviewed the executive director of WAP in EOC in Saratoga County, the EmPower NY director and founder, and the overseer of LIHEAP in Saratoga County. The directors have a unique position because they oversee all of the logistics and have a holistic view of where the program runs smoothly and where it does not. We also took into consideration that there is some bias toward their program for obvious reasons.

Through a comprehensive list of questions, our conversations with the directors provided us with data that we then used comparatively in the context of Saratoga County, NY. Follow up emails with the interviewees allowed us to collect additional statistics on the programs, as well as insight toward the ways in which savings are recorded.

After our interviews with the directors, we interviewed a private contractor who works with EmPower. He clarified how the system works from the middle level, and described in detail the two different levels of weatherization EmPower employs (HP and ER). His perspective was used to neutralize some of the bias in the director’s views because he has a clear view on how the program coordinates with the homeowner from start to finish. Our contractor’s perspective for the WAP also came from the director, because he assumes both roles at the EOC. This is interesting because the director is not completely separate from the installation process, which could be a factor in why WAP feels like it is more ‘personal’ than other programs.

We also interviewed the head of Saratoga Springs Public Housing Authority in order to gain perspective on the state of public housing in the town, as well as to find out if any weatherization has happened in the apartments and complexes. This was important to us because public housing is an area of dense, low-income population, and multi-family buildings are often relatively inefficient.

Lastly, we interviewed two homeowners whose names were given to us by the director of WAP in Saratoga County. Their homes had undergone weatherization in the last year and they were able to give us information on the programs: how the application, contractors, process, and installation was, and if there are any changes in their home and energy savings now. Although these two interviews were helpful in gaining the homeowner’s perspective, they were given to us by a director who wants to promote their program, and both interviewees were elderly, so we believe that they do not fully reflect the probable range of people that have undergone low-income weatherization programs.

To collect experiential and observational data, we had the director of the WAP set up a mock energy audit on a house. This allowed us to see the process that occurs each time an applicant is approved. By understanding the nature of the process, it put a perspective on the intricacies of handling a large amount of applicants with a diverse range of weatherization needs.

It also allowed us to understand how the devices the contractors use work, like the blower door, to further understand how potential savings after specific weatherization measures are calculated.

 To gain a spatial understanding of where the homes are and the types of houses being weatherized, we created a cluster map of Saratoga County homes that have had their homes weatherized with the WAP and EOC based on: mobiles homes, single family homes, multi-family homes, and public housing. This enables us to see general areas of where the most jobs have been completed, and what the most common type of housing is.

After all the interviews, we tested our original hypotheses to see if they held up to the information and data that we collected from annual reports from the program and research from past studies. With this information we compiled our own perspective on why weatherization is not working to its full potential in Saratoga County, what the actual barriers are, and how to make the programs more effective.

**Table 1: Reports analyzed for each program**

|  |  |  |
| --- | --- | --- |
| **LIHEAP** | **EmPower** | **WAP** |
| **-Program and Funding Report** | **-Impact Evaluation (2010/11)****-Data tracking records (CRIS)** | **-Policy and Procedures Manual****-DOE Review of Funding****-2014 State Plan****-ORNL Evaluation****-Energy Tabs****-Project history information**  |

**Case Studies**

In order to facilitate comparison and provide a deeper understanding of the programs, we individually analyze HEAP, EmPower, and WAP, as well as Saratoga Springs Public Housing. Through the mini case studies, the variables within each program at a local level become apparent. The cases represent how the programs are working specifically in Saratoga County.

***HEAP***

*Background*

The Low-Income Energy Assistance Program (LIHEAP) was established in 1981 as part of the Omnibus Budget Reconciliation Act as a way to combat energy insecurity in America. Through LIHEAP, the federal government can make federal grants to states, tribes, and territories to operate home energy assistance programs for low-income households. The program gives short-term critical aid to low-income people for heating and cooling during the fiscal year. Eligibility is based on income at 150% of the poverty level, household size, primary heating source, and the number of household members under 6, over 60, or with permanent disabilities. Persons who receive benefits from HEAP are likely living in an energy inefficient home with poor insulation, inefficient heaters or boilers, and/or are receiving energy from energy sources that are increasing in price, like propane, wood, or electric (Perl, 2013).

