DOCKETED

Docket Number:	16-OIR-02
Project Title:	SB 350 Barriers Report
TN #:	210818
Document Title:	Greening Our Neighborhoods and Putting Americans to Work: A Case for Carbon Reduction and Job Creation
Description:	This report from Greenlining Institute looks at how home energy efficiency projects in low-income neighborhoods can help lower home energy bills, reduce carbon emissions, and help to create jobs. They used a case-study of 36 homes in Richmond, California. The report concludes with an analysis of policies that "are creating mechanisms to facilitate retrofit programs for all communities." The report finishes with recommendations for going forward.
Filer:	Chris Wymer
Organization:	The Greenlining Institute
Submitter Role:	Public
Submission Date:	3/22/2016 5:15:35 PM
Docketed Date:	3/23/2016

Greening Our Neighborhoods & Putting Americans to Work

A CASE FOR CARBON REDUCTION & JOB CREATION

Tara Marchant
Green Assets
Program Manager

Zara Burkirin
Green Assets
Program Associate

THE GREENLINING INSTITUTE | DECEMBER 2009

Greening Our Neighborhoods & Putting Americans to Work

A CASE FOR CARBON REDUCTION & JOB CREATION

Tara Marchant
Green Assets
Program Manager

&

Zara Burkirin
Green Assets
Program Associate

THE GREENLINING INSTITUTE | DECEMBER 2009

About the Greenlining Institute

The Greenlining Institute is a national policy, organizing, and leadership institute working for racial and economic justice. We ensure that grassroots leaders are participating in major policy debates by building diverse coalitions of grassroots leaders that work together to advance solutions to our nation's most pressing problems.

Our leadership Academy has become the "farm system" for tomorrow's social justice leaders, training the best and brightest from our community. Our policy experts conduct research and coordinate multi-pronged strategies on major policy issues, including but not limited to the environment, wealth creation (asset building), philanthropy, health, energy, communications, and higher education.

About the Green Assets Program

The Green Assets Program at The Greenlining Institute stands upon the strong foundation created by advocates that early on recognized the link between health, the economy and the environment.

For years the institute's founders and coalition spearheaded efforts to ensure equitable economic participation by low-income communities in California's economy and protections from adverse environmental impacts from polluters. Orson Aguilar, Greenlining Institute's Executive Director, carries on this effort to support new ways to bring about equitable participation and outcomes in the building of our 'green' assets.

Green Assets are located within a region, a community, a home and a person. As we develop this new paradigm that includes education and job opportunities that lead to career paths, sustainable business practices, healthy communities, and asset/wealth development, we must look for innovative discussion, approaches and partnerships.

This research is funded in part by the generous support of the Energy Foundation and PG&E.

Acknowledgements

Design

christian gonzález-rivera, The Greenlining Institute
Janine Macbeth, The Greenlining Institute
Cover photo, Rising Sun Energy Center

Special Acknowledgements

Rafael Aguilera, Director, The Verde Group
Yvonna Cázares, Policy Analyst, The Verde Group
James Fine, Economist, Environmental Defense Fund
Stacy Ho, Policy Associate, Green For All
James Hodges, Attorney, Association of California Community and Energy Services
Aaron Lehmer, Network Development Director, Bay Localize
Michael Lizárraga, President and CEO, TELACU
Jodi Pincus, Executive Director, Rising Sun Energy Services
Shafiq Zainol, Program Associate, The Greenlining Institute

Table of Contents

Introduction: Going Green and Job Creation are Interwoven

There is growing concern among low-income communities that the "green wave" will pass them by, especially when everybody, it seems, is going green. Major companies, such as Boeing, Chevron, and others are using their resources and market power to ensure they profit in the emerging green economy. Financial companies such as Goldman Sachs are spending millions of dollars preparing for a windfall in the carbon trading market.

> How will this green wave lift the boats for everyone, especially the unemployed and underemployed in our nation?

But the question remains: How will this green wave lift the boats for everyone, especially the unemployed and underemployed in our nation?

In this report, Greenlining outlines a block-by-block strategy that directs home weatherization investments to neighborhoods that need it most. Specifically, Greenlining recommends that weatherization investments be directed to communities that suffer disproportionately from climate change, and that have high unemployment and home foreclosure rates.

Greenlining intends to hit a triple bottom line, arguing that by utilizing a neighborhood approach, we can hit three national priorities that include:

- Putting Americans to work,
- Saving families hundreds of dollars each year in electrical and gas bills, and
- Making a coordinated and systematic approach to cutting US carbon emissions.

Greenlining undertook a theoretical study of emissions reductions possible through retrofitting low– to moderate-income homes in the San Francisco Bay Area. Our findings demonstrate that retrofitting homes in low- to moderate-income neighborhoods is measurable and quantifiable. In addition, the potential CO_2 emissions reductions can meet international standards for a cap and trade program.

Our findings indicate that:

- On average, retrofitting a low-to-moderate income home reduces emissions by 6,500 lbs CO_2/yr.
- Our case study of 36 homes could produce reductions in emissions of 237,312 lbs CO_2/yr.
- Retrofitting 100 homes could reduce emissions by 650,000 lbs of CO_2 annually.
- Retrofitting 335,000 low-to-moderate income homes could reduce emissions by 1 $MMTCO_2E$ ($MMTCO_2E$ units are the standard metric for carbon emissions).
- Several financial incentives exist to assist homeowners with financing home retrofits and legislators continue to author policy to provide opportunities and incentives to accelerate this energy efficiency approach.

In this report we explain the whole house performance approach to energy efficient retrofits and the opportunity of targeting entire neighborhoods. We highlight the potential GHG emission reductions from retrofitting homes in a low-income neighborhood, and link this to California's ambitious targets for carbon emission reduction in residential and commercial energy efficiency goals. Finally, we discuss relevant legislation and recommendations to advance energy efficient retrofits of low-income and underserved neighborhoods.

Cash for Caulkers: The Time is Now!

A recent memo from The President's Economic Recovery Advisory Board to President Obama stated that, "With home retrofitting, we can put those unemployed workers back to work making millions of US homes energy

efficient, and allowing homeowners to save energy—and carbon and money—in the process."

