# Building a Brighter Day:

## Energy Efficiency Innovations Yield High Returns for the Commonwealth

A TRIPLE WIN FOR EMPLOYMENT, EQUITY AND THE ENVIRONMENT

**Community Labor United**

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Over the next three years, **innovations led by CLU's Green Justice Coalition** could yield these gains for the Commonwealth:

**84,000 tons**
*in greenhouse gas reductions*

**2,200**
*homes weatherized*

**$59 million**
*saved for Massachusetts households*

**$42.8 million**
*in wage gains for weatherization workers*

**$24.7 million**
*in revenue for state and federal government*

**$10.7 million**
*in health savings for workers and households*

Working with utility companies and the state's Energy Efficiency Advisory Council over the past four years, Community Labor United (CLU) has helped the state's energy efficiency programs reach low-income communities and communities of color. It has also improved wages and job quality for home weatherization workers. Those higher wages and other workplace reforms could save the government $44.4 million a year in higher tax revenues and money it won't have to pay out in public benefits. The reforms CLU 's Green Justice Coalition initiated will keep nearly 84,000 tons of greenhouse gases out of our atmosphere over the next 20 years. The health benefits – from safer working conditions, lower asthma rates, warmer and healthier homes, and more money for food – could yield another $10.5 million in savings over the next 20 years.

CLU/GJC brought together unusual allies to win these breakthroughs. Our coalition unites environmentalists, labor unions, and community organizations that have been known to disagree on other issues. The coalition then worked with utility companies and state officials to better reach working class communities where home weatherization rates have been low in the past, and to improve the jobs of low-wage weatherization workers. These diverse parties found a common interest in making weatherization accessible and affordable to every household in the Commonwealth.

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The numbers and calculations in this report were peer reviewed by experts in the energy efficiency industry.

# Executive Summary

Over the past four years, Community Labor United's Green Justice Coalition (CLU/GJC) has created a groundbreaking model for energy efficiency. Working with the state and utility companies, CLU/GJC has brought Massachusetts's home weatherization program to working-class communities of color, dramatically improved wages and job standards for weatherization workers, and kept tens of thousands of tons of greenhouse gases out of the air. CLU/GJC has won:

## *Policy Breakthroughs*

✔ **HIGH BENCHMARKS FOR GREENHOUSE GAS REDUCTION:** CLU/GJC joined a broad set of organizations to push for ambitious state climate goals. Adding the voices of immigrants, working-class communities and labor unions, we helped win the strongest greenhouse gas reduction standards in the country. We then went on to make sure that weatherization workers and communities of color benefited from those goals.

✔ **ACCESSIBLE HOME WEATHERIZATION:** CLU/GJC worked with utility companies to design and test Community Mobilization Initiatives (CMIs). These pilot projects hired trusted local organizations to reach out in their neighborhoods, sign residents up for home weatherization, and walk them through the complicated approval process. The CMIs found union and community contractors who hired and trained local workers and created pathways into construction careers. The CMIs also showed that subsidies for low- to moderate-income families and subsidies for "pre-weatherization" building repairs were necessary and cost-effective in making energy efficiency accessible to working-class communities. The state and utilities agreed to incorporate CMI lessons in the upcoming three-year energy efficiency plan.

✔ **OVERCOMING AFFORDABILITY HURDLES:** Our CMIs helped identify the biggest barriers to weatherization in low- to moderate-income communities. Massachusetts's new three-year plan will fund Efficient Neighborhoods+ (EN+), a targeted program for working class neighborhoods that includes:

- tiered rebates that make weatherization more affordable,
- "pre-weatherization" subsidies that fix problems like old wiring and carbon monoxide emissions, and
- effective outreach by trusted community organizations.

The three-year plan will also remove the complicated process of verifying households' income eligibility by automatically qualifying all families living in defined low- to moderate-income neighborhoods.

✔ **DATA ACCESS:** Effective programs need to track whom they are serving. After much negotiation, CLU/GJC won a commitment to establish a database that uses utility data to track weatherization work geographically and tell us if low- to moderate-income communities are being adequately served.

✔ **EQUITY:** While all these policy breakthroughs can certainly be seen as equity gains, CLU/GJC has achieved something broader. We have made equity part of the Commonwealth's energy efficiency policy and worldview. Access to good jobs and weatherization services for all ratepayers – regardless of race, income, and language – are now explicit goals of Massachusetts's energy efficiency programs.

These solutions originated with our grassroots leaders, who live the challenges of equity and affordability every day. Their policy breakthroughs have led to dramatic economic gains for working class communities, weatherization workers, and the Commonwealth.

Still on the agenda are completing the data access project; allocating more funds for community outreach; and adopting broader societal benefit-cost measures in calculating energy efficiency gains.

## *Economic Breakthroughs*

Massachusetts's energy efficiency programs calculate lifetime[1] cost savings of as much as $3 for every $1 invested in weatherization. This "Total Resource Cost" looks only at the cost of producing power (including power plant operations, administrative overhead, labor costs, and other factors), capacity, and consumer bill savings. Looking not just at savings on utility bills but at the full array of economic and social gains from these investments – including health, wage, and public revenue increases – we calculate a much higher payoff of $21 over the 20-year lifetime of these residential energy efficiency retrofits for every dollar invested in EN+ and pre-weatherization. (Charts in the Appendix show the calculations behind our projected savings figures.)

- ✔ **ENERGY SAVINGS:** Efficient Neighborhoods+ could yield as much as $7.50 for every $1 invested in the plan. EN+ will have the added benefit of extending weatherization to communities that have found it difficult to access and afford.
- ✔ **JOBS:** We estimate that EN+ could employ up to 22 additional weatherization workers each year in the plan. Because CLU/GJC insisted on fair pay for weatherization workers, their increased wages could support 60 additional jobs. CLU/GJC negotiated responsible contractor agreements with the state's largest utilities and weatherization vendors that cover subcontractors as well. The agreements set standards for training, health and safety, working conditions, proper classification of workers, and compliance with state labor laws. The strong enforcement provisions in these agreements should help eliminate the common practices of wage theft and misclassification. Increased spending from EN+ participants could spur the economic activity needed to create another four jobs. We estimate $42.8 million in overall wage gains over the next three years.
- ✔ **SAVINGS TO THE COMMONWEALTH:** When contractors misclassify or underpay their workers, the state picks up the bill for uninsured workers' health care, low-income family support, and lost tax revenues. We calculate that CLU/GJC's workplace reforms could save taxpayers and the state and federal governments $16.1 million over the next three years in avoided public benefits usage and bring in $24.1 million in additional revenue.
- ✔ **SAFER WORKPLACES:** Through training and higher safety standards, CLU/GJC's reforms could save $7.7 million in measurable health costs and claims through reduction in workplace asthma, injury and death.
- ✔ **LOWER FAMILY MEDICAL BILLS:** High fuel bills force families to go without either heat or food. Scrimping on either – as many low- to moderate-income families must do – can cause such chronic illnesses as respiratory problems, susceptibility to infection, or delayed mental development in children. The health consequences – repeated hospitalizations and treatments – are extremely expensive. We estimate total reduction in health services accessed by EN+ households in the next three years will generate a savings of at least $3 million over the next 20 years.

There are some surprises in these figures. Though CLU/GJC did not set out to reduce health costs or increase public revenues, those figures could represent a significant economic gain for the Commonwealth. These numbers confirm our hopes at the start of the campaign: that making home weatherization affordable and accessible would yield a triple win for the state's economic, environmental, and equity goals.

1 In the context of energy efficiency retrofits, "lifetime" indicates a 20-year term (i.e. the estimated lifetime of the effectiveness of the weatherization measures).

# Background

Massachusetts is often thought of as an environmental powerhouse, but we have long lagged behind west coast states on a number of indicators. Recently, ambitious environmental goals and a push to embrace green technology jobs have finally propelled us forward. We are now ranked first in the nation for energy efficiency, with aggressive savings goals for the next three years. Total combined gas and electric efficiency measures are estimated to save utility customers in Massachusetts over $8 billion and reduce greenhouse gas (GHG) emissions by 25,632,813 short tons, the equivalent of taking approximately 398,700 cars off the road or eliminating the output of a 460 MW power plant for one year.[2]

Yet who benefits from this green economy remains a key question. Community Labor United's Green Justice Coalition (CLU/GJC) has ensured that working-class communities and communities of color will get their full share of home weatherization jobs and services as we move forward. Our four-year Energy Efficiency campaign has won policy breakthroughs, benefit-cost improvements, and health gains that can serve as a nationwide model.

These gains are critical for the working families of Massachusetts. The recession of 2008 exacerbated long-standing problems in our communities of high costs, low pay and lost jobs. In Boston's predominantly African-American community of Roxbury, for instance, the unemployment rate is almost twice the city average.[3] Roxbury is also an official "environmental justice" community[4] – one of the many working class communities of color in Massachusetts with excessive health effects from environmental pollution. In general, African-Americans are 1.5 times more likely to have childhood asthma as whites,[5] and EJ communities have historically faced a cumulative exposure rate to environmentally hazardous sites and facilities that is more than 20 times greater than other neighborhoods.[6]

To help correct this stark imbalance, CLU and our allies convened a statewide partnership of more than fifty community organizations, labor unions, environmental groups and faith-based alliances, now known as the Green Justice Coalition. This group committed to focusing not just on environmental issues, but on good jobs, and racial and economic equity. Our *Green Justice Principles* (see inside back cover) reflect the fact that resources for greening must be accessible to all in order to stabilize our climate. CLU's coalition partners – whose members live in working-class communities and communities of color – have been overburdened by the fossil-fuel economy and excluded from decision-making structures, and must take a lead role in order to build a truly sustainable green economy.

The campaign initially focused on accessing economic stimulus money from the federal American Recovery and Reinvestment Act (ARRA) and on organizing within the City of Boston. However, in 2008 the state passed a trio of laws focused on the green economy. This set the stage for a dramatic expansion of energy efficiency programs and potentially tripled the funds that Massachusetts utility companies spend on energy efficiency:

- The *Green Communities Act* required "least cost procurement" by utilities, requiring them to invest in all efficiency measures that are less expensive than new supply.

2 "2013-2015 Massachusetts Joint Statewide Three-Year Electric and Gas Energy Efficiency Plan July 2, 2012 Submission to EEAC." *Massachusetts Energy Efficiency Advisory Council*. July 2, 2012. http://www.ma-eeac.org/docs/7.3.12/Gas%20and%20Electric%20PAs%20July%202%20Plan%207-2-12.pdf. This figure includes commercial as well as residential customers.

3 Finucane, Martin. "Menino proposes moving school headquarters to revitalize Dudley Square." *Boston Globe*. March 3, 2011. http://www.boston.com/yourtown/news/roxbury/2011/03/menino_proposes_moving_school_1.html

4 In 2002, the Massachusetts Executive Office of Energy and Environmental Affairs created an official designation for "environmental justice" neighborhoods, defined as those that meet one or more of the following criteria: Median annual household income at or below 65% of the statewide median income;25% or more of the residents are a minority; 25% or more of the residents are foreign born; or 25% or more of the residents are lacking English language proficiency. See http://www.mass.gov/eea/grants-and-tech-assistance/environmental-justice-policy.html for more information.

5 Massachusetts Department of Public Health Asthma Prevention and Control Program. "Burden of Asthma in Massachusetts." *Massachusetts Department of Public Health*. April 2009, p 31. http://www.mass.gov/eohhs/docs/dph/com-health/asthma/state-plan.pdf.

6 Faber, Daniel R., and Eric J. Krieg. "Unequal exposure to ecological hazards: environmental injustices in the Commonwealth of Massachusetts." *Environmental Health Perspectives*. 110.Suppl 2 (2002): 277.


- The *Green Jobs Act* established a Clean Energy Technology Center and allocated millions of dollars to support green job training programs.
- The *Global Warming Solutions Act* required the state to develop programs and policies to reduce greenhouse gas (GHG) emissions by at least 10% below 1990 levels by 2020 and 80% by 2050.

The Green Communities Act also created the Energy Efficiency Advisory Council (EEAC), a body of experts to oversee the work required of the utilities, and mandated that the utilities submit plans every three years to lay out how they will achieve the state's greenhouse reduction goals. Our analysis found that the utilities would not be able to meet the new state goals unless all Massachusetts residents have access to weatherization services - including the urban communities represented by CLU/GJC. With so much money in play at the state level, CLU/GJC identified these utility-run programs as bigger, more stable sources of funding than ARRA. Below, we detail the challenges we faced, the plan that CLU and the Green Justice Coalition put together, and the stunning success CLU/GJC partners have achieved in just four short years.

# The Challenges of Creating Energy Efficiency Equity

## *Access to Good Jobs and Fair Treatment*

Like residential construction generally, the weatherization industry has long operated outside the scope of state oversight. Union density is far lower than in commercial construction, and the pressure to keep down costs results in a race to the bottom. Abuse of workers is rampant – particularly those who are undocumented or who are not proficient in English. Mistreatment ranges from threatening workers with retaliation (such as deportation) if they complain about unsafe conditions, to outright wage theft.[7]

Misclassifying employees as independent contractors is another way that contractors game the system to keep costs low. Misclassification allows employers to avoid paying unemployment insurance, workers' compensation, and payroll taxes, cheating workers and the state out of millions of dollars every year. In addition, weatherization wages are low – averaging about $10/hour – in part because many workers are forced to work off the clock, or are not paid correctly for the time that is properly documented. For example, workers are often unpaid for their time picking up materials and equipment before work and returning them afterward.[8] Often, they are not paid overtime when they work over 40 hours in one week.[9]

For communities of color, pre-employment background checks are a barrier to accessing jobs in the first place. Contractors routinely run potential employees through the Massachusetts Criminal Offender Record Information (CORI) registry. Despite recent reforms to Massachusetts's CORI laws, these background checks often incorrectly show job applicants with no criminal records as being "in the system," while some applicants have old records with minor offenses that have no bearing on weatherization jobs.

## *Access to Weatherization Services*

Section 116(b)(3) of the Green Communities Act of 2008 required an equitable distribution of services to all customers. However, the Act laid out no benchmarks and mentioned no specific ways to reach people of color, renters and immigrant households. In other words, there was no plan for signing up low- to moderate-income households, and previous efforts had not produced good results. Additionally, the legislation defined success with a narrow benefit-cost ratio that discouraged utilities from taking the extra steps needed to reach these households.

Household income can present a barrier for households that earn 60-120% of the State Median Income (SMI).[10] While federal and state energy efficiency programs pay 100% of weatherization costs for the very poor of the Commonwealth, households above that poverty line must pay a quarter of their weatherization costs.[11] For these families, that co-pay is often unaffordable. This 60-120% of SMI group represents a full 27% of households in Massachusetts, and 39% of state utility customers who fall above low-income eligibility. The Commonwealth's aggressive greenhouse gas (GHG) emission reduction goals will be difficult – if not impossible – to achieve unless this group can fully participate.

For families on the lower end of this income bracket, the high co-pay represents an additional injustice. All Massachusetts households contribute to Mass Save, the state weatherization program, with a monthly charge per kilowatt or therm of energy they use.[12] Working class families,

7 Community Labor United. "An Industry at the Crossroads: Energy Efficiency Employment in Massachusetts." *Community Labor United.* March 2010. http://massclu.org/sites/clud6.prometheuslabor.com/files/industry_at_the_crossroads.pdf.
8 "An Industry at the Crossroads." Interviews conducted by CLU with weatherization workers and contractors throughout the industry indicated that, in the absence of reliable labor market data, $10 hourly wages with no health or pension benefits is a fair proxy for 'low road' compensation.
9 Bernhardt, Annette, et al. "Broken Laws, Unprotected Workers." *National Employment Law Project. New York: NELP* (2009).
10 60-120% of Massachusetts SMI is $50,515-$101,030 for a family with three and $60,134-$120,269 for a family of four. http://www.mass-resources.org/Income-eligible-child-care-eligibility.html.
11 Arbor Consulting Partners. "Moving Towards Community Driven Energy Efficiency: An Evaluation of Green Justice Coalition's Community Mobilization Initiatives." *Community Labor United.* November 2011. http://massclu.org/sites/clud6.prometheuslabor.com/files/cmi_evaluation_full.pdf.
12 "Energy Efficiency Advisory Council Responsibilities." *Energy Efficiency Advisory Council.* http://www.ma-eeac.org/docs/081118-EEAC-Responsibilities.pdf.

who often live in older and draftier homes, pay more proportionately into this weatherization pool. Yet, Mass Save's co-pay system has not offered anything like a sliding scale. This means that many low- to moderate-income families are paying into a program that they cannot access.