*Interviews*

We talked with Peter Martin, who is the supervisor for multiple departments in Saratoga County, one of which is Social Services, the department that oversees the federally funded Home Energy Assistance Program (HEAP) that is administered through the New York State Office of Temporary and Disability Assistance (OTDA). Peter referred us to Marisa Alber, who is the Director of Eligibility in Saratoga County’s Department of Social Services. We conducted a semi-structured interview with her over the phone.

*Services*

States may use LIHEAP funds to help low-income households pay for heating and cooling costs, emergency costs, weatherization assistance, and counseling and education to reduce the need for energy assistance. States administering LIHEAP are also to coordinate with the Weatherization Assistance Program (WAP) in order to “increase consistency between the two weatherization components” (Perl, 2013). LIHEAP grantees can use up to 15% of their allotment for the WAP, unless a grantee has a waiver from Health and Human Services for up to 25% (Perl, 2013).

 In NY State, HEAP assists low-income New Yorkers with the cost of heating their homes from November through March. Regular HEAP benefit amounts range from a few hundred dollars to over $500 depending, and are given once throughout the heating season. Emergency benefit covers heating, electricity, and gas costs if a person(s) system is about to be shut off due to insufficient funds. Second benefit is given if the person(s) need supplementary funds to the regular benefit. HEAP also has a heating equipment repair or replacement that varies from year to year: boilers, furnaces, and/or other essential heating components are replaced or repaired to keep the home’s heating source functional. HEAP pays up to a maximum of $6500 on the home for this and other minor weatherization services. These repairs are not common and only done in emergency situations. Any benefit can be given to homeowners, tenants of single or multifamily homes, or mobile homes (Home Energy Assistance Program (HEAP), 2015).

*Data Tracking*

Since LIHEAP mostly directs funds towards Weatherization services, it does not directly track energy data from weatherized homes. But, it does track persons who received LIHEAP benefits based on type for each year.

*Constraints*

LIHEAP’s constraints are funding-related. Even if a person is eligible for LIHEAP funds, they are not immediately entitled to LIHEAP benefits because it is on a first-come-first-serve basis based on when the person applied. Benefit amount and scale are limited by the funds that Congress appropriates each year, so the number of households served depend on federal funding and how grantees use their allocated funds (Perl, 2013). In FY2009, an estimated 35 million households were eligible for LIHEAP in the US, and 7.4 million households received heating or winter crisis assistance (Perl, 2013). This means that 25% of all eligible households received financial help, but 75% of eligible households did not, and quite possibly, they struggled to pay for heating.

The Campaign for Home Energy Assistance is pushing to increase federal funding for LIHEAP in the FY2016 to $4.7 billion. During the American Recovery and Reinvestment Act in 2009, LIHEAP saw much growth, jumping from $2.5 to $5 billion in 2010. But, federal funding from FY2011 to present has been decreasing to just over 3 billion for FY2015 (Perl, 2013). While funding is decreasing, national poverty levels are reaching an all-time high: in 2013, there were 45.3 million people in poverty, which is up from 37.3 million in 2007 (DeNavis-Walt and Proctor, 2014). With LIHEAP’s limited funds, more low-income people will have to choose between vital necessities, heating, or eating and will not receive funds to help pay for high energy bills.

***EmPower***

*Background*

The EmPower program began as an offshoot of National Grid’s Affordability Program, which set aside money to assist low-income families with heating bills. NYSERDA picked up the program and it evolved into what it is today, using a portion of the New York State utility ratepayer money to work on weatherizing the homes of low-income families. The goal of the program is to provide weatherization services to energy insecure families, with priority given to the elderly and families with children. EmPower directly provided the EOC in Saratoga County with $45,571.48 and worked on 72 jobs with them in the 2013-2014 program year. There is also a strong educational component to EmPower, which is where the name comes from. Kelvin Keraga, the senior project manager of the program, strongly believes that the service does not exist purely as a charity. The recipients are encouraged to inherit a new sense of responsibility and are taught to make behavioral changes that will help keep their energy use sustainable. EmPower is just the first step in getting low income families to adjust their perspectives and feel enabled to move in a positive direction.

*Interviews*

Kelvin Keraga is the senior project manager of EmPower and oversees the entire program. He spoke with us about how the program has been running and what some of the complexities are. As lead role in the program, his views about where the program will go and what it can accomplish are optimistic. There is an attitude that the significance of the work being done is fulfilling in itself, independent from how many jobs are being completed. He believes that funding is a strong limiting factor, because it creates the foundation of how many homes can ultimately be weatherized.