President Obama quickly followed suit. On December 15, 2009 president Obama stood in front a Home Depot and said: "If you saw $20 bills just sort of floating through the window up into the atmosphere, you'd try to figure out how you were going to keep that, but that's exactly what's happening because of the lack of efficiency in our buildings."

Greenlining's idea is simple. We invest heavily in home weatherization efforts by targeting communities hardest hit by the recession and do it in a coordinated effort that goes block by block, street by street. The outcomes would be jobs, energy savings, and fewer greenhouse gas emissions.

Strategies like the Whole Neighborhood Approach (WNA), which scale up individual home retrofit services to serve entire neighborhoods, could be a cost-effective strategy of enrolling participants and leveraging community resources while reducing our carbon impact. To realize these opportunities, public, private and nonprofit actors must collaborate to implement retrofit programs in local neighborhoods and to study their environmental, economic and health impacts.

Greenlining strongly believes that the green wave can lift all boats but only when investments are directed to communities that need them most. Lessons learned from the dissemination of the American Reinvestment Recovery Act (ARRA) can guide future efforts to ensure that those Americans hardest hit by our recession recover, get jobs, and save money, all while contributing to the fight against climate change. As we engage at the state and federal levels around cap and trade and climate policy, it is critical to highlight where local efforts become the tangible common-sense solutions America deploys first, particularly those focused on communities hardest hit by the economy and by historically negative environmental impacts.

California's Climate Policy is the Leader

Passed in 2006, the landmark legislation, AB32, designated California the national leader in its comprehensive commitment to reduce greenhouse gases (GHG). California set an ambitious goal for industry and commerce to reduce greenhouse gas emitted from within state borders to 1990 levels by 2020. However, as the largest economy in the nation, California can influence industry, Wall Street investors and neighboring states with its policies.

California's emission reductions amount to 427 million metric tons of carbon dioxide equivalent ($MMTCO_2E$) of greenhouse gases. The $MMTCO_2E$ metric is used both in the federal and international climate discussions.
This effort will require a near-revolution in the way business is done in California.

The idea is simple: invest heavily in home weatherization efforts by targeting communities hardest hit by the recession and do it in a coordinated effort that goes block by block, street by street. The outcomes would be jobs, energy savings, and fewer greenhouse gas emissions.

Stakeholders have been aggressive in their efforts to influence how reducing carbon will impact their bottom line. Historically burdened by polluting industries, the state's most vulnerable populations are recognized in AB32, whereby "the state board shall ensure that the greenhouse gas emission reduction rules, regulations, programs, mechanisms, and incentives under its jurisdiction, where applicable and to the extent feasible, direct public and private investment toward the most disadvantaged communities in California and provide an opportunity for small businesses, schools, affordable housing associations, and other community institutions to participate in and benefit from statewide efforts to reduce green house emissions." This statute provides a unique opportunity for marginalized communities, recognizing that these communities are equitable stakeholders and should be recognized as such.

This report broadens the role that California's most disadvantaged can play as engaged partners in the fight to mitigate climate change while participating in the opportunity and the prosperity.

Lower-income Communities and Climate Change: The Climate Gap

Poor disenfranchised communities have been the hardest hit by pollution and climate change. In West Oakland, for example, residents are exposed to five times more toxins per person than the average Oakland resident (Pacific Institute, 2002). A recent study entitled the "Climate Gap" by a team of researchers and environmental scientists at UC Berkeley, USC and Occidental College argues that these conditions will be exacerbated by the lack of health insurance among residents of these communities.

Faced with close proximity to automobile and industrial emissions, lack of clean water, and rising energy and gas prices, poor and underserved communities are eager to improve the environmental and economic conditions of their neighborhoods.

These toxic emissions cause major health problems such as asthma and hypertension in low-income, communities of color who are more likely than Whites to live in close proximity to pollution sources (Morello-Frosch, 2009). Higher temperatures due to climate change intensify air pollution levels in urban areas and create additional health burdens for poor and underserved communities. The research team also found that these same communities will be disproportionately impacted by rising utility costs and reduced job opportunities in sectors like agriculture and tourism due to changes in the Earth's climate.

The rise in energy costs, coupled with the economic crisis, is leading to increasing utility shutoffs in low-income neighborhoods. According to the July 2009 Short Term Energy Outlook Report by the U.S. Government's Energy Information Administration, residential electricity prices rose by 8% during the first quarter of 2009. The California Public Utilities Commission, for example, reports that this past year alone utilities cut off service to 288,000 low-income households, an increase of 17.5% from 2008. With the increasing energy and unemployment rates, residents are experiencing more and more difficulty paying for basic housing costs.

Faced with close proximity to automobile and industrial emissions, lack of clean water, and rising energy and gas prices, poor and underserved communities are eager to improve the environmental and economic conditions of their neighborhoods. In addition, by reducing energy consumption, our dependence on fossil fuel "peaker" plants will be significantly less. Reducing fossil fueled utility use will ultimately improve health conditions in communities.

Decision makers are moving in the right direction by facilitating opportunities for all communities to participate in the fight against climate change. More notably, climate change policies are being developed to create not only environmental, but also economic and health benefits for communities that need it the most. The Federal American Recovery and Reinvestment Act (ARRA), for example, provides a substantial amount of funding for energy efficiency ($1.15 billion nationally) and conservation block grants ($3.2 billon nationally) that maximizes benefits, such as green jobs, to local communities.

These developments in legislation and investments present a significant shift in thinking. Approaches that primarily focused investments in large scale clean energy projects like solar, wind, hybrid and geothermal technology are now finding value in programs that have greater economic, environmental and social benefits for all communities.

Home Efficiency Retrofits: An Investment in Low-Income Communities

Weatherization as a Solution

Energy efficiency retrofitting is one such opportunity to democratize the green movement while we advance our efforts to fight climate change. Faced with rising foreclosure and unemployment rates, low-income homeowners of color possess the greatest need to build assets, to reduce housing costs and to obtain secure jobs with livable wages. Decision makers are now recognizing this nexus of weatherizing as a proactive approach to reduce GHG emissions while addressing the economic and environmental realities facing the most vulnerable.