Those at 60-120% of SMI fall into a broader group of customers known as "Hard-to-Reach, Hard-to-Serve" (HTR/HTS). This includes many immigrant communities and communities of color, and some HTR/HTS communities feel they have been historically underserved by the utilities. There are language barriers and also issues of trust. Families with undocumented immigrants frequently avoid official programs, even when they are paying directly into them, like Mass Save. For eligible families who rent, their landlords must agree to have the work done, creating worries that rents could go up as a result.[13] Complicated paperwork to verify income-eligibility is another significant obstacle.

Effectively reaching customers in working class and immigrant communities is one of the greatest challenges for weatherization programs. HTR/HTS is a diverse universe of customers, many of whom are not always plugged into the Internet or other information streams. They may not read or understand weatherization information that utilities slip into their monthly statements. As one organizer put it, *"Most people are not concerned about this little green piece of paper with their bill … They're worried about how much they owe. So the utility companies could have said 'We did the outreach and it didn't work,' but we know there's no way that strategy would be effective marketing."*[14]

Finally, weatherization cannot take place until a home meets certain physical requirements. These can include deactivating old New England "knob-and-tube" wiring, plugging roof leaks and other moisture sources, correcting improper gas dryer venting and ensuring that boilers and furnaces are not emitting high levels of carbon monoxide. Mass Save evaluation contractors identify these "pre-weatherization" barriers, but the homeowner has to correct them. CLU/GJC quickly realized that these up-front renovation costs were a huge barrier to weatherization. Often it only takes a few hundred dollars, but for low- to moderate-income homeowners – or tenants with unenthusiastic landlords – that obstacle can be insurmountable.[15]

## Access to Decision-Making

Massachusetts's weatherization system can be difficult to navigate. Utility companies have administered the state-mandated weatherization program, Mass Save, for over three decades. They, state officials, and other stakeholders who have long been involved in weatherization programs have developed a shared industry language and history that makes it hard for the public to jump in and fully participate. Much of the work goes on informally or in *ad hoc* committees and publicly available data are inadequate for informed participation.

More than once in our energy-efficiency campaign, members of our communities thought that they had figured out the process, only to find that crucial decisions had already been made in discussions we had not been initially invited to or didn't know about.

We found a further challenge at the Department of Public Utilities (DPU), which closely regulates utilities and their state energy efficiency plans. This could be an arena where advocates could best intervene and win changes. However, the DPU operates much like a formal court system. Intervening in its proceedings is an expensive, technical, time-consuming matter. The EEAC proved an avenue to get around some of these barriers. Its regular public meetings and seats for public representatives gave us a place to influence the process.

## Making Equity Part of the Equation

CLU's Green Justice Coalition has played a significant role in highlighting the racial and income disparities of access to both good jobs and energy efficiency programs. We used the EEAC meetings to officially introduce the concept of equity into the debate. We helped focus EEAC members on "Hard to Reach/Hard to Serve" communities and the barriers they faced. Giving those communities a name gave residents a voice in the process.

13 Garcia Soto, Jovanna. Personal interview. September 19, 2012.
14 Cunningham, Hakim, Boston Workers Alliance, Personal interview. September, 2010.
15 Arbor Consulting Partners. "Evaluation of the Green Justice Coalition's Community Mobilization Initiative Chinatown and Chelsea Residential Energy Efficiency Pilots." *Community Labor United.* September 4, 2011. http://massclu.org/sites/clud6.prometheuslabor.com/files/cmi_evaluation_full.pdf.

## *Unity*

There were potential challenges within the Green Justice Coalition that we were determined to address head-on. Historic divisions along race and class lines, plus differences in strategic thinking, could have kept the coalition from doing its best work. Some communities resented past exclusionary practices of labor unions and the lack within some traditional environmental organizations of a focus on racial justice; unions competed for jurisdiction over residential weatherization; environmentalists and labor had not always agreed on key issues.

"Our union membership was probably already about 40% minority and immigrant — reflecting how far we had already come as a union. However, the Chinese community was never really represented in the effort to integrate the industry. With its vulnerable location in the middle of the city, Chinatown had become a battleground for development, pitting community members against the construction industry and trades. I think quite rightfully that the community was disgusted with the whole process."

*— Jim Snow, Former Director of Organizing, Painters & Allied Trades DC35 and current AFL-CIO New England Director*[16]

"Our work around the coal-fired power plant issues had a dynamic of community and environmental leaders versus labor. So [joining the Green Justice Coalition] was part of a deliberate effort to reach out to labor to build bridges and work together towards common goals…In order for us to pay people at a decent wage it will probably result in fewer residences ultimately getting these services [at least initially]. We have to be willing to look past an initial knee-jerk objection to that, and look at why that benefits the whole — how that gets to better work being done with people who are trained and in it for the long haul."

*— Cindy Luppi, Clean Water Action*[17]

16 Snow, Jim. Personal Interview. September 25, 2012.
17 Luppi, Cindy. Personal Interview. September, 2010.

# Energy Efficiency and Equity: Breakthroughs and Innovations

Four years of planning and organizing by CLU/GJC have yielded groundbreaking policy, energy savings, jobs standards, as well as environmental and public health benefits. From better jobs to weatherization access for low- to moderate-income residents, CLU/GJC have won some of the country's most innovative energy efficiency policies.

These policies will measurably improve the health, job prospects, and economic well-being of thousands of low- to moderate-income households. They will also reduce Massachusetts's carbon emissions by over 84,000 tons. Millions of children will breathe more easily because of our impact on public health and the Commonwealth will save money in the process. Taken together, we estimate that the CLU/GJC's reforms could yield as much as $21 million in energy benefits, state savings, wage gains and other social benefits for every million dollars of investment spent on home weatherization over the next three years.

## *Policy Breakthroughs*

We have won nearly every policy recommendation that we proposed four years ago.

✔ **SETTING HIGH BENCHMARKS FOR GREENHOUSE GAS EMISSION REDUCTIONS:** CLU/GJC, along with many allies, advocated strongly for high GHG emissions reduction goals. Our coalition collected postcards, packed EEAC meetings, and added grassroots muscle to environmental advocates' voices. In the end the state agreed to cut GHG emissions due to electricity by 2.5% and by natural gas by 1%, making us first in the nation.[18] CLU/GJC's unique contribution was to spread the benefits of this investment to weatherization workers and communities of color.

✔ **VALIDATING AND SECURING FUNDING FOR THE COMMUNITY MOBILIZATION INITIATIVE (CMI) MODEL**: CLU/GJC's Community Mobilization Initiative model is unique in this country and it could be a game-changer in the age of energy efficiency. Our CMI pilot projects showed that community-based organizations play a key role in improving access to energy efficiency retrofits in moderate-income communities and communities of color; identified the main barriers these communities face; and created strategies for overcoming those obstacles. While the initial rates of completion were lower than expected, our community partners quickly identified solutions that increased completion rates substantially.

In the end, the program generated an impressive $7.90 of direct utility bill savings for every $1 invested by utilities and weatherization participants.[19] Community engagement going forward will be integrated into the utilities' marketing and outreach strategies, with the utilities agreeing to:

- Engage community-based organizations to deliver energy efficiency services to "Hard to Reach/Hard to Serve" neighborhoods;
- Customize community engagement plans based on social demographics;
- Use a "holistic outreach" approach that utilizes municipal officials, community-based organizations, and local businesses;
- Address barriers to participation identified by CLU/GJC's partner organizations;
- Use multilingual outreach strategies; and
- Create performance-based savings goals.[20]

18 Massachusetts Executive Office of Energy and Environmental Affairs. "Patrick-Murray Administration Announces Number One Ranking in Energy Efficiency." *Massachusetts Executive Office of Energy and Environmental Affairs*. October 3, 2012. http://www.mass.gov/eea/pr-2012/121003-ma-number-one.html.

19 The DPU requires the utilities to assess the effectiveness of energy efficiency programs based on a ratio of "benefits" – financial savings to consumers – to "costs," which are a total of all costs to both the utilities and the consumer, called the Total Resource Cost (TRC). Our estimates vary from the TRC, in that they do not include overhead costs, such as training, administration and research, nor do they include numerous ancillary benefits, such as reduced grid capacity and water conservation. We therefore refer to our calculations as a crude benefit-cost ratio, to distinguish it clearly from the TRC methodology, as well from our societal benefit-cost ratio, which includes health and wage-related economic benefits. Additionally, because we did not calculate energy inflation over the lifetime of the retrofits, these estimates may be low.

20 "2013-2015 Massachusetts Joint Statewide Three-Year Electric and Gas Energy Efficiency Plan," p 146.

✔ **FUNDING FOR PRE-WEATHERIZATION COSTS:** As a result of the HTR/HTS charrette that CLU/GJC initiated, pre-weatherization subsidies will be funded in the next three-year plan. We estimate that this could improve weatherization completion rates by over 5.3%, and over 2,000 participants could use this funding over the next three years.

Over the next three years pre-weatherization subsidies will allow nearly ***300*** additional homes to complete the weatherization process who would otherwise have given up.

✔ **TIERED REBATES, PRE-WEATHERIZATION FUNDING AND GEO-TARGETING:** To accelerate delivery of energy efficiency programs to low- to moderate-income areas of the state, the utilities have combined many of our policy recommendations under a new Mass Save residential program called Efficient Neighborhoods+ (EN+). According to the utilities' 3-year plan, this may include targeted census tracts that are lower income based on State Median Income and greater than 70% concentration of 1-4 unit buildings.[21] These designated neighborhoods will benefit from outreach methods developed by CLU/GJC and their partners, pay lower co-pays, and gain access to pre-weatherization funds without having to provide individual income documentation.

***1.2 million*** Massachusetts households will potentially be eligible to access energy efficiency measures through EN+

Based on census tract analysis, 1.2 million Massachusetts households will potentially be eligible to access energy efficiency measures through EN+.[22] CLU/GJC is strongly recommending that Mass Save devote 25% of its marketing budget to community initiatives, which could fund the equivalent of fifteen Community Mobilization Initiatives per year. At this rate, EN+ could weatherize more than 2,200 homes over the next three years.

This model is cost effective. Using a different methodology, the utilities project residential benefit-cost ratios of 1.58 for gas customers and 2.97 for electric users for the next three years. We project that EN+ could have a combined benefit-cost ratio of 7.5, even before taking into account indirect economic benefits. In other words, for every $1 of total cost, there could be $7.50 in energy-related benefits.

We estimate that the EN+ program will save participants a collective $59.2 million over the 20-year lifetime of the weatherization retrofits (see Chart C). Because lower-income households spend proportionally more of their available income, much of the money saved on energy bills will be injected back into the local economy, creating additional jobs and revenue (see "Job Creation" below).

✔ **TRANSPARENCY:** CLU/GJC has transformed the energy efficiency conversation in Massachusetts. Just a few years ago, public discussion was confined to a legal and procedural approach – and real discussion happened behind closed doors. Now there is open discussion that includes community voices. We have brought hundreds of regular ratepayers into technical meetings, uncovered and decoded the bureaucratic process, and increased accountability in spending energy efficiency dollars.

✔ **DATA COLLECTION:** CLU/GJC have made significant progress toward the energy efficiency program database that advocates and policy makers are asking for, with a recent DPU ruling that requires the utilities to reach consensus with CLU's Green Justice Coalition and submit a plan to the EEAC. This year, the EEAC has prioritized transparency, consistency and centralization of data under DOER, and DOER has secured funding to design a database.

21 "2013-2015 Massachusetts Joint Statewide Three-Year Electric and Gas Energy Efficiency Plan," p 146.
22 US Census Bureau. "Units in Structure" and "Income for Last 12 Months" (2007-2011 American Community Survey 5-Year Estimates). *American Fact Finder*. 2011. www.factfinder2.census.gov. Percent of SMI calculated based on 4-person family median income of $100,058.

✔ **ENERGY EFFICIENCY EQUITY:** One of our greatest achievements has been making the concept of equity central to energy efficiency policy in the Commonwealth. Our state's communities of color and working class families went from being complete outsiders to being de facto players in the process, and our voices have made the process both more complex and more successful for everyone. The thread of equity is woven throughout all of the progress we have seen; some concrete gains not listed above include:

- ***Overcoming barriers to participation***: Pre-weatherization subsidies, community outreach methods, and multilingual outreach will allow thousands of low- to moderate-income families to weatherize their homes. The use of geo-targeting in designated Efficient Neighborhoods+ will replace the cumbersome paperwork previously required for middle-income customers to verify eligibility for programs.
- ***Improved access to jobs:*** Background checks on job applicants often turn up criminal records that disqualify applicants from employment. CLU/GJC successfully worked with NSTAR to create a process by which any contractor who has an employee who had an offense as a minor can ask for an exception, which NSTAR will review. This can open the door for individuals seeking to turn their lives around.

## *Economic Breakthroughs*

The cost-effectiveness of energy efficiency initiatives is usually calculated using a ratio of direct costs to the value of energy saved. State utilities estimate that for every $1.00 spent on energy efficiency in the next three years, the Commonwealth will reap $3.00 in savings.[23] While this ratio is impressive, it omits the full range of economic benefits that equitable energy efficiency policies can bring. Below are just some of the economic gains we will make from serving the "Hard to Reach" and prioritizing fair treatment of weatherization workers (see Chart E).

✔ **JOB CREATION:** We estimate that the EN+ program could weatherize at least 2,273 homes in the next three years – homes that would have been passed over without CLU/GJC's coalition work. The utility companies estimate that every field worker can complete 35 homes per year, on average, meaning that the equivalent of at least 22 field workers per year will work on EN+-funded projects.

Additionally, weatherization workers will receive increases due to the agreements we negotiated (see "Job Standards and Wage Gains" below). Every new job and wage increase in turn yields additional indirect and induced jobs. One study found that each additional $127,000 of economic activity creates one full-time payroll job.[24] The estimated $7.6 million spent by higher-paid weatherization workers will therefore create 60 jobs per year[25] that will in turn pay out $2.5 million in wages over the next three years, furthering the economic benefits.[26] Likewise, money saved by EN+ participants on their utility bills will inject $10.5 million into the economy over the 20-year life of the retrofits, create 4 full-time jobs annually, and add $3.5 million to the pockets of Massachusetts workers. All together, high-road jobs and utility bill savings could add as much as $97.4 million to the pockets of low-wage workers, adding the equivalent of up to 261 job years to the Massachusetts economy, likely in communities that need them most.

✔ **JOB STANDARDS AND WAGE GAINS:** The job standards won in the new three-year plan are an economic victory for Massachusetts's weatherization workers. Many of them have been living in poverty and this "low-road" industry has been a drain on state resources. CLU/GJC's direct negotiations with the utilities resulted in strong jobs standards. NSTAR and National Grid, the state's two largest utility companies, now have responsible contracting provisions in

23 "2013-2015 Massachusetts Joint Statewide Three-Year Electric and Gas Energy Efficiency Plan."

24 Using minimum wage multiplier of .53, which represents53 cents of every dollar earned by low-income workers that is immediately reinjected into the economy. Gable, Mary. "A Massachusetts minimum-wage increase would help working families and generate jobs." *Economic Policy Institute*. August 21, 2012. http://www.epi.org/publication/ib340-massachusetts-minimum-wage-increase/.

25 60 FTE jobs per year, or 60 job year per year, 120 job years over the course of the 2013-2015 3-year plan.