We also interviewed Howard Vics, the head of Building Performance Consulting of NY. He is a BPI accredited contractor and has participation agreements with NYSERDA. As a private contractor, he is more interested in the business and economic viability of the EmPower program, while also having a focus on homeowner education, as opposed to a non-profit worker like Frank Wade from the EOC, whose focus is primarily positive social change.

 EmPower’s Electric Reduction Program (ER) is Howard’s major focus, as it allows him the greatest economic gain and the littlest time. He can go to the homeowner, train them in basic energy saving techniques, and give them an education about heating and how energy moves. He may help to wrap their windows in blankets, set their thermostat at the optimal energy saving level, and show them how to conserve water and energy by doing fewer laundry loads, unplugging appliances, and shutting off lights when not in use. ER’s change all light bulbs to energy saving bulbs, and change the home’s fridge/freezer or washer/drier with more energy efficient models when necessary.

All of these steps call for about 2 hours of his time and don’t require a BPI-approved audit, which requires about 3-4 hours in the field and further time inputting data. For someone like Howard who enjoys working with the homeowner and sees that even small changes are important and empowering, the ER has its benefits. He could potentially do five ERs a week, but right now he is only doing about two; NYSERDA does not refer him as much as he would like. If Howard and other contractors like him could work these shallow retrofits and receive more referrals, we think it would provide a positive working component to deeper retrofit programs like the WAP and EmPower’s Home Performance (HP) program.

*Services*

EmPower has two levels of weatherization: electric reduction (ER) and home performance (HP). The ER service focuses on minimizing electricity-related costs. These measures include replacing lights for CFLs, new refrigerators and other appliances, and dryer repair/replacement. This is the most common service EmPower provides because it has the best cost-benefit ratio in terms of how far the funding can go.

HP measures are more related to changes in the structural components of the home, and include new insulation, doors, windows, fixing air leaks, and changing heating units or switching to natural gas. The initial audit decides whether the house is categorized as ER or HP. Naturally, HP services are more costly because they have higher upfront costs and longer payback periods.

EmPower hires private contractors to conduct the audits and perform the installations. The homeowner’s information is sent to the contractor, who is then in charge of getting in contact.

There is also an educational component to the program, where the contractors are trained to show the residents how to adjust their behavior to help supplement the weatherization. EmPower makes sure that their contractors are doing the best possible job by sending out surveys to the recipients asking how they felt about the contractor.

*Data Tracking*

 EmPower tracks their data through the Comprehensive Residential Information System (CRIS). This breaks down the Empower program into annual information on: total measures installed, installation cost per measure, estimated mmBTU savings, dollar savings per metric, estimated kWh savings, and dollars by funding code. The tracking system can be adjusted to accommodate data from multiple years, or specific months. It can also be narrowed down to the jobs that specific contactors performed.

*Constraints*

For EmPower, funding is limited by the amount taxed to the ratepayer. If fewer people pay into a utility service, there is less money allocated to the program. Ironically, this means EmPower benefits when more people are using energy and prices are higher. EmPower also faces the problem that private contractors charge higher rates than contractors working for the state such as the EOC. Wait time can also be an issue. The application can take 3 to 4 months to process, which can lead to a backlog of applicants.

Without a county-based approach, handling all applicants can pose difficulties. The data tracking that the program utilizes to show savings is on a state level, limiting the analysis of how the counties differ in energy usage and savings.

***WAP***

*Background*

The U.S. Department of Energy created the Weatherization Assistance Program (WAP) under the Energy Conservation and Production Act of 1976. The official goal of the WAP as stated on their website is to reduce the burden of energy prices on the disadvantaged (Congressional Research Service, 2012). As the program has evolved since its creation its purpose has become more defined,

“The purpose of the Weatherization Assistance Program (WAP) is to install energy efficiency measures in the homes of income-eligible persons, especially homes occupied by the elderly, persons with disabilities, and children. Funds are targeted to the most cost- effective conservation measures, determined from an on-site energy audit of the building. The program is intended to reduce national energy consumption, particularly of imported oil, and to reduce the impact of higher energy costs on low-income families.” (New York State Homes, 2014)

The 1973 oil crisis caused oil and energy prices to increase dramatically. This brought the burden of energy prices on lower income households in particular to the forefront of the federal government's priorities. The program was originally designed to save imported oil and cut heating bills for low-income households. The WAP’s goals and purpose has morphed as the issues that needed to be solved changed and the technology and education on weatherization has improved.