The recently launched Energy Efficiency and Conservation Block Grant Program, for example, will provide $3.2 billion for state and city projects (Green for All and Policy Link, 2009). Energy efficiency projects are practical, cost-effective means to reduce GHG emissions while reducing utility costs and improving the health of residents. Among the contributors to California's GHG emissions, residential buildings are second only to on-road vehicles, the former contributing 14% and the latter 36%. (California Air Resources Board, 2008) Daily activities like heating the home, washing clothes and taking showers use energy, which releases GHG emissions into the atmosphere. Figure 1 illustrates basic energy use in low-income homes.

Retrofit measures such as attic insulation, lighting and appliance upgrades, as well as showerhead and toilet improvements can significantly reduce energy use and as well as lower utility costs. Furthermore, residential energy retrofit programs can be made more efficient, if they are scaled-up to target entire neighborhoods. (California Public Utilities Commission, 2009)

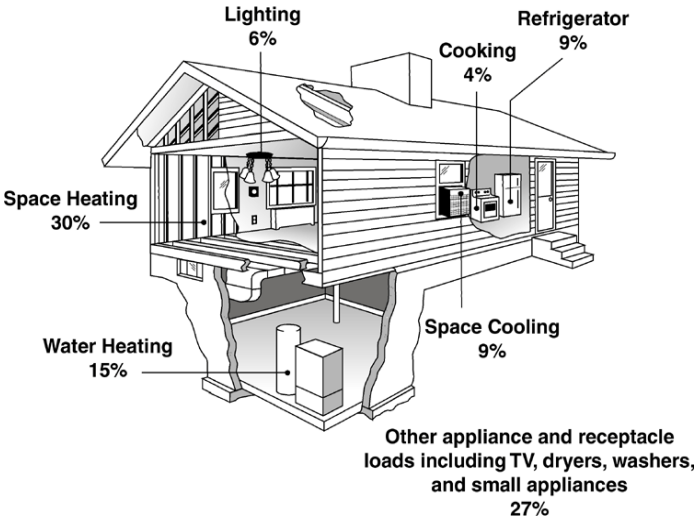
The Greenlining Institute stated in a previous study that building a 1.5 MW wind turbine that produces an equivalent amount of energy as can be saved by retrofitting 80 homes, could cost nearly double, take longer to implement and would provide few cost, safety and educational benefits for communities in need (Greenlining, 2008). The cost of a 1.5 MW turbine is approximately $1 - $1.6 million. The cost to retrofit a 2 bedroom home averages between $5-8k in California.

A US Department of Energy report concludes that when a million dollars is invested in weatherization programs in low-income communities, up to 52 jobs can be created (DOE, 2006). Given the potential national and state home stock, residential retrofitting could be a significant opportunity for more sustained job creation.

Creating Opportunities and Demand

Energy efficiency has already proved to be an economic driver. In California energy efficiency measures have enable households to redirect savings to other goods and services, creating up to 1.5 million full time jobs with a payroll of $45 billion dollars, and producing documented energy savings of $56 billion from 1972-2006. (REPP, 2004). Because of its minimal skilled entry

Figure 1: Energy Use in a Typical Low-Income Neighborhood



Source: weatherizationblog.com

point, residential retrofitting presents a significant opportunity to create jobs for the unemployed and underemployed.

This demand is amplified by the expected retirement of baby boomers working in fields related to the green economy. For instance, the energy company, Pacific Gas and Electric, reports that 40% of its 20,000 employees are eligible to retire within the next five years (Oakland Tribune, 2009). With adequate training that connects trained job seekers to retrofit contractors, the unemployed and underemployed individuals in low-income communities of color can meet this demand for labor.

Additionally, the growth of retrofit services could generate jobs in related industries. Both the building materials manufacturing and buildings materials retail sectors have experienced significant declines in employment in recent years and stand to benefit from an increase in demand from construction activities. Thus, energy efficient retrofits are investments providing communities with opportunities to build green assets, reduce utility costs, improve health, generate economic growth, and obtain career-track jobs in emerging green industries.

> Retrofitting 50 million buildings—40 percent of our building stock—by 2020 will require $500 billion in public and private investment but will directly and indirectly generate approximately 625,000 sustained full-time jobs and save consumers $32 billion to $64 billion a year in energy costs, or $300 to $1,200 a year for individual families.

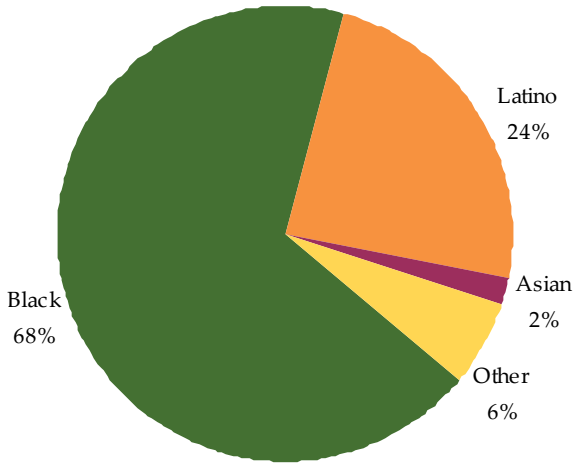
Case Study: 36 Single Family Homes in Richmond, California

Non-profit advocacy organizations such as Green For All are encouraging municipalities to adopt city-scale retrofit programs. By aiming program participation at entire blocks, neighborhoods and cities, advocates argue that the approach will allow municipalities, community-based organizations and retrofit contractors to develop economies of scale for materials and services and to utilize preexisting relationships among residents and local organizations. In this case study we explore the potential emissions reduction generated from retrofitting a whole neighborhood located in a low-income, underserved community in California.

GHG Potential in Aggregate

To project the potential GHG emissions reductions from greening an entire neighborhood, Greenlining utilized a sample of 36 single-family homes in census tract 3790 located in the City of Richmond in the San Francisco Bay Area. This Richmond neighborhood was chosen because of the availability of household data, the neighborhood's relatively high home ownership rate (46.8%), high percentage of low-to-moderate income residents (80.6%), and high percentage of communities of color. With a racial composition of 68% Black, 24% Latino and 2% Asian households, this neighborhood reflects the diversity of many low-income neighborhoods in the Bay Area (US Census Bureau, 2000).