26 Jobs and wages estimated using a minimum wage multiplier effect of .53 (53 cents of every dollar of a low-income wage earner is injected back into the economy) http://www.epi.org/publication/ib340-massachusetts-minimum-wage-increase/#_note8 and median wage for Massachusetts http://www.bls.gov/oes/current/oes_ma.htm

the participation agreements that govern all of their work through Mass Save. These agreements cover their lead vendor, Conservation Services Group, and all subcontractors. These provisions:

- Require that all contractors disclose any past history of violations – wage & hour laws, health & safety laws, labor law, etc. – and require them to sign an agreement stating that they are in compliance with all federal and state wage and benefit laws and regulations, as well as in compliance with federal and state workplace health and safety laws and regulations.
- Disqualify contractors who use discriminatory business practices and require notification to contractors that they are expected to follow the law.
- Obligate the utilities to send inspectors out to look for health and safety violations on the job.
- Recommend that the utilities also inspect working conditions during regular quality control inspections.
- Direct the utilities to work with CLU/GJC to eliminate contractors who misclassify workers as independent contractors.
- Require Building Performance Institute certification for contractors, which ensures contractors meet high industry standards.
- Pay contractors to send more workers to trainings.
- Prevent contractors from arbitrarily firing or not hiring a worker for having a criminal record and instead require them to look for a correlation between the offense and the nature of the work.

Enforcement mechanisms are strong. If contractors lie about past violations, their contracts will be terminated. If CLU/GJC finds contractors who are in violation, the matter can be taken directly to NSTAR or the lead vendor. CLU/GJC wrote the initial draft recommendations and worked directly with NSTAR to get this same language into all contracts.

Mass Save's lead vendor, Conservation Services Group, also signed a Responsible Contractor agreement with CLU/GJC. Two large weatherization contractors, The Aulson Company and InsulPro, signed similar responsible employer agreements. Next Step Living, the primary weatherization contractor for the City of Boston's Renew Boston program, has also signed a Memorandum of Understanding pledging to subcontract 25% of all work to union contractors who hire locally in the city of Boston through our coalition. Under this agreement, Next Step Living's hourly wage and benefit package rose to a weighted average of $23.82 per hour, up from $16.43, meaning the average worker saw a wage hike of $7.39 per hour – an increase of 45%. This means the 26 employees of Next Step Living and its subcontractors saw their total wages rise $391,966 upon signing of this agreement.[27]

The utilities estimate that every million dollars in residential incentives (i.e. rebates) sustains 12 full-time jobs in the field. Overall, that means there will be as many as 2,010 weatherization workers employed through Mass Save each year over the next three years. Based on the current proportion of work done by Next Step Living subcontractors, we estimate that at least 75 workers will be working for NSL, and will therefore be paid at least the prevailing wage of $22/hour in wages and benefits.[28]

Misclassification and wage theft are rampant in the construction industry and are two of the biggest sources of underpayment in the industry. Our agreements forbid contractors from misclassifying their employees as independent contractors and prevent wage theft by requiring contractors to pay workers for the work they perform. While there are no hard numbers on how many workers in the weatherization industry may have been misclassified before these CLU/GJC-initiated agreements went into effect, nearly half of all Massachusetts construction workers are misclassified each year.[29]Misclassification costs the average misclassified worker

27 Our agreements specify that contractors must pay the Davis-Bacon prevailing wage of $22 per hour.

28 Estimate based on conservative estimated increases to Renew Boston program and expansion in NSL's market reach. We have broken out the employees of Next Step Living (NSL) separately, because they are the only current signatory to CLU's prevailing wage agreement, and are likely to take on a significant portion of EN+ CMI jobs via the City of Boston's "Renew Boston" energy efficiency program and other planned expansion

29 "2013-2015 Massachusetts Joint Statewide Three-Year Electric and Gas Energy Efficiency Plan."

almost 15% of his annual wages, including the extra payroll taxes that he pays.[30] We estimate $10.8 million in increased wages due to correct classification of weatherization workers over three years.

Wage theft, in the form of off-the-clock work, impacts an estimated 72.2% of residential construction workers, and can cost those affected an average of 1 hour of pay each week.[31] Likewise, employers illegally withhold "time-and-a-half" overtime pay for 70.5% of residential construction workers, who work over 40 hours in a week. This deprives workers of an average of 11 hours of an extra half of their hourly wage. We estimate our agreements will put $4.7 million in overtime pay each year back into workers' wallets. Overall, the gains we have made will ensure an estimated $14.3 million in collective wage gains for weatherization workers each year.

✔ **ECONOMIC BENEFITS TO THE COMMONWEALTH:** Ultimately, low-wage jobs force taxpayers to foot the bill for a range of state and federal social support services. For instance, a weatherization worker who earns $10 an hour, or $20,800 per year, is barely earning above the federal poverty level, and qualifies for a broad of public benefits. We estimate that subsidies for the earned income tax credit, childcare, section 8 housing, Medicaid, SNAP (food stamps) and — ironically — fuel assistance would have cost the general public nearly $90 million over the next three years without our job standards improvements. That places the savings to taxpayers from CLU/GJC-negotiated wage increases for weatherization workers at nearly $16.2 million. (See Chart D.)

Massachusetts could gain ***$40 million*** in revenue due to CLU/GJC's economic gains and jobs standards improvements.

When employers misclassify workers or steal their wages, they are often cheating the state as well, meaning that taxes and fees go unpaid. Misclassification in the construction industry costs the state millions of dollars per year in unpaid unemployment insurance contributions, lost income tax revenues, and workers' compensation premiums each year.[32] As we discuss above under "job creation," workers will turn around and spend much of these wages that will now go into their pockets, which generates sales tax revenue for the state. Altogether, improved standards won by CLU/GJC that prevent misclassification could inject public coffers with as much as $16.1 million in additional revenue, including tax, income tax, workers' compensation and unemployment payments. (See Chart E.)

Meanwhile, the jobs created indirectly from the increased wages of weatherization workers and increased household income by EN+ participants will add hundreds of thousands of dollars in state income tax revenue, and EN+ participant spending will also generate additional sales tax revenues. Overall, we estimate that the revenue increases, savings on public benefits and wages and revenue from indirect job creation that come as a result of our efforts could contribute more than $44.4 million to the Massachusetts economy over the lifetime of the EN+ weatherization retrofits.

30 Carré F and Wilson R. *The Social and Economic Costs of Employee Misclassification in Construction*. Center for Social Policy, McCormack Graduate School of Policy Studies, University of Massachusetts Boston, 2004. http://www.lecet.org/legislative/misclassification%20report.pdf Chaliffe, Deborah. "Backgrounder: Worker Misclassification Cheats Everyone." Change to Win. http://www.nelp.org/page/-/UI/UI%2520Conference/Chalife.Misclassification%2520Backgrounder%2520.pdf&sa=U&ei=sKR2UdXAELao4AOFqoDwBg&ved=0CBwQFjAB&sig2=fvLfvdObVyrs8Azo05LE_Q&usg=AFQjCNHyQ-0nPCmIvMM1t8H03a5Cp41Gyw

31 Bernhardt A, et al. "Broken Laws, Unprotected Workers." *National Employment Law Project. New York: NELP*, 2009. http://www.nelp.org/page/-/brokenlaws/BrokenLawsReport2009.pdf?nocdn=1

32 Commonwealth of Massachusetts Joint Task Force on the Underground Economy and Employee Misclassification. *Annual Report 2009*. Executive Office of Labor and Workforce Development, June 2009.

# Projected health gains

For working-class and environmental justice communities, the health impacts of our fossil-fuel-driven economy can be a matter of life and death. Our victories have the possibility to bring public health improvements to both weatherization workers and working class communities in Massachusetts. And because the impacts of clean air and greenhouse gas reductions are bigger than any one household or community, these are only some of the health-related gains that might be realized as a result of our efforts.

We start by focusing on the impacts of asthma at work and home, due to its prevalence, preventability and the large amount of research related to its causes and remediation. However, asthma is just one of the many diseases caused by workplace hazards and the fossil fuel-driven economy, and the remediation measures suggested here may well alleviate a much broader array of ailments. (See Charts F-1 and F-2.)

✔ **THE ECONOMIC BENEFITS OF ASTHMA REDUCTIONS DUE TO RESIDENTIAL WEATHERIZATION:** Because Americans spend an estimated 67% of their time in their homes[33] a home's indoor air quality has a big impact on health. Indoor air pollutants have been ranked among the top five environmental risks to public health. They can be 100 times more concentrated than pollutants outdoors.[34] Indoor air quality in the home has been linked to a variety of diseases and dangers including asthma, cancer and carbon monoxide poisoning.[35] Asthma in particular is strongly correlated with poverty and poor housing stock. Chronic exposure to allergens unique to the home environment – ranging from mold and moisture to cockroach and mouse allergens – can both cause asthma and trigger attacks.[36]

Children are particularly vulnerable to developing the disease; the 2009 hospitalization rate for children under age five in Roxbury was approximately 79% higher than the overall Boston rate. Throughout the city, Black and Hispanic children under the age of five had consistently higher rates of hospitalization than the city average. Studies show that weatherization can help prevent or mitigate asthma. Air sealing can keep out mice and cockroaches,[37] while other weatherization techniques prevent new moisture penetration and improve household ventilation.

People with asthma – particularly in lower income populations like those who might use EN+ – can sometimes have attacks that require an emergency room visit or even hospitalization. It turns out, however, that because the home environment has such an impact on asthma symptoms, weatherization can reduce hospital usage. One study conducted in Ohio found that remediation similar to pre-weatherization (mold and moisture remediation, venting of dryers, etc.) reduced emergency room visits by about two-thirds.[38] A New Zealand study found that weatherization and pre-weatherization activities reduced hospital visits among the elderly for respiratory illness by 10% and reduced workers' days off by 10% as well.

By targeting households at 60-120% of State Median Income for weatherization services, Massachusetts can make inroads in lowering the prevalence and severity of asthma in the state. Based on census tract data and figures from the Department of Public Health, an estimated 9.6% of the state population has asthma. However, while the EN+-eligible population is only 19% of the total population, it includes as many as two-thirds of those with current asthma in Massachusetts. Taking an average of the two studies, we can roughly estimate a

33 Though we focus on the impacts of asthma at work and home, it is just one of the many diseases caused by workplace hazards and the fossil fuel-driven economy, and the remediation measures suggested here may well alleviate a much broader array of ailments.
34 Klepeis NE, et al. "The National Human Activity Pattern Survey (NHAPS): a resource for assessing exposure to environmental pollutants." Journal of Exposure Analysis and Environmental Epidemiology. 11.3: 231-252, 2001.
35 United States Environmental Protection Agency. "Questions About Your Community: Indoor Air." Region 1: EPA New England. http:// www.epa.gov/region1/communities/indoorair.html
36 Jacobs DE, et al. "Linking public health, housing, and indoor environmental policy: successes and challenges at local and federal agencies in the United States." Environmental Health Perspectives. 115.6: 976, 2007.
37 "Burden of Asthma in Massachusetts."
38 Breysse P, et al. "The relationship between housing and health: children at risk." Environmental Health Perspectives. 112.15: 1583, 2004.

conservative 38% reduction in asthma-related health services usage, which means that EN+ retrofits will keep 461 people out of the hospital over the lifetime of the 2013-2015 retrofits.[39]

Asthma care is not cheap. In Massachusetts, charges for acute care hospital use for asthma totaled over $136 million in 2006, and public insurance was the primary source of payment for 63% of those visits.[40] We estimate that together, these reductions in hospital visits for asthma care could save Massachusetts $1.3 million in lifetime benefits. However, this estimate is low, because we still do not know the full extent that indoor air quality and temperature account for health service usage. For instance, while we could not find numbers broken out for hospitalization of the elderly due to cold homes, there are numerous studies that point to this population as extremely vulnerable to health problems when the heat is turned down.

✔ **THE ECONOMIC BENEFITS OF UTILITY BILL-RELATED SAVINGS:** Energy costs are so high in the Northeast that some middle-income households are forced to turn down the heat to the point that it can be dangerous to their health. Other families face the cruel choice of buying groceries or keeping the heat on.

Not surprisingly, cold weather brings an increase in deaths, particularly for elderly residents of homes that have not been weatherized. Rather than a dramatic "freezing to death," strokes and heart attacks result from changes in blood pressure or infections stemming from cold-related suppression of the immune system. Chronically cold houses are also associated with increased risk of influenza, pneumonia, asthma, arthritis, and accidents in the home. The health effects of living in chronically cold houses are cumulative over time, and they become progressively more difficult to treat as people age.[41]

Very young children are especially vulnerable to cold. Living in a cold home has a significant impact on children's respiratory health, and negatively affects both infant weight gain and resistance to illness. Children who live 3 years or longer in homes that lack affordable warmth are two to three times as likely to have respiratory ailments as children who do not. Children of these families more often find themselves in need of acute hospitalization in the winter.[42]

Infants living in cooler homes require more calories than average in order to both keep warm and grow at a normal rate. However, children of lower income families have lower caloric intake during the winter months than higher income families– as much as 200 fewer calories per day, on average.[43] The effects of childhood malnutrition can be severe and persistent, including increased susceptibility to disease, and delayed mental development, poor school performance, and diminished earnings in adulthood.[44]

Bill savings from weatherization make it more likely that the household will turn up the thermostat back up, and can save lives in the process. A weatherized home protects the health of young children, both directly – through maintaining a higher interior temperature – and indirectly – through money saved that can be spent on food and medications. We know that reducing energy costs can improve nutrition, because infants from low-income families who received a winter fuel subsidy had significantly higher weight-for-age and lower risk for growth impeded by nutritional deprivation than did those from homes without a fuel subsidy. They also had lower odds of using the emergency room and were rated by caregivers as being in better health and of more advanced developmental status. We can infer that a family with reduced utility bills, much like a subsidy, will be more likely to spend the extra cash on groceries.[45] Similarly, one British study estimated that heating and insulation improvements were associated with an average increase of 10 days to the life expectancy of older men and 7 days to the life of older women; extrapolated to the households that the utilities propose to serve over the next three years, dozens of life years could be saved.[46]

39 Chapman, Ralph, et al. "Retrofitting houses with insulation: a cost–benefit analysis of a randomized community trial." *Journal of Epidemiology and Community Health* 63.4 (2009): 271-277.
40 "Burden of Asthma in Massachusetts." Figures for 2006 are the most recent available. Therefore, our numbers are probably low, because we did not adjust for health care inflation or the estimated increase in asthma prevalence.
41 Liddell C and Morris C. "Fuel poverty and human health: a review of recent evidence." *Energy Policy*. 38.6: 2987-2997, 2010.
42 Frank, Deborah A., et al. "Heat or eat: the Low Income Home Energy Assistance Program and nutritional and health risks among children less than 3 years of age." *Pediatrics*. 118.5: e1293-e1302, 2006.
43 Snyder, Lynne Page, and Christopher A. Baker. "Affordable Home Energy and Health: Making the Connections." AARP Public Policy Institute. June, 2010.
44 Frank, "Heat or Eat."
45 Frank, "Heat or Eat."
46 Liddell, "Fuel Poverty."

While we know that warmer homes save lives and keep down health care costs in general, we do not yet have the data that show exact dollars saved when a home is weatherized here in the United States. We hope that research in this area continues, as it is critical to the intersection of public health and energy efficiency.

✔ **THE ECONOMIC BENEFITS OF WORKPLACE HEALTH AND SAFETY PROTECTIONS:** Residential construction is one of the most dangerous occupations in the United States, and the materials used to insulate buildings – sprays, foams, and fine particles – create special hazards for weatherization workers. "As the foam is sprayed, small droplets of foam end up in the air," reported one weatherization worker. "This stuff gets in your hair, in your skin, and on your clothes."[47] Both airborne and skin exposure can potentially trigger asthma symptoms, and workers may be exposed both during and after application.[48] Work-related asthma can have deep economic effects for families, employers, and the state. Individuals with occupational asthma report unemployment rates as high as 25% and reductions in income following their diagnosis.[49] As for the state, unscrupulous employers often do not pay into the workers' compensation fund when their employees are injured but encourage them to use private or public health coverage instead.[50] [51] Those employers can file a claim under the state's workers' compensation insurance trust fund, driving up rates for law-abiding employers in the process.[52]

Proper protective equipment could help avoid the equivalent of nearly ***1,000*** lost days of work.