In 2009 the American Recovery and Reinvestment Act (ARRA) was introduced by the Obama administration and was made into law. This Act provided $5 billion to weatherize an estimated 600,000 homes throughout the country and hopefully jump-start the WAP and get it back on track, making it so it provides for more people.

The WAP has branches of the program in each state and funding trickles down via a formula. Within New York State the funding is broken down using an established formula and given to the sub-grantees within each county. The funding allocation formula uses the percentage of low-income people in each county and the number of days that people would have to use heating or cooling appliances on within.

The New York Housing and Community Renewal (HCR) agency distributes the funds that they receive to the sub grantee whose job it is to work with the low-income citizens within their county or specified area. In Saratoga County the sub-grantee is the Economic Opportunity Council (EOC), which has been working with the community since 2004 (New York State Homes, 2014). EOC is in charge of both Saratoga county and Schenectady county due to the sizes of the counties populations they have around people. A total of around 40,000 households were considered income eligible in the 2013- 2014 program year and the EOC received approximately $1.189 million (New York State Homes, 2014).

*Interviews*

Frank Wade is the regional energy service director of the EOC in Saratoga County. He is both the head of this branch of the program and has received all of the training available to become both an energy auditor and retrofit contractor. This made him an excellent person to interview because of his experience and expertise in the field.

*Services*

The EOC uses several methods of outreach to communicate with the public. These include word of mouth- especially in mobile home parks, public forums, energy saving classes, an energy saving seminar once a month, and give always where they give out light bulbs, hot water tank wraps, and both CO and smoke alarms. In order to change a prospective client into a customer each branch also needs a good intake person that can convince the people to fill out an application right on the spot.

 All sub-grantees are obligate by the WAP to reach out to all eligible citizens within their jurisdiction. A person is eligible to apply with the EOC to work on their home if their income level is 60% of the state median income (New York State Homes, 2014). If they have already applied and worked with programs like HEAP or EmPower than they do not need to prove that they are income eligible a second time. Households with the elderly or children usually get priory.

|  |  |  |
| --- | --- | --- |
|  |  |  |
| **Table 2: WAP Income Eligibility Guidelines** |  |  |
| **Household Size** | **2014-2015 Monthly** | **2014-2015 Annual** |
| 1 | $2,194 | $26,328 |
| 2 | $2,869 | $34,428 |
| 3 | $3,544 | $42,528 |
| 4 | $4,219 | $50,628 |
| 5 | $4,864 | $58,368 |
| 6 | $5,569 | $66,828 |
| 7 | $6,005 | $72,060 |
| 8 | $6,682 | $80,180 |
| 9 | $7,358 | $88,300 |
| 10 | $8,035 | $96,420 |
| 11 | $8,712 | $104,540 |
| 11+ | Add $677 for each eligible household member |  |

Source- New York State Homes, 2014

Once a person has been identified and has applied they are put on a waitlist until assistance becomes available. The current waitlist for the EOC is around 18 months. When assistance becomes available the EOC reviews the documents and then if the applicant is eligible then they begin an education process to let the person know what is going to happen to their house. In order to maximize the customers energy savings there is a 30-step education program that is tailored to each projects individual circumstances. In addition to the standard education the customers are asked to pick 5 extra measures to try to lower their energy bill. The measures are usually habit based, asking the clients to use their shades to regulate and utilize heat from the sun, change dishwasher and laundry use habits, change thermostat use, use CFL light bulbs, and other small changes. Education is administered to the customer whenever contact is made. Advice and information handouts and packets are also handed out on a number of occasions (New York State Homes, 2014).

**Table 3: WAP EOC Saratoga Average 2014 Wait Time for EOC Applicants**

|  |  |  |
| --- | --- | --- |
| **Housing Type** | **Number of Jobs** | **Average Wait Time** |
| Mobile Homes | 108 | 380 |
| Apartments | 17 | 341 |
| Single Family | 137 | 464 |
| Total Jobs Completed ('10-'14) | 254 (274 total) | Average Wait Time Total: 442 Days |

A trained contractor then conducts an energy audit. The contractor starts by looking for health hazards like carbon monoxide leaks or lead paint then outlines the measures that need to be made to the house. Some measures are made on the spot if they are easy to do and the materials are present. The homeowner accompanies the contractor when conducting the energy audit because of their first hand knowledge of the home. This speeds up the process of identifying the sources of energy loss, energy inefficiency, and causes of discomfort throughout the house.