Figure 3: Diversity of Census Tract 3790



Additionally, as much as 24% of the households that owned their housing in the census tract had incomes below the poverty level in 1999. Housing costs contribute to the neighborhood's endemic poverty where 1 out of 2 households in the city spent 30% or more of their household income on monthly home owner costs and 1 out of 4 spent 50% or more on these costs. (Census, 2007)

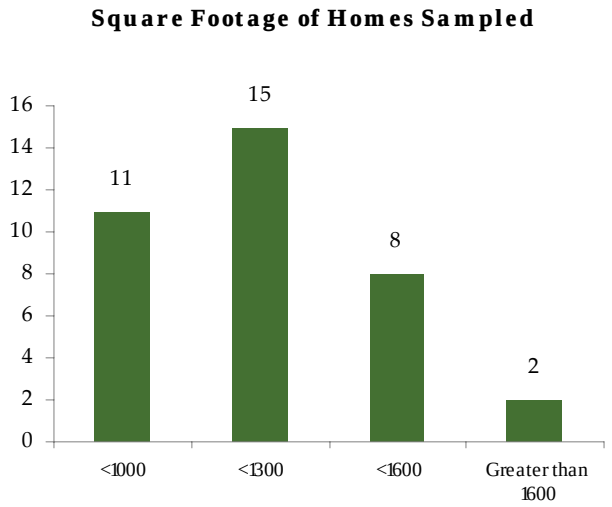
Homeowners vs. Renters

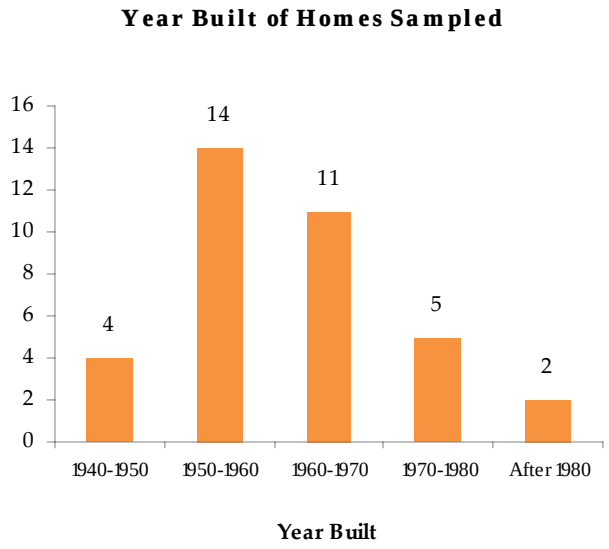
While the vast majority of low-to-moderate income people of color rent rather than own their housing, the study focused on owner-occupied homes because of the difficulty in calculating GHG emissions reductions for retrofits in multi-tenant unit housing and the lack of funding incentives for tenants and landlords.

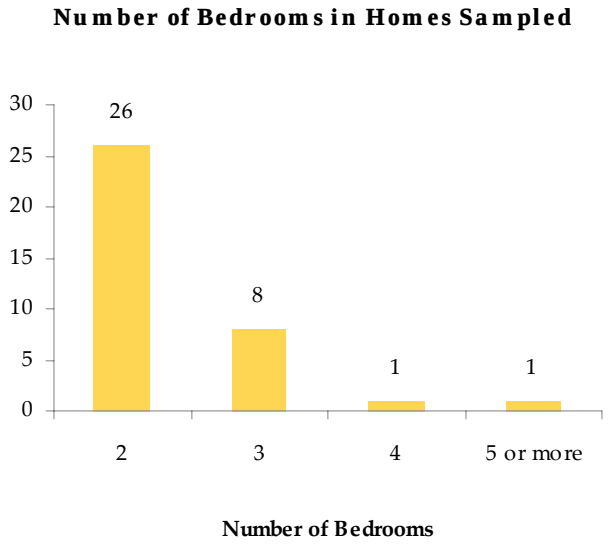
The Greenlining Institute, however, recognizes the need for the CPUC, investor-owned utilities and municipalities to develop stronger incentives for multi-tenant unit energy efficiency programs. As only 25% of households with incomes below the poverty level were homeowners in 1999 (US Bureau of the Census, 2000), the opportunity to reach renters (75%) that can benefit greatly from reduced utility costs and improved health, safety and comfort in their homes is substantial.

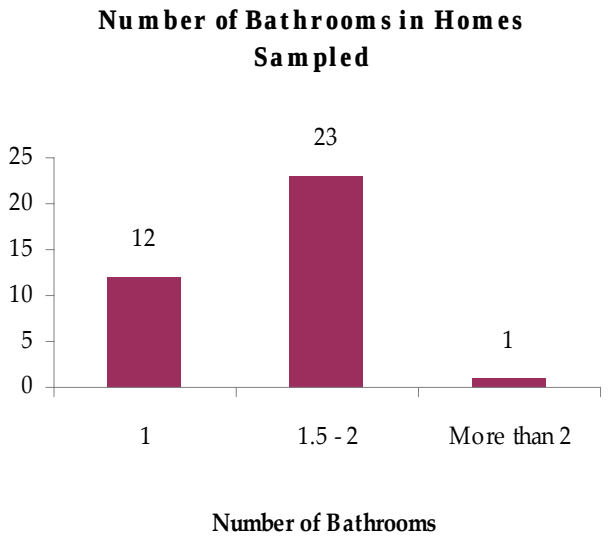
Existing programs face challenges in addressing split incentives between rental property owners who adopt retrofit investments and tenants who pay the utility bills. However, municipal programs in Chicago and New York have implemented innovative financing mechanisms and technical support services to aid owners of affordable multiunit rental properties with retrofit investments (Community Preservation Corporation, 2009).

Figure 3: Characteristics of Homes Sampled









Data on home square footage, number of bedrooms, number of bathrooms, and year built were used to obtain realistic measures of GHG emissions reductions from home retrofits. Household data was provided by California Youth Energy Services (CYES), run by Rising Sun Energy Center, a nonprofit organization that trains youth energy specialists to survey homes and to install energy and water saving devices such as efficient showerheads and compact fluorescent light bulbs.