Avoiding workplace injuries and illnesses can cut these public and private health insurance costs. Health and safety training can cut those costs still further. CLU/GJC won ten hours of safety training for all weatherization workers in its agreement with Mass Save's lead vendor, Conservation Services Group (CSG). The agreement covers weatherization contractors and subcontractors as well. Its enforcement mechanisms far exceed the oversight to which most residential construction is subject. The agreement will not only protect weatherization workers; it could set the stage for stronger health and safety measures throughout residential construction.

How effective is health and safety training? A study of the workers' compensation claims submitted by the North Carolina Homebuilders Association and their subcontractors determined a rate of 24.3 injuries for residential insulation workers per 200,000 hours worked, or 96 FTEs.[53] An equivalent rate for the weatherization workers in Massachusetts covered by our agreements would be an injury rate of 509 per year. A study of union laborers found that those who received health and safety training were 12% less likely to file a workman's compensation claim over a two-year period.[54] Applying this to our pool of 2,010 estimated residential weatherization workers, and using an estimate of $42,000 average per construction workplace injury or death in direct and indirect costs,[55] we estimate that our health and safety training requirements could save the Commonwealth $7.7 million over the next 3 years in reduced injury and death. Public health insurance funds and the Department of Industrial Accidents' Uninsured Employers Trust Fund, which covers workplace accidents when employers have not paid into the workers' compensation system, will realize the bulk of these savings.

Proper protective equipment can cut additional medical costs. A Boston Public Health Commission study of auto body shops – where hazards and conditions resemble those on

47 Nicholson PJ, et al. "Evidence based guidelines for the prevention, identification, and management of occupational asthma." *Occupational and Environmental Medicine*. 62.5 (2005): 290-299.
48 Bello D, et al. "Skin Exposure to Isocyanates: Reasons for Concern." *Environmental Health Perspectives*. 115.3: 328, 2007.
49 Massachusetts Department of Public Health Asthma Prevention and Control Program. "Burden of Asthma in Massachusetts." *Massachusetts Department of Public Health*. April 2009. http://www.mass.gov/eohhs/docs/dph/com-health/asthma/state-plan.pdf.
50 Lowery EP, et al. "Quality of life of adults with workplace exacerbation of asthma." *Quality of Life Research*. 16.10: 1605-1613, 2007.
51 Galizzi M. "On the Recurrence of Occupational Injuries and Workers' Compensation Claims." *Health Economics*. 2012.
52 Commonwealth of Massachusetts Joint Task Force on the Underground Economy and Employee Misclassification. "2011 Annual Report." *Executive Office of Labor and Workforce Development*. 2011. http://www.mass.gov/lwd/eolwd/jtf/.
53 Dement, John M. "Workers' compensation experience of North Carolina residential construction workers, 1986-1994." *Applied Occupational and Environmental Hygiene*. 14.2: 97-106, 1999.
54 Dong, Xiuwen, et al. "Effects of safety and health training on work-related injury among construction laborers." *Journal of Occupational and Environmental Medicine* 46.12 (2004): 1222-1228.
55 Kriebal, David, et al. "Lessons Learned Solutions for Workplace Safety and Health." *Lowell Center for Sustainable Production, University of Massachusetts Lowell*. January 2011.

weatherization worksites – found that health and safety training increased workers' use of adequate respirators by 12-14%.[56] For the 66 workers currently covered by our agreements that we estimate have occupational asthma, health and safety standards and training could eliminate many instances of health services usage each year, ranging from doctor visits to hospitalization, as well as 796 lost days of work and an average of 0.9 hours of work lost each day due to working while ill ("presenteeism").[57] [58] We estimate that this could save over $100,000 in reduced asthma treatment over three years and prevent the equivalent of nearly 1,000 lost days of work over the course of the 2013-2015 plan.

✔ **THE ECONOMIC POTENTIAL OF MITIGATING GHG EMISSIONS:** The best way to calculate the cost of damages related to climate change per ton of carbon emissions is a matter of intense global debate. A range of useful – if imperfect – proxies for estimating "social cost of carbon" has been developed by the EPA Interagency Working Group. This measurement takes into account avoided future costs to agriculture, environmental damage and human health, among other considerations. We used the midpoint of the values identified in the paper, $20.28 per ton of carbon.[59] Applying that number to the nearly 85,000 tons of carbon EN+ could save the Commonwealth gives us an estimated lifetime economic benefit of $1.7 million.

CLU efforts over the next three years account for an estimated lifetime reduction of ***84,070 tons*** of carbon emissions. The estimated economic benefit is over ***$1.7 million***.

There may be other health benefits to reducing our carbon emissions. For instance, neighborhoods near fossil fuel power plants experience worse health effects from any emitted pollutants. Not surprisingly, these communities are often low-income communities of color that already suffer a higher burden of disease. By weatherizing homes and thus cutting total power plant emissions we can reduce air pollution and improve the health of these neighborhoods.

Massachusetts utility companies estimate that greenhouse gas reduction achieved by the next three-year energy efficiency plan will be equivalent to taking approximately 398,700 cars off the road or eliminating the output of a 460 MW power plant for one year, or 25,632,813 tons of carbon.[60] We estimate that CLU/GJC efforts over the next three years could account for a lifetime reduction of 84,070 tons altogether.[61]

These are impressive figures and CLU/GJC joined a larger set of advocates to set them. We are proud to have helped push for the higher efficiency standards that made this goal a requirement, and proud to have contributed meaningful policy solutions to help achieve those goals. Ultimately, our impact will not stand out from anyone else's but we will feel it in lives saved and local economies that thrive.

56 Shoemaker PA, et al. "The Boston Safe Shops Project—Preliminary Findings of a Case Study in Applying the 10 Essential Services of Public Health to Building Environmental Health Capacity." *Journal of Environmental Health–Denver*. 70.1:22, 2007.

57 "Burden of Asthma in Massachusetts." Based on an estimated prevalence among painters of 3.3%, the closest category of worker identified, and an estimated 9.5% of those with work related asthma who visited the ED at least once in the last 12 months.

58 Goetzel, Ron Z., et al. "Health, absence, disability, and presenteeism cost estimates of certain physical and mental health conditions affecting US employers." *Journal of Occupational and Environmental Medicine* 46.4 (2004): 398-412.

59 Aubuchon Craig and Hibbard Paul. "Summary of Quantifiable Benefits and Costs Related to Select Targeted Infrastructure Replacement Programs." Analysis Group, Inc. January, 2013. http://www.analysisgroup.com/uploadedFiles/Publishing/Articles/Benefits_Costs_TIRF_Jan2013.pdf

60 "2013-2015 Massachusetts Joint Statewide Three-Year Electric and Gas Energy Efficiency Plan."

61 Using estimates of 223 therms and 798 kwhs saved per house. Mendyk A, et al. "Wisconsin Weatherization Assistance - Evaluation of Program Savings Fiscal Years 2007-2009." June 2001. http://homeenergyplus.wi.gov/docview.asp?docid=22311Converted to tons of carbon at United States Environmental Protection Agency. "Greenhouse Gas Equivalencies Calculator." Environmental Protection Agency Clean Energy Programs. http://www.epa.gov/cleanenergy/energy-resources/calculator.html#results

# Overall Cost-Effectiveness

At the core of our energy efficiency work is the need to reassess not just how much energy we are saving, but who is benefiting from those savings. To fully understand the benefits of creating energy efficiency equity in Massachusetts, we need to be able to quantify the full range of benefits to all of our residents.

The utility companies' Total Resource Cost analysis estimates that each dollar spent on home energy efficiency will yield as much as three dollars in savings in heating and cooling. We estimate that the programs created by CLU's Green Justice Coalition and the utilities will yield greater savings on those measures alone. However, that figure does not include societal benefits from increased access to energy efficiency programs and improved jobs standards -- benefits such as health benefits, wage increases and revenue accrued to at the state and federal level. We strongly encourage the DPU to create a societal benefit-cost ratio that can be used alongside the current one, which can be used to calculate the much broader savings of all energy efficiency programs.

Using our preliminary Societal Benefit Cost analysis, we calculate the three-year benefits at $13.30 for every dollar spent on the programs that CLU/GJC helped create. If we look at health gains over 20 years — the same period used to calculate "lifetime" energy savings from weatherization — the programs CLU/GJC helped create could save $10.7 million in health care costs. Altogether, we estimate all of our initiatives will create lifetime societal benefits of $21.00 for every dollar invested.

**Total Estimated Societal Economic Benefits From GJC Breakthroughs and Innovations**

| | | | |
|---|---|---|---|
| Total Estimated Financial Cost to Consumers and Utilities | | $7,866,203 | |
| | | 2013-2015 | LIFETIME |
| COMMUNITY BENEFITS | Total Estimated Economic Savings to Consumers from EN+ Residential Weatherization and Pre-Wx Benefits | $5,923,044 | $59,230,440 |
| | Total Estimated Health Savings due to Residential Retrofits | $129,003 | $2,994,970 |
| WORKER BENEFITS | Total Estimated Wage Increases for Weatherization Workers | $42,889,707 | $42,889,707 |
| | Total Estimated Societal Wage Increases from Weatherization Worker Spending | $7,646,963 | $7,646,963 |
| | Total Estimated Worker Health and Safety Savings | $7,788,599 | $7,788,599 |
| | Total Estimated Societal Wage Increases via Jobs Created by Spending from EN+ Customer Bill Savings | $176,007 | $3,520,137 |
| GOVERNMENT BENEFITS | Total Annual Avoided Public Benefits Costs | $16,188,976 | $16,188,976 |
| | Total Estimated Additional State & Federal Tax Revenue from Societal Wage Increases via Jobs Created by Spending from EN+ Customer Bill Savings | $26,659 | $533,189 |
| | Total Estimated Additional State & Federal Tax Revenue from Wx Workers & Societal Wage Increases from their Spending | $24,179,148 | $24,179,148 |
| Total Estimated Economic Benefits to Massachusetts | | $104,948,107 | $164,972,130 |
| Total Societal Benefit-Cost Ratio | | 13.3 | 21.0 |
| Total Additional GHG Reductions (in tons) | | | 84,070 |
| Total Job Years Created | | | 261 |

# How CLU/GJC Succeeded

Earlier in this report we described the multiple challenges in reforming Massachusetts's complicated energy efficiency program. CLU needed a strong game plan to address these challenges. Because the world of energy policy can move so slowly, the coalition would need to endure and be able to evolve in order to see results. Rather than calling on allies to endorse a campaign plan developed entirely by staff, CLU took on the more challenging task of building consensus and developing long-term bonds among our member organizations.

## *Building a Strong Coalition*

The Steering Committee, the official decision-making body of the Green Justice Coalition (GJC), is composed of community organizations, labor unions, and environmental groups organizing in working-class communities. Steering Committee partners must be membership-based organizations, committed to taking a leadership role and actively engaging their staff and members in the campaign. One Steering Committee member observed: *"[This is] different from some traditional coalitions where there is no base, or others that are just a turn-out engine."*[62]

From the beginning, CLU worked hard to use each organization's strong points to complement the work of the whole. CLU is the convener and driver of the Green Justice Coalition—facilitating campaign meetings, conducting strategic research to inform recommendations, mapping out strategies and tactics, handling internal and external communications, and monitoring benchmarks and goals. Environmental and consumer advocates, such as Mass Energy and Clean Water Action, contribute technical knowledge and credibility on global warming, power plants and energy policy. They were closely involved in the effort to pass the state's historic climate legislation in 2008, and they bring long-standing connections to other advocacy and service organizations, knowledge of the players and connections with key government officials.

The trade unions bring their own technical knowledge and political connections. The Painters and Carpenters unions understand the building trades and weatherization work and have the capacity to train workers for weatherization jobs. Trade union leaders in GJC also have valuable connections to key policy makers, especially in the Massachusetts legislature. Meanwhile workers' centers, like those run by the Chelsea Collaborative and Chinese Progressive Association, can tell the compelling stories of low-wage, immigrant workers.

Community-based organizations are well known and trusted in the neighborhoods that they represent. Their work ranges from organizing for safe, affordable housing, to job access and education, often offering services in native languages to immigrant families. They know their constituents well, providing invaluable and credible expertise on the needs of their communities.

From the beginning, CLU staff held individual meetings with member organization leaders to surface hopes and concerns and to work on solutions. As Mark Liu of the Chinese Progressive Association puts it, *"Because CLU had worked one-on-one with each group, the people there really wanted to be there, were there for the right reasons. The level of commitment was already there, people came ready to work."*[63]

CLU also strengthened relationships between GJC members by gradually and deliberately surfacing issues that could have torn the Coalition apart, such as "jobs vs environment" and long-standing tensions between building trades unions and communities of color.

62 Taylor, Madeleine and Fried, Mindy. "Rapid Assessment of the Green Justice Coalition: Summary of Findings." *Arbor Consulting Partners*. March 13, 2012.
63 Liu, Mark. Personal interview. September 25, 2012.

CLU's partners within the Green Justice Coalition consult their own memberships before making decisions. This helps us identify real-world challenges – and realistic solutions. Our member organizations went out to talk to their membership bases, and immediately found pervasive barriers to both home weatherization and good jobs in the industry. This allowed us to put together a unique set of policy recommendations:

1. **HIGH-ROAD JOBS:** Green jobs should be good jobs, with family-sustaining wages, benefits, safe working conditions, and opportunities for career advancement. Jobs standards can reduce workplace abuse and discrimination.
2. **COMMUNITY ACCESS TO GOOD JOBS:** Weatherization funding has the power to create green careers in working class neighborhoods – the very same communities that energy efficiency programs most need to reach. We therefore must reduce unnecessary barriers to employment.
3. **GREENHOUSE GAS EMISSIONS REDUCTION:** Properly implemented energy efficiency measures can reduce GHG emissions, and slow down global climate change. Climate change impacts all of us, but the impacts may well be more severe in under-resourced communities.
4. **COMMUNITY ACCESS TO ENERGY EFFICIENCY RESOURCES:** Every Massachusetts resident who uses public utility services pays into a statewide energy efficiency fund. Yet, due to the barriers to participation identified by our partners, the communities CLU/GJC represent have not been able to access those funds at the same rates as wealthier homeowners.

## *Key Strategies*

The coalition created a multi-pronged approach that engaged key stakeholders and changed the dialogue on equity, green jobs and climate change. Our members' wide-ranging strengths allowed us to use a wide variety of strategies. Below are key ways we approached our work:

✔ **GETTING ALLIES ON THE INSIDE**: Our members' connections with key legislators, administration officials, and other policy players were instrumental to our policy work. For instance, these connections helped to get a long-time ally, Penn Loh, on the EEAC. Penn, a professor of urban planning and environmental policy at Tufts University, is the former Executive Director of ACE. Penn brings an equity perspective to the EEAC and builds active relationships between CLU and EEAC members. He notified us when the EEAC created ad hoc committees, giving us time to request seats on those committees and assemble a case for our recommendations.

✔ **MOBILIZING OUR BASE:** CLU/GJC's member organizations do not just reach out to their members. They organize them through education and leadership development. They involve members in developing proposals that we then drive forward as a coalition. Our grassroots strength comes not just from the number of people we can mobilize, but from the quality and depth of our recommendations that come directly from our grassroots base.

Because our members were involved at every step, they moved our proposals forward when they stalled. Our community members:

- Knocked on hundreds of doors and collected thousands of postcards
- Organized educational events in their neighborhoods
- Turned out by the hundreds to attend EEAC meetings and tell their own personal stories about how barriers to jobs, poor working conditions and lack of access to energy efficiency programs impact their everyday lives
- Joined delegations to make our case to the utilities, EEAC members, and staff at the DOER, the Attorney General's office, and the Department of Labor
- Participated regularly in EEAC meetings and subcommittee meetings, and effectively impacted their policy debates

✔ **THINKING CREATIVELY:** Weatherizing one home at a time will not create many jobs, and it will not reach Massachusetts's weatherization goals. CLU/GJC partner organizations came up with a new approach , and the utilities agreed to help design, fund, and analyze a pilot program to see if it would work. This model — the Community Mobilization Initiatives (CMI) — was developed through discussions with established community organizations and their grassroots base. Those organizations coordinated the initial outreach and education in their neighborhoods, then bundled scores of homes into one big weatherization project. Then they worked with a trade union or local cooperative to bring in a responsible contractor committed to local hiring and establishing career pathways for new workers.