 After the initial energy audit the scope of the workload and a cost estimate projection for the project is conducted. Then construction bids are issued. Sometimes the job goes to private contractors but most of the time the measures are all taken care of by the trained employees of the EOC even though there are only a few people. The owner then agrees to the retrofitting measures. Construction is planned around the homeowners schedule and work is completed as efficiently as possible. The measures conducted are usually different for each home. However, there are similarities in the measures within each type of housing stock, especially with mobile homes. Finally if there are private contractors they are paid and the project is presented to the NY HCR for certification and payment.

When an apartment building is retrofitted the process is changed. Working with the landlord is important to make the process go as smoothly as possible. The landlords who own the buildings are recruited by being told that a tenant in a retrofitted apartment will be happier and end up staying longer. This is economically beneficial to landlords because changing tenants requires repairs, re-advertising, and a lack of rent for a month or two. During a retrofit of an apartment building the landlord pays 20% of the building costs. Circumstances change when the landlord is living in the building as well. In order for an apartment to be eligible for an energy audit and retrofit two thirds of the tenants need to qualify based on income. After the retrofit the tenants see an average of 30% reduction in their energy bill.

When a retrofit is successful the benefits are numerous. The homeowners and tenants seem to have a new sense of pride. On follow up appointments it has been seen that the homeowners tend to keep the house cleaner and even paint, showing an enhanced standard of living. The programs can be improved upon however.

*Data Tracking*

There is currently no tracking of data by the EOC. This means that they don’t know what measures save the most energy or what measures have the most benefits for the least amount of money. In the future there are plan to introduce an Energy Tab to keep track of this data so trends and other information can be gleaned.

*Constraints*

There are several problems and limitations that affect the number of jobs and types of jobs the program can undertake each year. In Saratoga country, many people qualify for the programs assistance. The waiting list for the WAP services is around a year to 18 months long. There are a number of possible causes for the long waiting list. Citizens below the poverty line cannot afford to do the construction work themselves so they have no choice but to wait for assistance. There is also not enough of a workforce and the workforce that is there must be educated on the unique techniques that are used when retrofitting. This also limits the workforce available because even if private contractors were interested in these jobs they might not have the experience or education to retrofit certain houses. There is also a set number of money that the DOE will give to each county based on population limiting the amount of jobs they can do.

***Comparison***

**Table 4: Comparison of Three Major Weatherization Programs in Saratoga County**

|  |  |  |  |
| --- | --- | --- | --- |
|  | LIHEAP | WAP | EmPower |
| Funding Source | Federal Appropriations to HHS | DOE | Rate payer |
| 2013 Funding | $8,500,000 | $908,084 | $45,571 |
| Most Common Services in Saratoga County | Subsidize heating bills | Deep weatherization (insulation, HVAC, CO2 mitigation) | Shallow weatherization (ER’s) and Natural Gas Conversion |

Most of the programs try to spend an average of $6,500 on each house. The actual amount of money spent on each job varies but the average expenditure on each house is the goal. In the 2013 program year the EOC used $908,084 on Saratoga County, HEAP used $8,500,000 and EmPower used $45,571. If the WAP’s average funding of $6,500 on each house is used, during the 2013 program year 1,454 houses could be weatherized, instead of the roughly 90 jobs that were actually completed by the EOC.

***Saratoga Springs Housing Authority***

Saratoga Springs Housing Authority is not a weatherization program, but it is important enough to have its own case study. We were interested if the SSHA’s public housing complexes have been weatherized or what the conditions of the complexes are, because they house such a large portion of low-income people.

*Background*

In Saratoga Springs, close to 1000 people live in a public housing unit, managed by the Saratoga Springs Housing Authority (SSHA). SSHA receives 100% of their funding from the Federal government through HUD. They receive an operating subsidy, which is based on a formula to allocate funds. The HUD formula determines the cost of the housing authority to operate based on a “per unit/apartment” basis. That total dollar amount is calculated, and then the amount of rent received from tenants is also deducted.

There are three different apartment complexes under the SSHA: Jefferson Terrace, Vanderbilt Terrace, and Stonequist Apartments. Jefferson Terrace consists of 28 buildings, a total of 339 units; Vanderbilt has 15 buildings, for a total of 58 units; and Stonequist is a large high rise with 176 units. The public housing is currently at full occupancy and they also give out 90 vouchers to people under section 8 to help them pay for housing in the private rental market.