Data on appliances, lighting, and insulation were not available, therefore this study utilized assumptions based on the age of homes and household income levels, which were characteristic of low-to-moderate income homes in underserved neighborhoods. Appendix 1 lists these assumptions. Since participants in CYES services are more likely to have energy-inefficient homes than those who didn't participate, there may be some concern that our sample is biased. However our study only used data on home square footage, rooms, and year built. The data on these features are unlikely to be biased since they are characteristic of low-to-moderate income homes.

The square footage of the homes ranged from 741 sq. ft. to 2604 sq. ft., with the average being 1195 sq. ft. Accordingly, the number of bedrooms and bathrooms

ranged from two to six bedrooms and one to four bathrooms with medians of three and two respectively. In addition, the year the homes were built varied between 1924 and 1997 with more than 75% of the homes built before 1970. (See Figure 3.)

Utilizing GHG emissions estimates and calculators provided by the Lawrence Berkeley Lab, Pacific Gas and Electric, EnergyStar and the East Bay Municipal Utility District, Greenlining quantified the emissions reductions potential from a number of retrofit services, which can be categorized according to the following:

- Thermal Load (Attic Insulation, Slab Insulation, Wall Insulation, Exterior Door Weatherization and Window Caulking);
- Base Load (Appliance Upgrades, Replacement of Light Bulbs with Compact Fluorescent Lights, Water Heater Blanket Installation and Toilet and Showerhead Upgrades);
- Heating, Ventilation, and Air Conditioning (Gas Furnace Replacement, Air Duct Insulation, Air Duct Sealing and Programmable Thermostat Installation).

Due to variation in energy generation processes, there is uncertainty in the exact avoided emissions factor associated with avoided electricity use. This study uses the EPA's 2009 Climate Change Action Plan's grid-electricity emission factor of 1.54 lbs CO_2/kWh.

Neighborhood Carbon Metric: A Cost-Effective GHG Reduction

Greenlining's findings demonstrate that retrofitting low-income neighborhoods can be a significant contributor to reducing California's GHG emissions. Our results show that retrofitting our 36 home sample can result in avoiding 237,312 lbs. of CO_2 emissions annually. Extrapolating this to 100 homes yields more than 650,000 lbs of CO_2 avoided annually.

Table 1. CO_2 Emissions Avoided from Greening a Low-to-Moderate Income Neighborhood

	Energy Efficient Improvement	Annual CO_2 Avoided (pounds)	
		Total For Richmond Sample (36 Homes)	Household Average
Thermal Load Improvements	Slab Insulation	14,089.00	391.36
	Exterior Door Weatherization and Window Caulking	22,955.00	637.64
	Attic Insulation	23,229.00	645.25
	Wall Insulation	45,128.00	1,253.56
Base Load Improvements	Shower Head Replacement with Low Flow Shower Heads*	54.55	1.52
	Toilet Replacement with High Efficiency Toilets**	1,331.97	37.00
	Water Heater Blanket Installation	2,592.00	72.00
	Clothes Washer Replacement with EnergyStar Model	6,048.00	168.00
	Refrigerator Replacement with EnergyStar Model	6,861.60	190.60
	Light Bulb Replacement with Compact Fluorescent Lights	21,702.74	602.85
HVAC Improvements	HVAC Duct Insulation	4,582.00	127.28
	Gas Furnace Replacement with EnergyStar Model	17,765.91	493.50
	HVAC Duct Sealing	29,273.00	813.14
	Programmable Thermostat Installation	41,700.00	1,158.33
	Total* **	**237,312.77 lbs CO_2/yr**	**6,592.02 lbs CO_2/yr**

*Replacing showerheads with low flow showerheads would also save 30,300 gallons of water
**Replacing toilets with high efficiency toilets would also save 73,900 gallons of water
***This may reflect an overestimation since emissions savings may not be additive

To put this in context of California's climate legislation, retrofitting 335,000 low-to-moderate income homes could reduce emissions by 1 $MMTCO_2E$. This is 23% of the 4.4 $MMTCO_2E$ reduction recommendation for commercial and residential buildings proposed in the AB 32 scoping plan.

With a clear target to retrofit residential and commercial properties to meet the emission cap mandated by AB 32, inclusion of communities that have the least knowledge and capital to implement these retrofits, yet stand to gain the most, is an opportunity of great economic and societal value to California.

Estimates of potential GHG emissions avoided are displayed in Table 1 and Figure 4. The quantities in the left column of Table 1 indicate the total amount of emissions avoided by retrofit for the entire 36 home sample. Quantities in the right column indicate the average household emissions reduced by each retrofit measure. Retrofits such as attic and wall insulation, programmable thermostats, and HVAC duct sealing provide the largest reductions in household CO2 emissions.

Homeowners in low-to-moderate income and underserved communities can also take advantage of several financial incentives to improve their home energy efficiency. As displayed in Table 2, utility companies offer incentives such as a $150 rebate for a high efficiency toilet and a $300 rebate for efficient gas furnaces.

Energy Efficient Federal Tax Credits also provide up to $1,500 for energy efficient home improvements such as wall insulation, duct sealing, window and door weather-stripping, and gas furnace and water heater replacement. Moreover, for households with incomes of up to 200% of the federal poverty level (for a family of four, the income limit is $43,200), the Federal Low-Income Energy Efficiency (LIEE) Program offers no-cost retrofit services. Services provided by LIEE include attic insulation, door weather-stripping, low-flow showerheads, water heater blankets, and energy efficient refrigerators and furnaces.