To put together the pilots, we moved quickly from an advocacy role to mastering the complexities of program administration. We needed to pinpoint what worked — and what didn't — about this model. Layers of administrative bureaucracy had to be peeled away to find exactly where our constituents got lost in the Mass Save process.

The learning curve was steep. Out of 188 households that signed up for weatherization between November 2010 and August of 2011 through the Chelsea and Chinatown pilots, only 27 had completed the process by the time the program was officially evaluated. In the end, however, these pilots identified solutions to key obstacles, and cost-effectively weatherized over 450 homes. This included funding for pre-weatherization fixes, streamlining outreach to tenants and homeowners, and consolidating the complex qualification process. Ultimately, we showed that our new model could work well in "hard to reach" communities. It is not just our members who appreciate our ability to shift roles and think outside the box; Jeremy

McDiarmid from Environment Northeast and a member of the EEAC commented, *"It was impressive — the speed with which they were able to understand the dynamics and landscape and not be just a set of activists who complained without providing solutions. They offered solutions in a way that won the respect of folks around the table."*[64]

✔ **USING DATA TO GAIN CONSENSUS:** The CMIs also built relationships with utility executives and program managers, which we then used to get past other barriers. "Everyone was trying to reach HTR/HTS [customers], but we were stuck, particularly around pre-weatherization issues," said Penni Connor, Chief Customer Officer at Northeast Utilities (NSTAR). "CLU was able to bring peoples' stories and to help gather data on the ground. Their community-based process complemented our market segmentation analysis. That allowed NSTAR to get a brokered deal with DOER on pre-weatherization, we broke through that logjam."[65]

✔ **ENGAGING THE LEGAL/REGULATORY SYSTEM:** We learned how to navigate the state's complicated regulatory process, weighed in on DPU proceedings, filed comments and legal briefs reflecting CLU/GJC recommendations with the DPU, and even explored possible lawsuits. ACE's tireless legal team, their credibility and experience made our legal/regulatory strategy possible.

✔ **USING THE LEGISLATIVE PROCESS:** DOER, CLU/GJC, and other stakeholders recognized the need for utility data to identify populations that weren't accessing energy efficiency programs. For help obtaining those data, we turned to the Legislature. CLU/GJC organized thirty-three state representatives to cosponsor *An Act Regarding Community Access to Energy Efficiency Programs and Green Jobs*. This bill required the utilities to provide data on who is accessing their energy efficiency programs, who is getting weatherization jobs, whether they are hiring locally, and how they are implementing responsible contracting policies. The bill also mandated ambitious benchmarks for equity of access and total weatherization goals.

We organized over 100 members of our coalition to attend a state hearing on the bill, trained community members to lobby and speak with their elected officials about energy efficiency. Our coalition leaders met with DOER and the AG's office to gain their support. This momentum encouraged the utilities to participate in a data collection symposium sponsored by DOER. The next three-year energy efficiency plan includes funding to set up the database we need.

✔ **GETTING CONTRACTORS ON BOARD:** Using union connections, CLU/GJC recruited contractors for the CMI pilots who had good relationships with unions and were looking to increase their share of the residential market. These connections allowed us to demonstrate to policy makers, the utilities and to other contractors that residential weatherization was financially workable for a high-road employer.

It was also important to win over lead vendors, the organizations that schedule initial audits and subcontract weatherization work. Community groups in our coalition won over Sam Nutter from Conservation Services Group during the CMI pilots. As he says, *"The number one definitive lesson learned is that these community groups can reach into these neighborhoods, with these populations ... I think that without a doubt they've proven an ability to reach into those neighborhoods where the traditional marketing had not been as successful."* [66]

✔ **BUILDING CONSENSUS WITH UTILITY EXECUTIVES AND OTHER DECISION-MAKERS:** While organizing the grassroots is the core of our campaign work, the good relationships we have forged with key players in the energy efficiency arena have moved our work forward. Those relationships developed in several stages.

64 McDiarmid, Jeremy. Personal interview. September 27, 2012.
65 Connor, Penni. Personal interview. September 21, 2012.
66 "Evaluation of the Green Justice Coalition's Community Mobilization Initiative."

***The Community Mobilization Initiatives*** brought us in close contact with utility executives and program managers for more than a year. As a working relationship developed, they began realizing that we were ready to dig in and work on real, concrete solutions to problems the utilities themselves had been raising. The CMI process made us their colleagues.

***The Hard to Reach/Hard to Serve Charrette*** deepened that collaborative relationship. The CMIs exposed a string of barriers to energy efficiency work in HTR/HTS communities. We kept bringing up those barriers, but the EEAC was unable to focus on them and resolve them. Finally we proposed an extended working meeting – a charrette – where the most interested parties could step back and brainstorm solutions to the entire range of HTR/HTS barriers. The charrette was highly successful; it developed many of the changes that are now incorporated into the state's next three-year energy efficiency plan; and it deepened our relationship with utility executives and program managers.

***The Department of Energy Resource's Data Symposium*** was the result of long discussions between CLU/GJC, the Department of Energy Resources (DOER) and the Attorney General's office. We worked closely with Tina Halfpenny at the DOER to create the symposium. It ultimately led not only to the funding that the utilities allocated in the 3-year plan for database administration, but also to a recent DPU ruling that directed the utilities to come to a consensus with CLU/GJC, the DOER, and other stakeholders on this key issue.

***Our job agreements*** showed the strength of the relationships we built with utility program officers. Raising wages and job standards in the low-road weatherization industry was a very important objective for our coalition. NSTAR executive Penni Connor pushed for incorporating our jobs standards into agreements with Mass Save's lead vendor and subcontractors. Collaboration with Ms. Connor was instrumental in winning those agreements. She kindly notes that CLU/GJC takes the time to meet face to face to talk about agenda priorities. She reiterated, "I value that."[67]

"This campaign was ultimately co-operative and very unusual. After the first 3-year plan, CLU had an award ceremony. We had NSTAR execs there with low-wage workers and their advocates and labor unions. CLU used strong campaign tactics, but in the end the goodwill and mutual respect was something I've very rarely seen."

*— Rich Rogers, Secretary-Treasurer, Greater Boston Labor Council*[68]

✔ **EQUITY ADVOCACY:** We won credibility with state officials and environmental leaders by joining the fight for energy efficiency and greenhouse gas reduction. But we also won credibility by bringing a new dimension to the discussion – equity. We made our equity focus a win-win that would achieve both climate goals (by making it possible for one-third of the state's families to weatherize their homes) and social justice goals. That perspective is now a solid part of the EEAC's and utility companies' work. Western Mass Electric Company executive Dick Oswald says it's been very moving to have local residents come to EEAC meetings to tell their "actual situation. You sit there and listen to a Chinese gentleman talk through an interpreter and it's hard to dispute the issues they're faced with."[69]

Working relationships like these led to real gains that simply could not have happened otherwise.

67 "Rapid Assessment of the Green Justice Coalition: Summary of Findings."
68 Rogers, Rich. Personal interview. September 25, 2012.
69 "Evaluation of the Green Justice Coalition's Community Mobilization Initiative."

# The Road Ahead

In the future the Commonwealth should rely even more on energy efficiency programs to meet the targets in the Clean Energy and Climate Plan, maximizing the economic and social returns on energy efficiency investments that we have documented in this report.

The Massachusetts 2013-2015 energy efficiency plan is a success. But, it is a success we can use to chart a course that will help us achieve even greater cost and energy efficiency in the future.

The state must allocate more funds for outreach to our communities if we are to achieve true green equity.

We must continue working with our partners to improve jobs standards.

We need data collection so that we can better analyze where our energy efficiency dollars are going and how effectively they are being used.

We want Massachusetts to adopt our societal benefit-cost measures to estimate its energy efficiency gains.

Greater alliances with the public health community can strengthen and amplify the already-impressive health impacts.

And of course we must monitor the implementation of our gains to assure that they come to fruition as planned.

Over the past three years we have created a model that improves wages, benefits, safety, and opportunity for even higher jobs standards in one of the lowest-wage industries in Massachusetts. Through agreements that prevent misclassification and wage theft, and by using penalties and monitoring to enforce those agreements, we have brought a shadow industry into the sunlight. In the process, we have supported working class families and communities of color as they take the lead in building a greener future with equity at the center.

The model is not complicated. We are disseminating it through national networks including the Partnership for Working Families and the Blue-Green Alliance. Unions, community organizations, and coalition projects like ours can use it to win similar agreements in other parts of the country. They can also apply it to other sectors of the construction industry that are plagued by misclassification, wage theft, and low-wage worker exploitation.

> "Let's celebrate the successes! [There is] a lot of harmony between [CLU's] values and ours. This model can be applied in other states as well. Connecticut, for instance, wants to be #1 in energy efficiency. We at NSTAR are working with them to file a three-year plan in November with a huge increase in energy efficiency goals."
>
> *— Penni Connor, Chief Customer Officer, Northeast Utilities*[70]

We have come far, and though challenges remain, the Green Justice Coalition is up to the task. The relationships, respect, and leadership we have developed are the bedrock for more accomplishments in the years ahead.

70 Connor, Penni. Personal interview. September 21, 2012.


## CLU Board

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Co-Executive Director

## CHART A - CMI PILOTS

| A | B | C EQUATION (NUMBERS) | D EQUATION (EXPLANATION) | E CITATION/SOURCE | F ADDITIONAL COMMENTS |
|---|---|---|---|---|---|
| 4 Total pilots conducted | 2 | | | Arbor Consulting, "CMI Evaluation," p 42. | Although 4 pilots were funded, only 2 - Chelsea and Chinatown - were independently evaluated by Arbor Consulting. |
| 5 Funding per pilot | $50,000 | | | | |
| 6 Total households in 1-4 unit homes weatherized during CMI pilots | 101 | 51+50 = 101 | Chinatown homes completed + Chelsea homes completed | Rubin, "GJC Direct Testimony of Jovanna Garcia Soto," line 13 and "GJC Direct Testimony of Mark Liu," lines 9-10. Docket #12-100 - 12-111. Nov 20, 2012. | |
| 7 Average rate of completion | 51 | (50+51)/2 = 50.5 | Total number of units/households weatherized (B6), divided by total number of pilots (B4) | | |
| 8 Average cost of retrofits per household completed | $2,325 | (($1,927+$2,723)/2 = $2,325 | Average of mean costs for Chinatown and Chelsea retrofits | Arbor Consulting, "CMI Evaluation," pp 34, 40. | |
| 9 Total estimated cost per CMI | $167,413 | $50,000+($2,325*51) = $167,413 | Total initial funding of $50k for each CMI (B5), plus the mean job cost of the retrofits for each pilot (B8) times the average number of homes completed per pilot (B7) | | Includes costs to both participants and utilities. The prevailing wage increases negotiated by CLU as part of the pilot work agreements are included. |
| 10 Lifetime of measure (in years) | 20 | | | | Industry standard |
| 11 Average Massachusetts utility bill per household | $4,344 | $3,000+$1,344 = $4,344 | Average MA annual heating bill, plus average MA annual electric bill per household | Mass EO EEA, "Average Monthly Household Electric Bill." "LIHEAP Home Energy Notebook For Fiscal Year 2009." | Based on average of $3,000 northeast annual home heating costs for all heating fuels for non-low income households from the LIHEAP 2009 Home Energy Notebook, the most recent year for which data are available. Average annual electric bills for Massachusetts are approximately $1,344, according to the MA Executive Office of Energy and Environmental Affairs. |
| 12 Average annual utility bill savings per Wx participant - average savings of 30% | $1,303 | $4,344*30%= $1,303 | Average MA annual utility bill (B11)*average savings of 30% per Wx participant | MassEnergy, "Home Energy Saver." | Estimates for annual bill savings due to weatherization range from 10%-50%. While we believe many of the EN+ participants will fall on the higher end of the range, we have taken an average of this range, or 30%, as a conservative estimate. |
| 13 Average lifetime utility bill savings per Wx participant - average savings of 30% | $26,064 | $1,303*20 = $26,064 | Average annual utility bill savings (B12) * lifetime of measure (B10) | | |
| 15 Total projected lifetime benefit per CMI pilot | $1,316,232 | 51*$26,064 = $1,316,232 | Average houses completed per CMI (B7) times average lifetime bill savings per participant (B13) | | The utilities refer to bill savings as one of several economic benefits achieved by weatherization. We have used the term in the same way in this report to refer to all bill savings to consumers as well as societal economic savings, such as health care costs. |
| 16 Rough lifetime benefit-cost ratio per CMI pilot | 7.9 | $1,316,232/$167,413 = 7.9 | Total projected lifetime benefit per CMI pilot (B15), divided by total cost per CMI pilot (B9) = Rough lifetime benefit-cost ratio | | Rough Benefit-Cost Ratios are the economic benefits divided by the total projected costs. Because we did not have access to internal utility budget numbers, these ratios do not include certain costs, such as administration and research, or certain benefits, such as increased grid capacity that the utilties may use as part of their own benefit-cost calculations. |

## CHART B - PRE-WEATHERIZATION INCENTIVES (PART 1)

*Projected Increase in Massachusetts Energy Efficiency Participation and Cost-Effectiveness Due to Pre-Weatherization (pre-Wx) Incentives 2013-2015*

| Ⓐ | Ⓑ | Ⓒ EQUATION (NUMBERS) | Ⓓ EQUATION (EXPLANATION) | Ⓔ CITATION/SOURCE | Ⓕ COMMENTS |
|---|---|---|---|---|---|
| 5 Projected statewide EN+ residential energy audits per year for the period 2013-2015 | 1,800 | ((126+114)/2)*15 = 1,800 | Average audits completed for each of the two pilot CMIs, times 15 CMIs per year. | Rubin, "GJC Direct Testimony of Jovanna Garcia Soto," line 13 and "GJC Direct Testimony of Mark Liu," lines 9-10. Docket #12-100 - 12-111. Nov 20, 2012. | 15 CMIs per year is approximately equal to CLU recommended spending of 25% of utilities' total MassSave marketing budget on the EN+ model. |
| 6 Estimate proportion of audited EN+ eligible households with one or more pre-Wx barriers | 44% | | | "Next Step Living Pre-Wx Experience." | Based on Renew Boston data from Next Step Living (NSL), a lead vendor for MassSave. In general, pre-Wx data taken from Department of Energy Resource (DOER) memos and NSL data (submitted as testimony at the Department of Public Utilities) is taken from the source that has the most applicable and clearly cited numbers. This is usually Attachment A, "DOER proposal on pre-Wx barriers," which cites clear lead vendor data as its source, and is generally applicable to the EN+ population. Attachment B, "Providing Limited Pre-Weatherization Funding: Estimated Statewide Increase in Homes Insulated, Costs, Energy Savings, and Benefit-Cost Ratio," is a working draft, and uses internal data that we are not able to verify, so is cited only when necessary. Here, according to the DOER memo, CSG reports 30% pre-Wx barriers, but NSL's numbers from Renew Boston are more applicable to the EN+ population. There is a discrepancy between NSL's data and the way it is reported in DOER's memos, so we have deferred to the primary source in this case. |
| 7 Number of audited households with one or more pre-Wx barriers | 792 | 44%*1,800 = 792 | Proportion of audited homes with pre-wx barriers (B6) out of total projected audits (B5) | | |
| 8 Increase in proportion of assessed households that would proceed with weatherization if could remove pre-Wx barrier | 11% | | | Rubin, Testimony at DPU, Attachment A. "DOER proposal on pre-Wx barriers,"Docket #12-100 - 12-111. | |
| 9 Proportion of pre-Wx barriers fixable for $500 or less | 60% | | | "Next Step Living Pre-Wx Experience." | Based on Renew Boston data. |
| 10 Estimated proportion of those who want to proceed and who have pre-Wx fixable for $500 or less would follow through with scheduling both pre-Wx fixes needed and the actual weatherization job | 80% | | | Rubin, Testimony at DPU, Attachment A. "DOER proposal on pre-Wx barriers,"Docket #12-100 - 12-111. | |
| 11 Increase in the proportion of audited households that could proceed with weatherization due to availability of pre-Wx funding up to $500 | 5.3% | 11%*60%*80% = 5.3% | Increase in participation if pre-Wx barriers were addressed (B8), multiplied by proportion of pre-Wx barriers fixable for <$500 (B9), multiplied by estimated households motivated to follow through with pre-Wx barrier fixes in order to proceed with weatherization (B10). | Rubin, Testimony at DPU, Attachment B. ""Providing Limited Pre-Weatherization Funding: Estimated Statewide Increase in Homes Insulated, Costs, Energy Savings, and Benefit-Cost Ratio," Docket #12-100 - 12-111. | The original memo estimates the proportion of pre-Wx barriers fixable for $500 or less at 50% - we have used the 60% estimate from NSL's Renew Boston data, which we believe to be more accurate for the EN+ eligible population. The original memo therefore has this percentage estimated lower, at 4.3%. |
| 12 Estimated additional EN+-eligible households per year that would proceed with weatherization with availability of pre-Wx funding up to $500 | 95 | 5.3%*1,800 = 95 | Increase in the proportion of audited households that could proceed with weatherization due to availability of pre-Wx funding up to $500 (B11), times projected statewide EN+ residential energy audits per year (B5). | | |