 The different apartment complexes give different levels of assistance to their tenants and were all built at different times. The first complex to be built was Jefferson terrace in 1950, Vanderbilt in the late 60’s, and Stonequist in 1970. In Jefferson Terrace the tenant pay for their own utilities, in Vanderbilt they only pay for their electricity while the SSHA pays for their heating, and in the Stonequist Apartments the Public Housing Authority pays for both the electricity and the heat (Paul Feldman Interview, 2015).

**Table 5: Public Housing Managed by Saratoga Springs Housing Authority**

|  |  |  |  |
| --- | --- | --- | --- |
| Name | # Units | Construction Years | Assistance Level |
| Jefferson Terrace | 339 | 1952 | Tenant pays electricity/heat |
| Vanderbilt Terrace | 58 | 1970 | Tenant pays electricity |
| Stonequist | 176 | 1970 | Tenant pays electricity/heat |

*Interviews*

In order to gain a better understanding of Saratoga Springs Housing Authority, we interviewed Paul Feldman, the Regional Manager. Before Paul became the regional director, there was no thought about energy efficiency, as seen by the buildings’ condition: Stonequist apartments still have their original heating plan and boilers from the 70’s. Recently Frank Wade from the Saratoga EOC has been in contact with Paul to hopefully work on a retrofitting job, but nothing has begun yet. There was an attempt to work with the EOC in the past, but the project fell through. Paul has been requesting proposals from contractors to retrofit or renovate the buildings. He wants to replace boilers, implement water saving measures, install low flow toilets and showerheads, install CFLs, install heating furnaces and boilers that are separate domestic hot water from the boiler system so the hot water is not being heated all summer, and add new insulation to Vanderbilt Terrace .

*Services*

Maintaining the apartments or keeping them modernized is the public housing authority’s function. They allow for people, who would otherwise not be able to pay for housing, to have a home.

*Constraints*

The main constraints in SSHA are funding related. Due to the federal budget crisis, HUD only receives 83% of the eligible funds that they should receive. There is currently a 24 billion dollar backlog of capital needs in public housing across the country because HUD has not been fully funding the capital program for over a decade now. The Saratoga Springs Housing Authority receives approximately $400,000 dollars a year for their Capital Program, but this year alone there was identified almost 1.5 million dollars in immediate capital needs. Obviously, there is a need for more funding in order to sustain the Authority (interview with Paul).

The small amount of money that is given to the SSHA for building maintenance often goes towards measures that fall under a physical needs assessment, while weatherization takes the wayside. Priority goes to renovating or replacing critical items, like the original elevators in some of the apartments that are now 40 years old. HUD money has previously gone toward new windows in Jefferson Terrace and Vanderbilt Terrace, energy star stoves and fridges, but primarily to building envelope work. Building Envelope refers to siding, roofing, and occasionally renovating the building’s basement or foundation. Due to the buildings’ ages, problems are beginning to pop up: since they all have the original piping, there have been some minor leaks, but since all the buildings are cinderblock buildings, changing pipes would mean a deep retrofit process that would be very expensive.

 Energy savings and retrofitting the public housing apartments and buildings needs to be considered by the SSHA, even though weatherization is often seen as secondary to physical changes. The little problems that are popping up are an indicator of larger problems in the future if the buildings are not updated soon--problems that would pose safety and health risks for the tenant. There are different programs for funding in place and opportunities that have not been utilized yet in order to subsidize and cover weatherization costs for public housing buildings that would help to make more comfortable and energy efficient buildings for low-income people. Since the federal government is funding most aspects of the SSHA it would be in their best interest to make the buildings more energy efficient to reduce energy costs.

**Results**

***Discussion***

*HEAP*

From researching HEAP, we can quantify the scope of need for energy assistance in America and Saratoga County for low-income people.

The table below is from Marisa Alber and shows the number of HEAP benefits in Saratoga County from 2009-2013. It reflects to us the scope of need for energy assistance in Saratoga County.

**Table 6: Number of HEAP Benefits in Saratoga County from 2009-2013**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Program Year | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 |
| Total Benefits | 21,421 | 16,116 | 20,717 | 18,921 | 21,357 |

The data reflects a steady need for energy assistance in Saratoga County. If we use the most recent total benefit number, 21,357 people served, as the estimate for number of

people in the County in need for home energy assistance and weatherization, it would mean that 9.5% of Saratoga County’s population is in need; estimated Census Bureau total population in Saratoga County 2014 is 224,921 persons. This percentage is also likely an underestimate of need, because it is often the case that not all eligible persons are able to be served because all funding is usually used up by March or earlier. Also, some eligible persons may not even be aware of the program’s existence.