Figure 4: Average Household Emissions Avoided

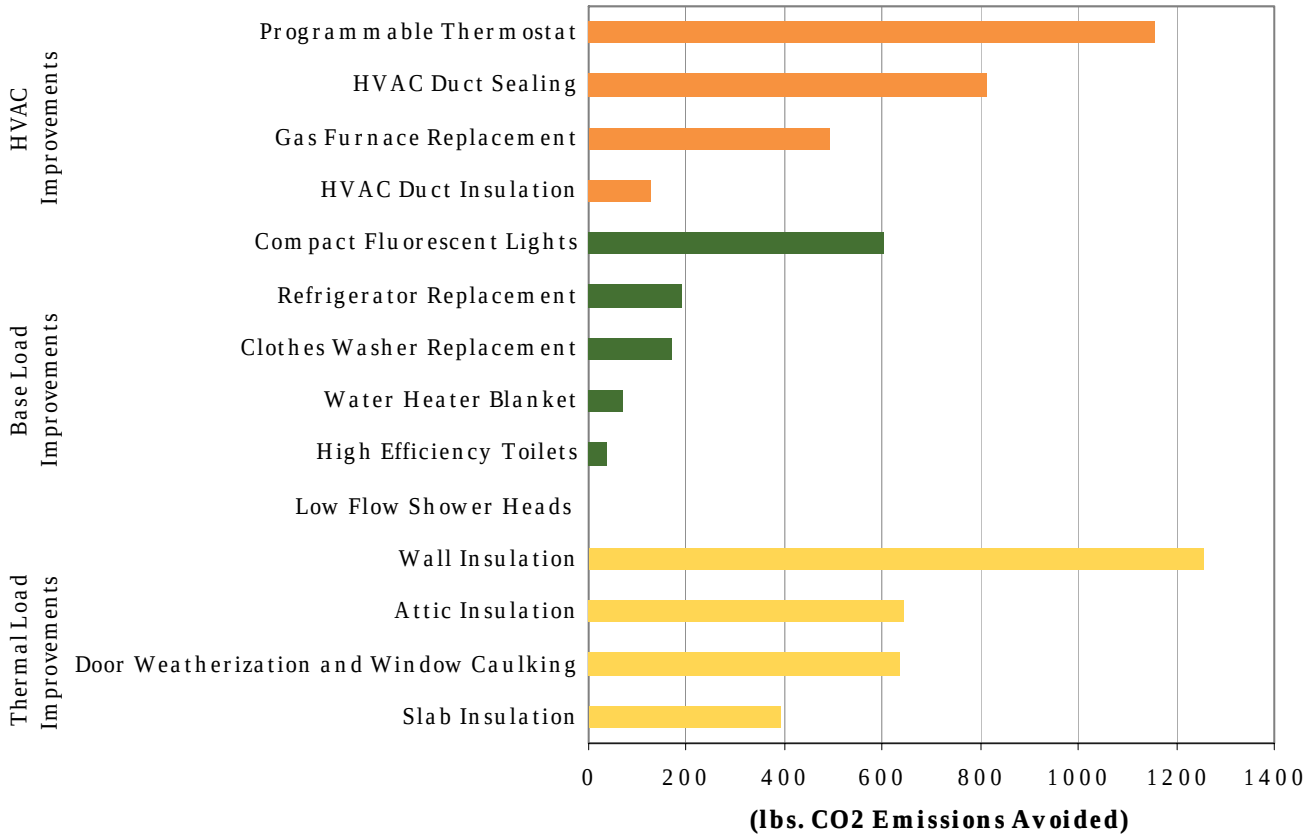


Table 2. Snapshot of Retrofit Incentives for the 36 Home Sample in Census Tract 3790
Assumptions include 2 doors and 9 windows per house, 2 light bulbs per bedroom and 1 light bulb per bathroom

Energy Efficient Improvement	Total Quantity	Incentives
Attic Space Insulation	43,027 Sq. Ft.	PG&E rebate of $0.15 per sq. ft. for attic and wall insulation Rising Sun Energy Center rebate of $.50/sq. ft. for attic insulation
Door Weather-stripping	72 Doors	US Department of Energy tax credit up to $1,500
Window Weather-stripping	432 Windows	US Department of Energy tax credit up to $1,500
High Efficiency Toilets	61 Toilets	EBMUD rebate of up to $150 per HET unit
Low-Flow Shower Heads	59 Shower Heads	EBMUD offers free low-flow shower heads
EnergyStar Clothes Washers	36 Clothes Washers	Combined EBMUD & PG&E rebate of $125 for efficient models or $200 for most efficient models
EnergyStar Refrigerators	36 Refrigerators	PG&E rebate of $35 per refrigerator
Compact Fluorescent Lights	285 CFL's	PG&E rebate (included in price)
EnergyStar Gas Furnaces	36 Gas Furnaces	PG&E rebate of up to $300 per unit

Whole House and Whole Neighborhood

Energy efficient retrofits have improved from the traditional weatherization services made popular by programs such as the Federal Weatherization Assistance Program (WAP) developed in 1976. The latter involves low-cost upgrades such as door and window weather-stripping whereas new methods, termed *whole house performance*, entail more extensive retrofits and tailor retrofits to the individual home.

To minimize energy use and cost, the whole house performance approach involves professional home energy audits that result in recommendations for the most cost-effective retrofits for the homeowner. Such recommendations may include attic insulation, appliance replacements and HVAC upgrades. Though the whole house performance approach may be more resource- and time-intensive than traditional weatherization, it can result in higher savings in utility costs especially as energy prices continue to rise over time. Research demonstrates that while basic weatherization and lighting upgrades save between 5% and 15% of energy use, more extensive retrofits save 20% to 50% of energy use and will usually last longer (Fuller, 2009).

To further maximize the cost-effectiveness of home retrofits, energy efficiency stakeholders such as the California Public Utilities Commission (CPUC) and the investor-owned utilities it regulates are considering whole neighborhood approaches. The CPUC's Whole Neighborhood Approach involves targeting specific neighborhoods that experience difficulty paying for energy bills.

After outreaching to such neighborhoods and enrolling participants, implementers will perform first wave installations, or easy-to-install measures such as compact fluorescent bulb installations, in homes that have signed up during the outreach period. This phase will also be used to encourage homeowners to participate in deeper retrofit measures such as large appliance upgrades and attic insulation, which will take place during second wave installations. To further increase participation, implementers will conduct a secondary outreach sweep of the neighborhood to enroll households who have gained interest in the program from observing and learning about the retrofit benefits from their neighbors.

Regulators Consider Adoption of WNA

While the WNA may be a new approach, it is an idea that has been tried by community-based organizations that recognize its value. Greenlining performed a test pilot of a WNA in 2008 to explore the barriers and opportunities.

Challenges for local organizations contracted by investor-owned utilities in implementing retrofits at the neighborhood level result from inadequate funding for outreach and education, lack of financing and incentives for moderate income households, and poor coordination with public and private stakeholders. In the sections entitled *The Need for CBO Involvement* and *Supportive Policy Measures*, this report discusses the importance of involving local organizations and addressing challenges in the Whole Neighborhood Approach.