## CHART B - PRE-WEATHERIZATION INCENTIVES (PART 2)

*Projected Increase in Massachusetts Energy Efficiency Participation and Cost-Effectiveness Due to Pre-Weatherization (pre-Wx) Incentives 2013-2015*

COST TO PROVIDE PRE-WEATHERIZATION (PRE-WX) FUNDING

ECONOMIC BENEFITS OF ENERGY SAVINGS DUE TO EN+ PRES-WX INITIATIVES

| A | B | C EQUATION (NUMBERS) | D EQUATION (EXPLANATION) | E CITATION/SOURCE | F COMMENTS |
|---|---|---|---|---|---|
| 14 Average cost per home for pre-Wx remediation | $350 | | | Rubin, Testimony at DPU, Attachment A. "DOER proposal on pre-Wx barriers," Docket #12-100 - 12-111. | |
| 15 Proportion of "free riders" per year - those with pre-Wx barriers, who would have paid for pre-Wx remediation on their own and will now get an incentive | 28% | | | Rubin, Testimony at DPU, Attachment A. "DOER proposal on pre-Wx barriers," Docket #12-100 - 12-111. | |
| 16 Number of "free rider" households per year | 222 | 28%*792 = 222 | Proportion of "free riders" (B15) of total homes with pre-Wx barriers (B7) | | |
| 17 Total projected households getting incentives per year | 317 | 222 + 95 = 317 | New participants (B16) + free riders (B12) | | |
| 18 Total projected cost for pre-Wx remediation per year | $110,880 | $350*317 = $110,880 | Participants getting pre-Wx incentives (B17) times average pre-Wx incentive cost (B14) | | |
| 19 Average cost per household for weatherization | $2,325 | (Chart A, B8) | Average of mean costs for Chinatown and Chelsea retrofits | Arbor Consulting, "CMI Evaluation," pp 34, 40. | Average cost of weatherization based on evaluation of CMI Pilots |
| 20 Total projected cost due to greater implementation per year due to demand created by pre-Wx funding | $220,968 | $2,325*95 = $220,968 | Average weatherization cost per home (B19), times additional participants (B12) | | |
| 21 Total projected cost of additional participation in residential Wx per year | $331,848 | $220,968 + $110,880 = $331,848 | Total pre-Wx costs (B18) plus total additional weatherization costs due to demand created by pre-Wx funding (B20) | | |
| 23 Lifetime of measure (in years) | 20 | | | | Industry standard |
| 24 Average Massachusetts utility bill | $4,344 | | (Chart A, B11) | | |
| 25 Average annual utility bill savings per Wx participant | $1,303 | | (Chart A, B12) | | |
| 26 Total projected annual bill savings for each year of implementation of pre-Wx funding from 2013-2015 | $123,856 | $1,303*95 = $123,856 | Average annual savings (B25) times total houses completed (B12) | | |
| 27 Total projected 3-year benefit | $743,137 | ($123,856*3)+($123,856*2) +$123,856 = $743,137 | Total projected annual bill savings, added cumulatively over 3 years (B26) | | The utilities refer to bill savings as one of several economic benefits achieved by weatherization. We have used the term in the same way in this report to refer to all bill savings to consumers as well as societal economic savings, such as health care costs. |
| 28 3-Year Rough Benefit-Cost Ratio | 0.7 | $743,136/($331,848*3) = 0.7 | Total projected 3-year benefit (B27), divided by the total additional cost per year due to pre-Wx incentives (B21) multiplied by three years | | |
| 29 Total projected lifetime benefit | $7,431,368 | 95*3*$1,303*20 = $7,431,368 | Total houses completed per year (B12), times three years, times average annual savings per participant (B25), times lifetime of measure (B23) | | Rough Benefit-Cost Ratios are the economic benefits divided by the total projected costs. They do not include costs, such as administration and research, or benefits, such as increased grid capacity, that are based on utilities' internal numbers. |
| 30 Lifetime Rough Benefit-Cost Ratio | 22.4 | $7,431,368/($331,848*3) = 22.4 | Total projected lifetime benefit (B29) divided by total additional annual cost due to pre-Wx incentives (B21) multiplied by three years | | |

## CHART C - TOTAL INCREASE IN MASSACHUSETTS ENERGY EFFICIENCY PARTICIPATION DUE TO EN+ PROGRAM AND BENEFIT-COST ANALYSIS

| A | B | C EQUATION (NUMBERS) | D EQUATION (EXPLANATION) | E CITATION/SOURCE | F COMMENTS |
|---|---|---|---|---|---|
| 5 Estimated households eligible for EN+ | 1,213,906 | | | "2013-2015 Massachusetts Joint Statewide Three-Year Electric and Gas Energy Efficiency Plan," p 145 and US Census Bureau | Using criteria of census tracts w/70% 1-4 unit housing at 60-120% of SMI proposed in 3-year plan |
| 6 Projected number of homes that could be weatherized through the EN+ program per year | 758 | 51*15 = 758 | Average rate of completion per CMI (Chart A, B7) times CLU recommended number of CMIs annually | | |
| 8 Estimated administrative cost per CMI | $50,000 | | (Chart A, B5) | | |
| 9 Total estimated annual administrative costs for CLU recommended 15 CMIs per year | $750,000 | 15 *$50,000 = $750,000 | Average cost per CMI (B8) times CLU recommended number of CMIs annually | | Estimated spending for15 CMIs per year is approximately equal to CLU recommended spending of 25% of utilities' total MassSave marketing budget |
| 10 Average cost per home for insulation | $2,325 | | (Chart B, B19) | | |
| 11 Total estimated cost per year due to EN+ weatherization jobs | $1,761,188 | 758*$2,325= $1,761,188 | Homes weatherized by EN+ program (B6), times average weatherization cost per home (B10) | | |
| 12 Projected total statewide costs of EN+ weatherization per year, including pre-Wx costs | $1,872,068 | $110,880 + $1,761,188 = $1,872,068 | Total annual pre-Wx costs (Chart B, B18) + total annual EN+ weatherization costs (B11) | | |
| 13 Total cost per year of EN+ program, including administrative costs | $2,622,068 | $750,000 + $1,872,068 = $2,622,068 | Total annual administrative cost for 15 CMIs per year (B9) plus total annual costs of EN+ weatherization jobs (B12) | | |
| 16 Lifetime of measure (in years) | 20 | | | | Industry standard |
| 17 Average Massachusetts utility bill | $4,344 | | (Chart A, B11) | | |
| 18 Average annual utility bill savings per Wx participant | $1,303 | | (Chart A, B12) | | |
| 19 Average lifetime utility bill savings per Wx participant | $26,064 | $1,303 * 20 = $26,064 | Average utility bill savings (B18) * lifetime of measure (B16) | | |
| 20 Total projected annual bill savings for each year of implementation of EN+ at 15 CMIs per year | $987,174 | $1,303*758 = $987,174 | Average annual savings (B18) times total EN+ houses weatherized per year (B6) | | |
| 21 Total projected 3-year benefit | $5,923,044 | ($987,174*3)+($987,174*2)+ $987,174 = $5,923,044 | Total projected annual bill savings, added cumulatively over 3 years (B20) | | Rough Benefit-Cost Ratios are the economic benefits divided by the total projected costs. They do not include costs, such as administration and research, or benefits, such as increased grid capacity, that are based on utilities' internal numbers. |
| 22 3-Year Rough Benefit-Cost Ratio | 0.8 | $5,923,044/($2,622,068*3) = 0.8 | Total projected 3-year benefit (B21) divided by total annual cost of EN+ program (B13), times 3 years | | |
| 23 Total projected lifetime benefit | $59,230,440 | 758*3*$26,064= $59,230,440 | Total houses completed per year (B6), times 3 years of participation over 2013-2015, times average lifetime savings per participant (B19) | | |
| 24 Lifetime Rough Benefit-Cost Ratio | 7.5 | $59,230,440/($2,622,068*3) = 7.5 | Total projected lifetime benefit (B23) divided by total annual cost (B13) times three years of participation over 2013-2015 = Rough lifetime benefit-cost ratio | | |

INCREASE IN INSULATION JOBS DUE TO EN+

COST TO PROVIDE EN+

VALUE OF ENERGY SAVINGS DUE TO EN+

## CHART D (PART 1) - COSTS TO GOVERNMENT OF SOCIAL BENEFITS FOR A LOW-WAGE WORKER WITH 2 CHILDREN AND NO SPOUSE LIVING IN BOSTON, WITH NO EMPLOYER-PAID HEALTH OR PENSION BENEFITS

| A | B BASE WAGE (PRE-2013) | C EQUATIONS | D ESTIMATED WAGE AVERAGE WAGE FOR NON-PREVAILING WAGE WORKERS | E EQUATIONS | F PREVAILING WAGE | G EQUATIONS | H CITATION/ SOURCE | I COMMENTS |
|---|---|---|---|---|---|---|---|---|
| 5 Hourly Wage | $10 | | $11 | | $24 | | | Base wage level from Green Justice Coalition interviews with weatherization workers. $1/hour wage increase based on estimates of "rising tide" effect of prevailing wage on non-prevailing workers. Prevailing wage of $22/hour from CLU negotiated work agreements with NSL, which has brought NSL wages up to a weighted average of $23.82. See Chart E, cell F13 for additional comments on wages. Please note that we did not calculate benefit levels for the estimated 26 employees of NSL who were earning an average of $16.43 prior to 2013. |
| 6 Annual Wage | $20,800 | $10*40*52 = $20,800 - Hourly wage (B5) multiplied by 40 hours/week and 52 weeks/year | $22,880 | $11*40*52 = $22,880 - Hourly wage (D5) multiplied by 40 hours/week and 52 weeks/year | $49,546 | $23.82*40*52 = $49,546 - Hourly wage (F5) multiplied by 40 hours/week and 52 weeks/year | | |
| 7 Public Subsidy for SNAP (Food Stamps) | $4,080 | 12*$340 = $4,080 - Months in the year multiplied by monthly subsidy | $3,660 | 12*$305 = $3,660 - Months in the year multiplied by monthly subsidy | No Longer Income-Eligible | N/A | http://www.massresources.org/snap-financial-eligibility.html and http://www.gettingfoodstamps.org/homepage.html | SNAP eligibility calculated using MA eligibility guidelines and assuming median rent in Boston at $1,600/month and average childcare costs for one child over age 2 at $1,248/month and no complicating family factors (i.e. high health costs). |
| 8 Public Subsidy for Health Insurance for 1 adult and 2 children (Medicaid/ Commonwealth Care) | $11,161 | ($4,098*2)+$2,965 = $11,161 - Medicaid Payments per Enrollee, FY2009, for 1 adult and two children | $11,161 | (4098*2)+2965 = $11,161 - Medicaid Payments per Enrollee, FY2009, for 1 adult and two children | $9,745 | $11,161-(12*$118) = $9,745 - Medicaid Payments per 1 adult and 2 child enrollees, FY2009 (D8) minus lowest monthly Commonwealth Care premium, multiplied by twelve months | StateHealthFacts.org - Massachusetts: Medicaid Payments per Enrollee, FY2009. mahealthconnector.org - Commonwealth Care Member Monthly Premiums and Income and Plan Types | Families earning below $28,644 (150% of FPL) are enrolled in MassHealth, the state Medicaid program, and pay no premiums for the lowest cost plans (BMC). Families earning prevailing wage would qualify for partially subsidized care at the rates for 250-300% FPL under MA Commonwealth Care. Massachusetts subsidizes plans for a family of 3 up to an annual gross income of $57,276. |
| 9 Public Subsidy for Section 8 Housing Voucher | $11,088 | (12*1444)-(0.3*$20,800) = $11,088 - Monthly fair market rent for 2 bedroom apartment multiplied by 12 months, minus copay of thirty percent of net income (B6) | $10,464 | (12*1444)-(0.3*$22,880) = $10,464 - Monthly fair market rent for 2 bedroom apartment multiplied by 12 months, minus copay of thirty percent of net income (D6) | No Longer Income-Eligible | N/A | http://www.massresources.org/section8-rent.html | The public benefit/subsidy amount is calculated as $1,444/month Fair Market Rent (FMR) for a 2 bedroom apartment, minus the 30% of net monthly income that voucher recipients must pay, calculated with all applicable deductions, including co-pays for subsidized childcare where applicable. Note, however, that the FMR is lower than the average 2-bedroom rent in Boston, so the family contribution may be higher, and that only 1/4 of vouchers are available for those over 30% area median income. |

## CHART D (PART 2) - COSTS TO GOVERNMENT OF SOCIAL BENEFITS FOR A LOW-WAGE WORKER WITH 2 CHILDREN AND NO SPOUSE LIVING IN BOSTON, WITH NO EMPLOYER-PAID HEALTH OR PENSION BENEFITS

| A | B BASE WAGE (PRE-2013) | C EQUATIONS | D ESTIMATED WAGE AVERAGE WAGE FOR NON-PREVAILING WAGE WORKERS | E EQUATIONS | F PREVAILING WAGE | G EQUATIONS | H CITATION/ SOURCE | I COMMENTS |
|---|---|---|---|---|---|---|---|---|
| 10 Public Subsidy for LIHEAP (Fuel Assistance) | $1,080 | $990+$90 = $1,080 - Fuel subsidy for family of 3 below 150% of FPL plus high energy cost supplement for that income level | $1,080 | $990+$90 = $1,080 - Fuel subsidy for family of 3 below 150% of FPL plus high energy cost supplement for that income level | $735 | $675+$60 = $735 - Fuel subsidy for family of 3 below 60% of state median income plus high energy cost supplement for that income level | http://www.massresources.org/liheap-benefits.html | LIHEAP 2013 grant range is $385 – $1,125, depending on fuel and billing; $50,515 = 60% of State Median Income for family of 3. Calculations based on heating costs of $3,000 for previous heating season over 6 months. Not calculated are possible additional utility discounts of 20–35% depending on company. |
| 11 Public Subsidy for Child Care Voucher for one child in care | $11,172 | 12*($1,081-$150) = $11,172 - Twelve months multiplied by the total monthly child care fee minus income-specific co-pay | $10,932 | 12*($1,081-$170) = $10,932 - Twelve months multiplied by the total monthly child care fee minus income-specific co-pay | $7,644 | 12*($1,081-$444) = $7,644 - Twelve months multiplied by the total monthly child care fee minus income-specific co-pay | http://www.massresources.org/Income-eligible-child-care-benefits.html and "Daily Reimbursement Rates – FY12, Department of Early Education and Care." http://www.mass.gov/edu/docs/eec/financial-assistance/funding-opportunities/open-competitive-grants/fy13-hs-390a/20120831-appendix-e-2012-reimbursement-rates.xls | $50,515 = 60% of State Median Income for family of 3; Calculated using MA EEC maximum daily reimbursement rates for Boston of $51.50, or $1,081 monthly based on 21-days/month in child care, minus income-based monthly co-pays- for full-time care. |
| 12 Federal Earned Income Tax Credit | $5,104 | | $4,683 | | No Longer Income-Eligible | N/A | www.irs.gov - EOTC Form P596 - Guidelines for 2012 Returns | EITC determined using IRS guidelines. Workers paid in cash and/or misclassified as independent contractors would not qualify for EITC at the same level. |
| 13 State Earned Income Tax Credit | $766 | 15% of $5,104 = $766 | $702 | 15% of $4,683 = $702 | No Longer Income-Eligible | N/A | | Massachusetts EITC is 15% of Federal EITC |
| 15 Total Maximum Annual Public Cost Per Worke | $44,451 | Sum of B7-B13 = $44,451 | $42,682 | Sum of D7-D13 = $42,682 | $18,124 | Sum of F7-F13 = $18,124 | | |
| 16 Total number of weatherization workers at income level | 2,010 | Chart E (B8) | 1,935 | Chart E (B11) | 75 | Chart E (B10) | | |
| 17 Total Maximum Annual Public Cost | $89,357,270 | 2,010*$44,451 = $89,357,270 - Total number of workers (B16) * Total maximum cost per worker (B15) | $82,601,645 | 1,935*$42,682 = $82,601,645 - Total number of workers (D16) * Total maximum cost per worker (D15) | $1,359,300 | 75*$18,124= $1,359,300 - Total number of workers (F16) * Total maximum cost per worker (F15) | | |