 While LIHEAP is an important aspect of aiding energy insecurity in Saratoga County, New York, and the US as a whole, it does not often enough address the root of the energy efficiency problem by actually retrofitting the home with an emphasis on a better, more sustainable and energy efficient future for low-income people. Although LIHEAP does allocate funds for Weatherization services, it is most often used as a short-term economic fix for an energy and sustainability problem that will continue to exist without help, as in, old homes will continue to be expensive and energy inefficient for the resident; this will continue to cause the resident to live in energy insecurity and in need of government or private aid. Without retrofitting and fixing home energy inefficiency, LIHEAP will continue to pool money into a problem that is not being solved and is likely growing as energy prices and poverty are on the rise.

*EmPower*

We found that in Saratoga County, EmPower is currently more focused on electric reduction measures than home performance measures, which is the inverse of the situation in the state as a whole. This is due to the type of applicants they receive and where they find the cost-benefits are the highest. Because it is a statewide program, the emphasis on Saratoga County is not very concentrated. There is no organized outreach or awareness events taking place, and that limits the number of eligible people who apply. There is a need to increase data tracking and impact evaluations so that savings can be better understood, both for the homeowner and the program. In 2014 there were 86 jobs completed in Saratoga County, the majority of which went through the EOC. Because EmPower works with private contractors, a major limitation for the program is maximizing the funds that they receive. Without their own contractor team, prices can climb much higher for weatherization projects. The majority of the jobs were on mobile homes, with single family homes close behind. The lack of focus on multifamily buildings demonstrates that although the program is set up to deal with the split incentive, it may still be a barrier for applicants.

**Table 6: EmPower Weatherization Trends in Saratoga County**



*WAP*

In 2009 under the Obama administration the American Recovery and Reinvestment Act (ARRA) of 2009 was passed. In an effort to recover after the recession of 2008 the Act allocated $5 billion to the DOE’s Weatherization Program. The DOE became concerned when a year later the sub grantees whose job it is to utilize the funds were failing to do so. Only $368.2 million, less than 8% of the total award of $4.73 billion had been drawn as of February 2010 (Congressional Research Service, 2012). Despite the limited use of the available funds the 2010 annual National Community Action Foundation Energy Leveraging conference discussed new ways to keep over 1700 weatherization sub grantees alive after the ARRA money runs out. They leveraged $1 billion in funding exclusive of ARRA on a $250 million annual federal investment from the DOE. In a statement released by Bob Adams, Program Lead with the WAP at the time he said, “That’s a strategy that cannot stop. We must continue to provide the best product that we can. It’s time to start monitoring ourselves and policing out work to generate even more savings” (White, 2010). In the 2013-2014 program year congress appropriated $68 million to the WAP. This is less than a third of the funding that the WAP received before the ARRA (Holladay, 2013). In the 2014-2015 program year they allocated $174 million, a 150% increase over last years appropriation (Warfield, 2014).

**Graph 1: DOE Appropriated Funds 1977-2015**



Source- Congressional Research Service, 2012.

Funding for the WAP can oscillate by hundreds of millions of dollars from year to year. During the first year or two of George W. Bush’s presidency the administration viewed the WAP in a positive light and wanted to support the program. At the end of his second term in office though he had changed his mind and made it clear that he wanted to get rid of the WAP entirely (White, 2010). The unreliable nature of these funds is a challenge that these programs are not able to solve themselves.

 However, it is in the best interest of the federal government to increase the funding for programs that work on weatherization measures and not simply to subsidizing heating and electric expenses. A onetime investment in weatherizing a home can lead to long-term monetary savings. The federal government is paying for the utilities for most of these homes so if were to make them more efficient on a noticeable scale the federal government itself would directly benefit and save money.