The CPUC anticipates that the WNA will reduce program costs, leverage neighborhood resources, and increase household participation (California Public Utilities Commission, 2009). By assessing and servicing homes in the same neighborhood, program implementers will reduce transportation and overhead costs.

In fact, some contractors offer discounts for retrofitting clusters of homes: Minnesota-based Xcel Energy's Neighborhood Energy Connection program cites a 20% discount for clustered households of 20-30 homes. Provided that WNA program administrators target appropriate low- to moderate-income neighborhoods, this approach would significantly reduce major bureaucratic barriers to retrofit take-up.

By automatically qualifying homes within targeted neighborhoods, the WNA avoids the confusing process of determining individual household eligibility for scattered incentives. Currently, if a low-income homeowner has received energy-retrofits they are disqualified from participating in new, better technologies for up to seven years. Given the need to help these vulnerable communities, the program guidelines must be revisited and streamlined to include any homes in need of retrofitting and energy-efficiency opportunities.

The Need for CBO Involvement

Although several financial incentives exist for homeowners, participation in low-income energy efficiency programs and take-up of subsidies remains low. While 33% of California households qualified for the LIEE program in 2006, annual program penetration ranged from only 2-4% across the state with PG&E reporting a rate of 3%. Such dismal rates reflect the challenges that program implementers face in making energy efficiency services and funding accessible and appealing to poor and underserved households.

> Retrofitting 335,000 low-to-moderate income homes could reduce emissions by 1 $MMTCO_2E$. This is 23% of the 4.4 $MMTCO_2E$ reduction recommendation for commercial and residential buildings proposed in the AB 32 scoping plan.

In particular, program participation is low in San Diego County, the Central Valley and among households with disabilities and African-American households (KEMA, 2007). Specific challenges to program enrollment and participation include: residents being away from the home during outreach visits; resident disbelief of no-cost services; mistrust of contractors; and confusing and time-consuming applications (Hodges, 2009).

These shortcomings speak to the importance of community-based organization involvement in energy efficiency education and outreach. With existing ties to poor and underserved neighborhoods, local non-profits are best poised to design culturally competent strategies to address challenges of energy efficiency program participation. Community-based organizations can utilize neighborhood institutions to build trust and confidence in energy efficiency programs. In the census tract of Greenlining's 36 home sample, for example, there are 14 churches and 4 schools that can be utilized to perform outreach for whole neighborhood retrofitting.

Regional Project Management Adoption

Local organizations, in several communities across California, have long understood the importance of energy efficiency and have been working to make home energy efficient retrofits available to low-income communities and communities of color.

Most organizations such as Rising Sun Energy Center in the Bay Area, TELACU in Southern California and the Community Resource Project, Inc. in Sacramento have had no strategic partners to accelerate their good work. Through their own unique approaches they conduct outreach and education to underserved communities about discounted utility rate programs, energy efficient appliance rebates and subsidies for home retrofits. The American Recovery Reinvestment Act will contribute significantly to the growth capacity of weatherizing programs. However, finding sustainable models for continued energy savings, job creation and local economic growth through whole home retrofits and weatherization has yet to be achieved.

In addition, Rising Sun Energy Services operates several educational programs for youth and displaced workers to gain skills in retrofitting homes and buildings. The organization involves local employers; their request for skill advancement and entry level certification needs help to ensure a qualified hiring pool of candidates for job placement. This effort for capacity building is happening throughout California on a local level.

Greenlining believes that a WNA program would benefit from an area program manager. Like Grid Alternatives' role as program manager for the low-income program under California's Solar Initiative (CSI), the Whole Neighborhood Approach would benefit from a One-Stop Educational coordinator. In the Bay Area for example, there is a consortium of cities and organizations that have sponsored such an approach called Green LEAP. This coordination by a local or regional program manager would work along with CBOs, energy efficiency implementers, faith-based organizations, media, utilities, and consumers to enhance the dialogue and the process of the stakeholders.

Supportive Policy Measures

Given that residential energy efficiency can significantly contribute to reductions in GHG emissions, federal, state and local policymakers are creating mechanisms to facilitate retrofit programs for all communities. Listed below are a sample of policy measures in California that support residential energy efficiency by providing political leverage, infrastructure and financing mechanisms for retrofit programs.

Community organizations should educate residents about these opportunities and build partnerships with public and private stakeholders to maximize benefits for low-income and people of color neighborhoods.
Although California has made significant strides in accelerating legislation that support home retrofits, other states are finding innovative approaches as well. Sharing information from all sources and adopting best practices will help expedite our localized energy-efficiency efforts.

FEDERAL

American Recovery and Reinvestment Act (ARRA)

ARRA provides funding for a number of residential energy efficiency measures including:

- $5 billion for the Weatherization Assistance Program, which provides attic insulation, weather-stripping, caulking, and HVAC and furnace modifications. State recipients sub-grant funds to Community Action Agencies, public entities and nonprofit organizations.
- $3.2 billion for Energy Efficiency and Conservation Block Grants (EECBG) to implement GHG emissions reduction strategies that maximize benefits for local communities. 68% of funding goes to local governments who can sub-grant funds to nongovernmental organizations. $454 million of the EECBG funds will go towards competitively selected local energy retrofit projects. These projects will serve as national role models for grassroots retrofit efforts.
- $2 billion for Neighborhood Stabilization Program Grants to redevelop foreclosed properties. Funds may be used to improve energy efficiency or conservation. Competitive grants are available for states, local governments, nonprofits and public/ private partnerships.

HOME STAR Program (The President's Economic Recovery Advisory Board)

The President's Economic Recovery Advisory Board intends to jumpstart the growth of a large-scale home performance industry by launching the HOME STAR program as early as 2010. With the ambitious goal of retrofitting 100 million US homes, the program aims to realize a 5% reduction in the U.S. carbon footprint by 2030 while ensuring that ARRA workforce training graduates have ongoing job opportunities. As proposed, the program offers low cost consumer financing options and homeowner incentives that cover at most 50% of a home weatherization project's total cost.

Furthermore, it will provide incentives to major industry stakeholders such as Home Depot and Lowe's to encourage involvement in the development of the home performance industry. Enhancing the program's appeal is its low cost; HOME STAR poses minimal long-term costs to the government due to substantial savings in energy use generated by home retrofits. If adopted, the HOME STAR program would play a significant role in accelerating the growth of the retrofitting industry and creating jobs for thousands of U.S. workers. Greenlining recommends that the HOMESTAR program fund up to 100% of a home weatherization project's total cost.