## CHART D (PART 3) - COSTS TO GOVERNMENT OF SOCIAL BENEFITS FOR A LOW-WAGE WORKER WITH 2 CHILDREN AND NO SPOUSE LIVING IN BOSTON, WITH NO EMPLOYER-PAID HEALTH OR PENSION BENEFITS

| A | B BASE WAGE (PRE-2013) | C EQUATIONS | D ESTIMATED WAGE AVERAGE WAGE FOR NON-PREVAILING WAGE WORKERS | E EQUATIONS | F PREVAILING WAGE | G EQUATIONS | H CITATION/ SOURCE | I COMMENTS |
|---|---|---|---|---|---|---|---|---|
| 19 Total Maximum Annual Public Savings Per Worker | | | $1,768 | $44,451- $42,682 = $1,768 - Total Maximum Annual Public Cost Per Worker at $10/hour (B15) - total costs at $11/hour (D15) | $26,327 | $44,451-$18,124 = $26,327 - Total Maximum Annual Public Cost Per Worker at $10/hour (B15) - total costs at NSL $23.82/hour (F15) | | |
| 20 Total Annual Savings to Taxpayers | | | $3,421,830 | $1,768*1,935 = $3,421,830 - Total Maximum Annual Public Savings Per Worker (D19)*Total number of weatherization workers earning $11/hour (D16) | $1,974,495 | 75*$26,327 = $1,974,495 - Total weatherization workers earning NSL wage of $23.82/hour (F16)*Total Maximum Annual Public Savings Per Worker (F19) | | |
| 21 Total 2013-2015 Savings to Taxpayers | | | $10,265,491 | $3,421,830 *3 = $10,265,491- Total Annual Savings to Taxpayers (D20)*3 years | $5,923,485 | $1,974,495*3 = $5,923,485 - Total Annual Savings to Taxpayers (F20)*3 years | | |
| 23 Total reduction in benefits if all 2,010 weatherization workers earned prevailing wage | $158,769,945 | 2,010*26,327 = $158,769,945 - Maximum Annual Public Savings Per Worker at $22/ hour (F25)*total number of workers (B16)*3 years | | | | | | |
| 24 Total additional wages paid by utilities if all 2,010 weatherization workers earned prevailing wage | $149,465,597 | (($12*1,984)+($*26))*(40*52*3) = $149,465,597 - $12/hour wage differential between base wage and "spillover effect" wage times 2,010 workers currently earning $10/ hour, plus $5.57/hour wage differential times 26 workers currently earning NSL wages, altogether times 40 hours/ week, time 52 week/year times 3 years | | | | | | |
| 25 Total 2013-2015 Savings to Taxpayers if all 2,010 weatherization workers earned prevailing wage | $9,304,349 | $158,769,945 - $149,465,597 = $9,304,349 - Total savings via reduced public benefits (B23) minus total costs of providing additional wages (B24) | | | | | | |

## CHART E (PART 1) - STATEWIDE JOB CREATION, WAGE GAINS AND REVENUE INCREASES DUE TO IMPLEMENTATION OF EN+ FOR 2013-2015

*Based on estimated 2,010 workers employed each year via MA utility weatherization programs in 2013-2015*

| A | B | C EQUATION (NUMBERS) | D EQUATION (EXPLANATION) | E CITATION/SOURCE | F COMMENTS |
|---|---|---|---|---|---|
| 5 Estimated insulation jobs per worker per year | 35 | | | "2013-2015 Massachusetts Joint Statewide Three-Year Electric and Gas Energy Efficiency Plan," p 59. | |
| 6 Estimated spending by MA utilities per year on residential incentives | $167,521,680 | ($343,536,906+$159,028,134)/3 = $167,521,680 | 2013-2015 total residential electrical incentives, plus 2013-2015 total residential gas incentives, divided by 3 years | "2013-2015 Massachusetts Joint Statewide Three-Year Electric and Gas Energy Efficiency Plan," Appendix A (electrical and gas tables). | |
| 7 Amount spent by utilities per year on residential incentives that will support 1 direct field worker job year (insulation and air sealing) | $83,333 | $1,000,000/12 = $83,333 | Amount spent on incentives that supports 12 FTEs per year, divided by 12 FTEs | "2013-2015 Massachusetts Joint Statewide Three-Year Electric and Gas Energy Efficiency Plan," p 60. | The utility companies estimate that for every $1 million dollars spent on residential incentives annually, 12 full-time field positions are created |
| 8 Estimated job years created per year due to 2013-2015 MassSave incentives | 2,010 | ($167,521,680/$83,333) = 2,010 | Total residential incentive spending (B6) divided by incentive dollars that support 1 job year (B7) | | |
| 9 Total estimated weatherization worker job years created per year due specifically to EN+ residential incentives | 22 | 2,273/35/3 = 22 | Additional homes weatherized through EN+ (Chart C B6) divided by annual jobs per worker (B5) | | |
| 10 Estimated number of job years per year that will pay prevailing wage (for employees of Next Step Living who are signed on to the CLU-negotiated prevailing wage agreement) | 75 | | | Personal interview with NSL, 2012, based on current estimates of 26 NSL job years in 2011 and plans an potential for market share expansion. | Estimate based on conservative estimated increases to Renew Boston program and expansion in NSL's market reach. We have broken out the employees of Next Step Living (NSL) separately, because they are the primary Renew Boston contractor, the only current signatory to CLU's prevailing wage agreement, and are likely to take on a significant portion of EN+ CMI jobs. |
| 11 Estimated number of job years per year that will pay non-prevailing wage (employees of all other contractors) | 1,935 | 2,010 - 75 = 1,935 | Total estimated workers per year (B8) minus estimated prevailing wage workers (B10) | | |
| 12 Total number of hours worked per job year (equivalent to one year's work for one full-time employee) | 2,080 | 40*52 = 2,080 | 40 hours per week, times 52 weeks per year | | |
| 13 Estimated increase in wages & benefits package per year for prevailing wage workers due to CLU work agreement negotiated with utilities and for non-prevailing wage workers due to "spillover" effect of prevailing wage agreements | $5,178,181 | ($7.39*2,080*75)+($1*2,080*1,935) = $5,178,181 | Hourly wage increase for NSL workers due to prevailing wage increase, times total number of hours worked annually per FTE over one year (B12) times estimated number of prevailing wage workers per year (B10), plus $1 wage increase for non-NSL workers due to prevailing wage increase spillover effect, times estimated number of non-prevailing wage workers per year (B11), times hours worked per FTE over one year (B12) | Personal interview with NSL, 2013. | $7.39 wage increase based on the 2011 weighted average of $16.43/hour from NSL and $23.82/hour weighted average after increasing to a minimum of the $22/hour prevailing wage negotiated with NSL by CLU. Estimated "spillover" or "rising tide" effect of 10% due to prevailing wage agreements. Studies of California airport living wage ordinances have shown a spillover effect of 12% or more, so we believe this is a conservative estimate. |

## CHART E (PART 2) - STATEWIDE JOB CREATION, WAGE GAINS AND REVENUE INCREASES DUE TO IMPLEMENTATION OF EN+ FOR 2013-2015

*Based on estimated 2,010 workers employed each year via MA utility weatherization programs in 2013-2015*

ESTIMATED WAGE INCREASES FOR WEATHERIZATION WORKERS

| A | B | C EQUATION (NUMBERS) | D EQUATION (EXPLANATION) | E CITATION/SOURCE | F COMMENTS |
|---|---|---|---|---|---|
| 14 Total estimated additional wages per year for all weatherization workers due to reduced misclassification as independent contractors resulting from CLU-negotiated job standards | $3,599,600 | ((75*$23.82)+(1,935*$11))*50%* 2,080*15% = $3,599,600 | Total estimated prevailing wage workers (B10), times $22 hourly wage, plus the total estimated non-prevailing wage workers (B11), times $11 hourly wage, altogether times 50% misclassification rate, times hours worked per year (B12), times 15% wage loss resulting from increased payroll taxes | Chaliffe, "Worker Misclassification." | Workers incorrectly classified as independent contractors will pay an additional 15% of their salary in payroll taxes. In July of 2004, Massachusetts passed the Independent Contractor Law [Chapter 193 of the Acts of 2004] which narrowed the standard for determining IC status. Specifically, the Massachusetts law created a presumption that a work arrangement is an employer-employee relationship unless the party receiving the services can overcome three rigid legal presumptions of employment: First, the worker must be free from the presumed employer's control and direction in performing the service, both under a contract and in course of business. Second, the service provided by the worker must be outside the employer's usual course of business. Finally, the worker must be customarily engaged in an independent service performed. http://www.mass.gov/lwd/eolwd/jtf/underground-task-force.html |
| 15 Total estimated additional wages per year for all weatherization workers due to increased payment of legally required overtime pay resulting from CLU-negotiated job standards | $4,652,484 | ((75*$23.82)+(1,935*$11))*70.5 %*11*2,080*.5 = $4,652,484 | Total estimated prevailing wage workers (B10) times $23.82 NSL average hourly wage, plus the total estimated non-prevailing wage workers (B11) times $11 hourly wage, altogether times the estimated 70.5% of residential construction workers subject to overtime violations, times estimated average 11 hours of overtime worked per week without appropriate overtime pay, times 52 weeks worked per year, times 50% MA overtime pay rate | Bernhardt. "Broken Laws, Unprotected Workers." http://www.mass.gov/ago/doing-business-in-massachusetts/labor-laws-and-public-construction/wage-and-hour/overtime.html | Workers are often asked to work overtime (over 40 hours per week) at the straight hourly rate, rather than at "time-and-a-half." |
| 16 Total estimated additional wages per year for all weatherization workers due to reduced off-the-clock pay violations resulting from CLU-negotiated job standards | $866,304 | ((75*$23.82)+(1,935*$11))*72.2 %*1*52 = $866,304 | Total estimated prevailing wage workers (B10) times $23.82 NSL average hourly wage, plus the total estimated non-prevailing wage workers (B11) times $11 hourly wage, altogether times the estimated 72.2% of residential construction workers subject to off-the-clock violations, times 1 hour per week without pay, times 52 weeks worked per year | Bernhardt. "Broken Laws, Unprotected Workers." | This estimate is likely to be low, because some off-the-clock violations would result in overtime pay, if the contractor was obeying labor law. |
| 17 Total annual weatherization worker wage gains | $14,296,569 | $5,178,181+$3,599,600 +$4,652,484+$866,304= $14,296,569 | Sum of all wage gains (B13 - 16) | | |
| 18 Total weatherization worker wage gains, 2013-2015 | $42,889,707 | $14,296,569*3= $42,889,707 | (B17), times 3 years | | |

ESTIMATED REVENUE INCREASES DUE TO INCREASED WEATHERIZATION WORKER WAGES AND IMPROVED JOBS STANDARDS

| | | | | | |
|---|---|---|---|---|---|
| 21 Additional MA Income Tax collected per year due to increases in weatherization worker wages | $757,718 | $14,296,569*5.3 % = $757,718 | MA state income tax rate times total weatherization worker wage gains (B17) | | |
| 22 Additional MA Unemployment Insurance funds collected per year due to avoidance of misclassification of weatherization workers as independent contractors | $2,277,347 | (($22,880*1,935*50%) +($49,546*75*50%))*9.49% = $2,277,347 | Annual non-prevailing wage (Chart D, D6), times the number of non-prevailing wage workers (B11), times the estimated 50% of residential construction workers who are misclassified, plus the annual prevailing wage (Chart D, F6), times the number of prevailing wage workers (B10), times the estimated 50% of residential construction workers who are misclassified, all together multiplied by the average construction UI rate | http://www.payroll-taxes.com/state-tax/97-massachusetts.htm | |

## CHART E (PART 3) - STATEWIDE JOB CREATION, WAGE GAINS AND REVENUE INCREASES DUE TO IMPLEMENTATION OF EN+ FOR 2013-2015

*Based on estimated 2,010 workers employed each year via MA utility weatherization programs in 2013-2015*

| A | B | C EQUATION (NUMBERS) | D EQUATION (EXPLANATION) | E CITATION/SOURCE | F COMMENTS |
|---|---|---|---|---|---|
| 23 Additional Workman's Comp Funds collected per year due to avoidance of employee misclassification | $1,866,993 | (($22,880*1,935*50%) +($49,546*75*50%))*7.78% = $1,866,993 | Annual non-prevailing wage (Chart D, D6), times the number of non-prevailing wage workers (B11), times the estimated 50% of residential construction workers who are misclassified, plus the annual prevailing wage (Chart D, F6), times the number of prevailing wage workers (B10), times the estimated 50% of residential construction workers who are misclassified, all together multiplied by the MA workman's comp rate for insulation workers | https://www.wcribma.org/mass/Products/wcribma_maci/main.aspx | Rate code for insulation installation, #5479 |
| 24 Estimated sales tax generated by spending of wage increases by weatherization workers 2013-2015 | $473,574 | $14,296,569*.53*6.25% = $473,574 | Total additional wages for MA weatherization workers (B17) times the minimum wage multiplier effect times the MA sales tax rate | http://www.epi.org/publication/ib340-massachusetts-minimum-wage-increase/#_note8 | Low wage workers are estimated to inject 53% of their wages directly back into the economy |
| 25 Total additional annual revenue collections due to increased Wx Worker Wages | $5,375,632 | $757,718+$2,277,347 +$1,866,993+$473,574 = $5,375,632 | Sum of all revenue gains (B21 - B24) | | |
| 26 Total additional revenue collections due to increased Wx Worker Wages 2013-2015 | $16,126,896 | $5,375,632*3 = $16,126,896 | (B25) times 3 years | | |
| 28 Estimated cash injected into economy due to spending of wage increases by weatherization workers per year | $7,577,182 | $14,296,569*0.53 = $7,577,182 | Total wage gains per year (B17) times the minimum wage multiplier effect of .53 | http://www.epi.org/publication/ib340-massachusetts-minimum-wage-increase/#_note8 | Low wage workers are estimated to inject 53% of their wages directly back into the economy. Because we can only project employment numbers based on the current 3-year plan, all calculations based on weatherization worker wages are for 2013-2015 only. |
| 29 Estimated job years created per year due to spending of wage increases by weatherization workers | 60 | $7,577,182/$127,000 = 60 | Cash injected into economy by weatherization workers (B28) divided by amount needed to create one payroll job | http://www.epi.org/publication/ib340-massachusetts-minimum-wage-increase/#_note8 | 1 payroll job is created per every $127,000 of economic activity |
| 30 Estimated societal wage increases per year due to spending of wage increases by weatherization workers | $2,548,988 | 60*(40*52)*$20.54 = $2,548,988 | Number of jobs created by weatherization worker spending (B29) times annual hours per FTE, times MA median hourly wage | http://www.bls.gov/oes/current/oes_ma.htm | Using median wage for Massachusetts of $20.54.hour |
| 31 Estimated state income tax collected per year due to jobs created by spending of wage increases by weatherization workers | $135,096 | $2,548,988*5.3% = $135,096 | Income generated by weatherization worker spending (B30) times MA income tax rate | | MA state income tax rate of 5.3% |
| 32 Total annual state-wide revenue and wage gains due to spending of Weatherization Workers | $2,684,084 | $2,548,988+$135,096= $2,684,084 | Annual societal wage increases (B30) plus annual state income tax (B31) due to weatherization worker spending of increased wages | | |
| 33 Total state-wide wage and revenue gains 2013-2015 due to spending of Weatherization Workers | $8,052,252 | $2,684,084*3 = $8,052,252 | Total annual revenue increases due to weatherization worker spending of increased wages (B32), times 3 years | | |