Weatherization measures provide, on average, a 20% reduction in costs, with up to 55% recorded (Bird et al, 2012). This means that the full potential for low-income weatherization in the United States could save in the area of 4 to 11 billion dollars per year. In terms of energy, the average first year savings is 29 MBtu and the annual CO2 reduction per home is 2.65 metric tons (Eisenberg, 2010). If we correlate this with the income-eligible homes in Saratoga County, NY, alone, there is the potential for a reduction of 56,376.1 metric tons of CO2 per year, which is the equivalent of removing 11,054 cars from the road for a year (EPA, 2011). Clearly, weatherization has the ability to make a significant impact on the global issue of climate change, while also contributing to national economic savings. Within the sphere of welfare programs, the positive benefits from weatherization appear to be some of the greatest, combining the three pillars of sustainability. Homeowners who have undergone the weatherization process commonly feel more comfortable in their home and have a newfound feeling of motivation to maintain the cleanliness of their home (Kelvin Keraga Interview, 2015). The feeling of being energy secure helps to diminish the negative perception of being ‘victimized’ by society that is often taken by low-income families. The qualitative changes are equally as significant as the quantitative savings when it comes to weatherization, so it can be difficult to express these positive benefits to policymakers. The focus should not be limited to merely units of energy saved or number of dollars saved, but also the impacts on the livelihoods of the families involved.

By increasing funding, Saratoga County could possibly increase their workforce capacity, and decrease their other barriers to reaching their full weatherization potential. In Saratoga County, the EOC only uses one team of three people to perform the weatherization measures. The problem is not that a limited number of people are able to do the specific type of work. The workforce issues with the WAP and Empower stem from a funding issue, where adding more people or paying more people would not be economically viable. With EmPower, private contractors are hired to perform the installations, where Saratoga EOC acts as a contractor. In this case, private contractors cost more money, and so although EmPower has a larger potential workforce than the WAP, they are still limited by how far the funding can be stretched.

***Suggestions***

In order to maximize the impact of the programs, we have various suggestions for them moving into the future. By tracking data more consistently, the programs will be able to provide more specific energy and monetary savings estimates. The tracking should be on a County-based level in order to properly assess what the differences in the regions are. This is important because energy usage can have different trends from County to County. These estimates can then be used to influence future policy changes when it is time for the Federal government to decide funding allocations. With precise results of savings, policymakers will be more willing to listen to the programs when they are asking for more money, as all the positive benefits can be seen. Currently in Saratoga County, the EOC is working on tracking data from homes with an Energy TAB. Hopefully in the next few years, this data will be used to analyze what measures are working and what measures aren’t, in order to better weatherize to save money and energy.

 While more funding would be the number one way to increase productivity of the programs, it is important that the programs work on stretching the current funding as far as possible. In order to do so, there must be an assessment of what measures and types of projects have the greatest savings-investment ratio. Through our research we found that a focus on mobile homes presents an opportunity to maximize efficiency, in energy saved, money saved, and total number of projects. The average amount of money put into a mobile home for weatherization is about half of what is put into a single family home on average (Frank Wade Interview, 2015). This is because mobile homes are more standard in their construction, so it takes away some of the complexities with the installation process. Mobile homes are also often minimally insulated because they are prefabricated without weather issues in mind; In New York, they often are bought and brought up from Florida, therefore they are not built with harsh winters in mind (Frank Wade Interview, 2015). Because of this, insulation added to the walls and belly alone can be a significant benefit to the overall efficiency of heat distribution. Communities of mobile homes provide a place where there are numerous opportunities to weatherize in one geographic location, all with similar installation measures needed, and many of which have income eligible families. All of these factors allow for mobile home parks to be a great opportunity to maximize the programs efficiency. With increased outreach while working on a project in a mobile home park, the contractors have the potential to work on the community as a whole. But in order to do this and weatherize a mobile home park all at once, the EOC would likely not be able to work on a first-come-first-serve basis.

We also believe that there should be an increased focus on the relationship between weatherization programs and public housing. These buildings, as with mobile home parks, present an area of dense low-income population in structures that are relatively inefficient. Especially in public housing, there is an incentive for the government to weatherize because they would directly benefit from the savings if they are already subsidizing the heat and utilities. In Saratoga County, Frank Wade and Paul Feldman have been communicating about weatherizing some of the SSHA public housing units and we hope that this will continue and bring about weatherization success (Interviw with Paul, 2015).

With increased data tracking, and a focus on mobile home parks and public housing, we believe that the weatherization programs active in Saratoga County could greatly improve their overall efficiency. Our suggestion would mean that the programs deviate from their current first-come-first-serve basis, and take more of a ‘push’ strategy with increased outreach. By doing so, the entire process from application to completion could become more streamlined, and thus increase the amount of energy saved, money saved, and projects completed in Saratoga County.

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