ESTIMATED REVENUE INCREASES DUE TO INCREASED WEATHERIZATION WORKER WAGES AND IMPROVED JOBS STANDARDS

WAGE AND REVENUE GAINS 2013-2015 DUE TO INCREASED SPENDING OF WEATHERIZATION WORKERS

## CHART E (PART 4) - STATEWIDE JOB CREATION, WAGE GAINS AND REVENUE INCREASES DUE TO IMPLEMENTATION OF EN+ FOR 2013-2015

*Based on estimated 2,010 workers employed each year via MA utility weatherization programs in 2013-2015*

| | A | B | C EQUATION (NUMBERS) | D EQUATION (EXPLANATION) | E CITATION/SOURCE | F COMMENTS |
|---|---|---|---|---|---|---|
| ESTIMATED WAGE AND REVENUE INCREASES DUE TO INCREASED SPENDING BY EN+ PARTICIPANTS | 35 Total projected annual economic benefit due to EN+ bill savings | $987,174 | = $987,174 | (Chart C, B20) | | From Chart C |
| | 36 Estimated cash injected into economy due to spending of saved money on utility bills by EN+ participants per year | $523,202 | $987,174*0.53= $523,202 | Total annual EN+ bill savings (B35) times the minimum wage multiplier effect of .53 | http://www.epi.org/publication/ib340-massachusetts-minimum-wage-increase/#_note8 | Using minimum wage multiplier effect of .53 |
| | 37 Estimated jobs years created per year due to increased spending by EN+ participants | 4 | $523,202/$127,000 = 4 | Cash injected into economy by spending of EN+ bill savings (B36) divided by amount needed to create one payroll job | http://www.epi.org/publication/ib340-massachusetts-minimum-wage-increase/#_note8 | 1 payroll job per every $127,000 of economic activity |
| | 38 Estimated societal wage increases per year due to increased spending by EN+ participants | $176,007 | 4*2,080*$20.54 = $176,007 | Number of jobs created by spending of EN+ bill savings (B37) times hours worked per FTE over 3 years (B12) times MA median wage | http://www.bls.gov/oes/current/oes_ma.htm | Using median wage for Massachusetts of $20.54.hour |
| | 39 Estimated state income tax collected per year due to increased spending by EN+ participants | $9,328 | $176,007*5.3%= $9,328 | Estimated societal wage increases due to increased spending by EN+ participants 2013-2015 (B38) times MA state income tax rate | $186,567 | MA state income tax rate of 5.3% |
| | 40 Estimated sales tax generated per year by spending of wage increases by EN+ participants | $17,331 | ($523,202*0.53)*0.0625 = $17,331 | Estimated annual societal wage increases due to increased spending by EN+ participants (B36) times the minimum wage multiplier effect times the MA sales tax rate | | MA sales tax rate of 6.25% |
| | 41 Estimated total state-wide wage and revenue gains per year, due to increased spending by EN+ participants | $202,666 | ($176,007+$9,328+$17,331) = $202,666 | Estimated annual societal wage increases (B38) plus estimated annual state income tax collected (B39) plus estimated annual sales tax due to increased spending by EN+ participants (B40) | | |
| | 42 Total state-wide wage & revenue gains 2013-2015 due to increased spending by EN+ participants | $1,215,998 | ($202,666*3) +($202,666*2)+$202,666= $1,215,998 | Estimated total state-wide wage and revenue gains per year due to increased spending by EN+ participants (B41) added cumulatively over 3 years | | |
| | 43 Total lifetime state-wide wage & revenue gains due to increased spending by EN+ participants | $4,053,326 | 20*$202,666 = $4,053,326 | Estimated total state-wide wage and revenue gains per year due to increased spending by EN+ participants (B42), times lifetime of measure (20 years) | | |
| ESTIMATED JOB CREATION | 45 Estimated total state-wide wage and revenue gains per year, due to increased spending by EN+ participants | 202 | (60*3)+(4*3)+(4*2)+4 = 202 | (B29*3)+(B37*3)+(B37+2)+B37 | | |
| | 46 Total lifetime job years created due to CLU-negotiated job standards and energy efficiency equity | 261 | (60*3)+(4*20) = 261 | (B29*3)+(B37*20) | | |

## CHART F-1 - ECONOMIC BENEFITS OF HEALTH AND SAFETY INNOVATIONS

| A GJC BREAKTHROUGH OR INNOVATION | BC REDUCTION IN WORKPLACE INJURY AND DEATH DUE TO WORKER HEALTH AND SAFETY TRAINING | | DEFGHI REDUCTION IN ASTHMA-RELATED HEALTH PROBLEMS DUE TO WEATHERIZATION WORKER HEALTH AND SAFETY PROTECTIONS AND TRAINING | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5 Health Outcome | Workplace injury or death | | Asthma-related hospital visits | | | | | |
| 6 Estimated cost per incident | $42,000 | Kriebal. "Lessons Learned" | $2,604 | "Burden of Asthma in Massachusetts." Because hospital visits for work-related asthma were not broken out by type, we used a weighted average of the 2005 median costs of ER visits, observation stays and admissions | $91 | Weighted average of daily wage (hourly wage*8 hours) of prevailing and non-prevailing wage workers | $11.41 | Weighted average of hourly wage of prevailing and non-prevailing wage workers |
| 7 Estimated annual incidents in worker population | 509 | 509 incidents of injury or death. Dement, John M. "Workers' compensation." A study of the workman's' compensation claims determined a rate of 24.3 injuries for residential insulation workers per 200,000 hours worked, or 96 FTEs. An equivalent rate for the 2,010 MassSave weatherization workers in Massachusetts would be 509 injuries per year. | 6 | 7 hospital visits per year. "Burden of Asthma in Massachusetts." Based on an estimated prevalence among painters of 3.3%, the closest category of worker identified, and an estimated 9.5% of those with work related asthma who visited the hospital at least once in the last 12 months among 2,010 weatherization workers. | 796 | 796 lost work days per year. Goetzel, Ron Z., et al. "Health, absence, disability, and presenteeism." 12 lost days of work per year per worker. "Burden of Asthma in Massachusetts." Based on an estimated prevalence among painters of 3.3%, the closest category of worker identified, among 2,010 weatherization workers. | | |
| 8 Estimated Annual Costs | $21,368,813 | Mean cost per incident (B6) * Annual incidents (B7) | $16,414 | Mean cost per incident (D6) * Annual incidents (D7) | $72,667 | Mean cost per incident (F6) * Annual incidents (F7) | $177,104 | Mean cost per incident (H6) * Annual incidents (H7) |
| 9 Intervention | Health and Safety Training | | Health and safety training & job standards | | | | | |
| 10 Estimated GJC-attributable reduction in incidents per year of EN+ Program | 61 | Dong. "Effects of safety and health training." Union workers who received health and safety training were 12% less likely to file a workman's compensation claim. | 0.8 | Shoemaker. "The Boston Safe Shops Project" Health and safety training increased workers' use of adequate respirators by 12% (obtained by subtracting the proportion of workers using respirators after health and safety training, versus prior to training) | 96 | Shoemaker. "The Boston Safe Shops Project" Health and safety training increased workers' use of adequate respirators by 12% | 1,863 | Shoemaker. "The Boston Safe Shops Project" Health and safety training increased workers' use of adequate respirators by 12% |
| 11 Estimated GJC-attributable reduction in incidents 2013-2015 | 183 | Estimated reduction in incidents due to EN+ (B10) times 3 years | 2 | Estimated reduction in incidents due to EN+ (D10) times 3 years | 287 | Estimated reduction in incidents due to EN+ (F10) times 3 years | 5,588 | Estimated reduction in incidents due to EN+ (H10) times 3 years |
| 12 Estimated GJC-attributable economic benefits per year of EN+ Program | $2,564,258 | Estimated reduction in incidents due to EN+ (B10) multiplied by cost per incident (B6) | $1,970 | Estimated reduction in incidents due to EN+ (D10) multiplied by cost per incident (D6) | $8,720 | Estimated reduction in incidents due to EN+ (D10) multiplied by cost per incident (D6) | $21,252 | Estimated reduction in incidents due to EN+ (H10) multiplied by cost per incident (H6) |
| 13 Estimated GJC-attributable economic benefits 2013-2015 (and lifetime) | $7,692,773 | Estimated economic benefits per year (B12) multiplied by 3 years | $5,909 | Estimated economic benefits per year (D12) multiplied by 3 years | $26,160 | Estimated economic benefits per year (F12) multiplied by 3 years | $63,757 | Estimated economic benefits per year (H12) multiplied by 3 years |
| 14 Total 2013-2015/Lifetime Benefits | $7,788,599 | Sum of all economic benefits (B13+D13+F13+H13) | | | | | | |
| 15 Total Prevention of Lost Work Hours 2013-2015 | 985 | Total lost hours of work in one year, divided by 8 hours per day, plus total lost work days in one year, altogether times 3 years | | | | | | |

## CHART F-2 - ECONOMIC BENEFITS OF HEALTH IMPROVEMENTS DUE TO RESIDENTIAL WEATHERIZATION

| A GJC BREAKTHROUGH OR INNOVATION | BCD ASTHMA REMEDIATION DUE TO IMPROVED INTERIOR AIR QUALITY RESIDENTIAL WEATHERIZATION | | | E TOTAL | F SOURCES AND CALCULATIONS |
|---|---|---|---|---|---|
| 4 Health Outcome | Asthma-related ER visit | Outpatient asthma-related observation stay | Asthma-related hospital admission | | |
| 5 Mean cost per incident | $942 | $4,270 | $8,809 | | "Burden of Asthma in Massachusetts." |
| 6 Estimated annual incidents in EN+ eligible population | 23,846 | 1,604 | 6,965 | | "Burden of Asthma in Massachusetts." The estimated proportion of the total number of people in MA with current asthma in 2005 (9.6%) who live in a household at 60-120% of SMI in a census tract with at least 70% penetration of 1-4 unit housing (3,276,568), multiplied by the proportion of the total number of annual incidents in MA (2005 numbers) to the total number of people in MA with current asthma (476,800) |
| 7 Estimated Annual Costs | $22,462,874 | $6,850,925 | $61,357,031 | | |
| 8 Intervention | Weatherization/Indoor air quality | | | | |
| 9 Total 2013-2015 Savings to Taxpayers if all 2,010 weatherization workers earned prevailing wage | 6 | 0.4 | 2 | 8 | Sweet, "Urban Intervention." Chapman, "Retrofitting Houses." Total number of cases in the EN+ population (row 6) * estimated 38% reduction in health service usage (an average of the two studies cited) * Proportion of houses eligible for EN+ that will be retrofitted annually at 15 CMIs per year |
| 10 Total estimated GJC-attributable reduction in incidents 2013-2015 | 34 | 2 | 10 | 46 | |
| 11 Total estimated GJC-attributable reduction in lifetime incidents | 339 | 23 | 99 | 461 | |
| 12 Total annual Benefits | $5,326.56 | $1,625 | $14,549 | $21,501 | Total estimated annual reduction in incidents through EN+ Program * cost per incident |
| 13 Total 2013-2015 Benefits | $31,959.34 | $9,747 | $87,296 | $129,003 | Estimated cumulative 3-year reduction in incidents 2013-2015 * cost per incident |
| 14 Total Lifetime Benefits | $319,593 | $97,472 | $872,965 | $1,290,031 | Cost per incident * estimated lifetime reduction in incidents |

## CHART F-3 - ECONOMIC BENEFITS OF GHG REDUCTIONS

| A | B CALCULATIONS | C EQUATION (NUMBERS) | D EQUATION (EXPLANATION) | E SOURCE | F COMMENTS |
|---|---|---|---|---|---|
| 4 Societal cost of emission of one ton of carbon due to lifetime energy use | $20.28 | | | Aubuchon, "Benefits and Costs." | The Analysis Group recently reviewed a range of dollar equivalencies for the societal cost of carbon. This figure represents the mid-point of the range, using the EPA Interagency Working Group Social Cost of Carbon at a 3% discount rate. |
| 5 Lifetime of measure (in years) | 20 | | | | Industry standard |
| 6 Total EN+ participants 2013-2015 (from Chart C) | 2,273 | 758*3 = 2,273 | Annual EN+ participants, times 3 years | Chart C (B7) | |
| 7 Average annual therm savings per Wx participant | 223 | | | Mendyk, "Wisconsin Weatherization Assistance." | |
| 8 Average lifetime therm savings per Wx participant | 4,460 | 223*20 = 4,460 | Average annual therm savings (B6) multiplied by lifetime of measure (B5) | | |
| 9 Total lifetime therms saved through EN+ houses retrofitted 2013-2015 | 10,135,350 | 4,460*2,273 = 10,135,350 | Average lifetime therm savings per Wx participant (B8) multiplied by Total EN+ participants 2013-2015 (B6) | | |
| 10 Short tons of carbon from therm savings | 55,862 | | | EPA calculator | |
| 11 Average annual kilowatt hour (kwh) savings per Wx participant | 798 | | | Mendyk, "Wisconsin Weatherization Assistance." | |
| 12 Average lifetime kwh savings per Wx participant | 15,960 | 798*20 = 15,960 | Average annual kwh savings (B9) multiplied by lifetime of measure (B5) | | |
| 13 Total lifetime kwh saved through EN+ houses retrofitted 2013-2015 | 36,269,100 | 15,960*2,273 = 36,269,100 | Average lifetime kwh savings per Wx participant (B12) multiplied by Total EN+ participants 2013-2015 (B6) | | |
| 14 Short tons of carbon from kwh savings | 28,208 | | | EPA calculator | |
| 15 Total tons of carbon avoided due to EN+ lifetime energy savings | 84,070 | 55,862+28,208 = 84,070 | Tons of carbon from total lifetime kwh savings (B14) plus tons of carbon from total lifetime therm savings (B9) | | |
| 16 Total estimated lifetime economic benefit | $1,704,940 | 84,070*$20.28 = $1,704,940 | Societal cost of emission of one ton of carbon due to lifetime energy use (B4) multiplied by the total tons of carbon avoided due to EN+ lifetime energy savings (B15) | | |

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## GREEN JUSTICE FOUNDING PRINCIPLES

The Green Justice Coalition is founded on the following principles:

- We all have a right to a decent quality of life and healthy environment, but not at the expense of others or future generations.
- We all have a right to an equal voice on how public resources are used to go green and to know the outcomes of these public investments.
- We must protect those who are currently most vulnerable.
- Those who have contributed more to the problem need to contribute more to address past injustices, while those who have paid the price are owed a greater share of new green resources and opportunities.
- Green Justice requires that there be meaningful access to green jobs and other economic opportunities for residents of communities of color and other low income communities. Meaningful access includes appropriate education, training and support, as well as priority hiring for local projects.
- Green jobs must be safe jobs, with decent pay and benefits that can support families. Where possible, green jobs should be union jobs or at least pay the prevailing wage. Workers who will be negatively impacted by green development have a right to a just transition.
- Green justice supports not only green jobs but also opportunities for individual and community ownership and production among communities of color and other low income communities.

**THE GREEN JUSTICE STEERING COMMITTEE INCLUDES:**

Alternatives for Community & Environment (ACE), Alliance to Develop Power (ADP), Boston Climate Action Network (BCAN), Boston Workers' Alliance (BWA), Chelsea Collaborative, Chinese Progressive Association, Clean Water Action Massachusetts, Coalition for Social Justice, Greater Four Corners Action Coalition, Laborers New England Regional Organizing Fund, MassCOSH, Massachusetts Energy Consumers Alliance, Neighbor to Neighbor, New England Regional Council of Carpenters, New England United for Justice, Painters & Allied Trades DC35, Project RIGHT

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