CALIFORNIA STATE

AB 811 – Municipal Energy Efficiency Funding (Levine)

AB 811 permits municipal and regional entities to create sustainable energy financing districts. Financing districts allow property owners to finance energy efficiency improvements through a voluntary assessment on individual property tax bills. Property

owners avoid upfront installation costs of energy efficiency improvements. In addition, the repayment obligation remains with the property thereby addressing concerns that owners will fail to recover utility cost savings before the property is sold. The AB 811 financing mechanism improves energy efficiency opportunities for moderate-income households who are ineligible for low-income programs such as WAP and LIEE. The City of Berkeley, the City of Palm Desert, and Sonoma County have implemented AB 811 programs.

AB 758 – Energy Efficiency: Equity, Jobs and Green Buildings (Skinner, Bass)

AB 758 directs the California Energy Commission to implement a statewide energy efficiency retrofit program for existing residential and non-residential buildings. California already leads the nation with its energy efficiency building code for new construction. Drawing on federal stimulus funds for energy efficiency retrofits and recently approved utility funds, AB 758 will expand this code to the state's aging building stock.

Furthermore, the bill requires that energy efficiency programs run by the CPUC and publicly-owned utilities be in line with the Legislature's goals around energy efficiency and GHG emissions reductions. By providing an infrastructure for statewide implementation and increasing oversight of existing retrofit programs, the bill will achieve greater GHG emissions savings and will create new jobs.

AB 1405 – California Global Warming Solutions Act of 2006—Community Benefits Fund (DeLeon)

AB 1405 would establish a Community Benefits Fund, and would require a minimum of 30% of revenues generated from AB 32 market-based compliance mechanisms to be deposited in the fund. The California Air Resources Board would create a methodology to appropriate moneys in the fund to the most impacted and disadvantaged communities to reduce GHG emissions or to mitigate health impacts of climate change. The fund could be used to support residential energy efficiency, green jobs programs and public transit improvements.

SB 542 – Solar Energy and Energy Efficiency Programs (Wiggins and Strickland)

SB 542 would require the CPUC to develop and implement a strategy to expand participation of multi-tenant buildings in utility energy efficiency and solar energy programs. The bill would also ensure that the CPUC's strategy be cost-effective for customers and does not create additional ratepayer surcharges.

California Statewide Program for Residential Energy Efficiency (CalSPREE)

This past September, the California Public Utilities Commission announced its California Statewide Program for Residential Energy Efficiency (CalSPREE), which would provide $3.1 billion for utility companies to reduce energy consumption by 20% for up to 130,000 homes. This includes $100 million for education and training for all levels of the educational system to build a pipeline for energy efficiency professionals. The decision marks the largest commitment made by a state towards energy efficiency (CA Public Utilities Commission, 2009).

Local Climate Action Plans

Municipalities such as the Cities of Berkeley, San Francisco and Oakland have adopted local climate action plans that facilitate strong GHG emissions reductions efforts at the local level. These climate action plans typically include short-term and long-term emissions reductions targets. Oakland's plan, for example, calls for a 36% reduction below the 2005 level by 2020 and an 83% reduction by 2050. The plans help foster local support for efforts to clean up air pollution, create green jobs and improve energy efficiency among diverse stakeholders in the business, labor, social service, and science sectors.

Recommendations

As federal, state and local governments design and implement policies that facilitate residential energy retrofitting, community advocates must work to ensure that the resulting programs will be effective for low-income communities of color. The Greenlining Institute recommends the following to improve the effectiveness and community participation of residential energy retrofit programs.

Stakeholders Should Conduct Whole-Neighborhood Energy Retrofit Pilot Programs

To improve the efficiency of retrofit programs, public, private and nonprofit stakeholders should partner to invest in various pilot programs to retrofit entire neighborhoods across California. The pilot programs would provide valuable data on the real impacts of retrofits, as well as information about the challenges and best practices of implementing energy retrofits on a large scale. The implementation of pilot programs themselves would also help build community participation in monitoring and reducing household carbon footprints. The Environmental Defense Fund and San Francisco Community Power have launched one such pilot program with over 500 small businesses and households (Environmental Defense Fund, 2009).

Nonprofits Should Implement Energy Retrofit Programs in Their Communities

The participation of community stakeholders is central to democratizing energy efficiency programs for low-income and underserved communities. Residential retrofit services can build upon existing community development and social service programs by creating cost savings and improvements in health, safety and comfort for individuals and families most in need. CBO's should take advantage of funding opportunities established by the American Recovery and Reinvestment Act and increased attention to energy efficiency at the state and local level.

Resources such as Green For All's "Retrofit America's Cities Community of Practice" exist to provide technical assistance for the development of energy retrofit programs. Given their experience in working with low-income individuals and families of color, community-based nonprofits are the most poised to develop effective programs that maximize benefits for underserved communities.

Private Sector Should Invest in Greening Low-to-Moderate Income Neighborhoods

Residential energy retrofits are a worthwhile opportunity for corporations, banks and other private sector stakeholders to invest in low-to-moderate income communities. By insulating building structures, replacing outdated appliances and repairing heating and ventilation systems, private sector stakeholders can create a number of community benefits. Energy retrofits increase home values, reduce liabilities related to unsafe conditions in the home, build assets in low-to-moderate income communities and create jobs in the emerging green construction field. Furthermore, money not spent on utilities, heat or health liabilities from outdated homes are dollars available for savings and investment.

By investing in home retrofits, private sector stakeholders can play an important role in meeting the needs of low-to-moderate income communities. Corporations, banks and other private investors can subsidize programs to fund retrofits for individuals and families who do not meet eligibility for low-income rebates and subsidies. In addition, the current foreclosure crisis may be an opportunity for banks to invest in retrofits of vacant homes, which raises home values while reducing greenhouse gas emissions at the same time.

Public Sector Stakeholders Should Maximize Community Participation in Energy Efficiency

Policy makers and program administrators have been designing policies and programs to make residential energy retrofits accessible to all communities. Greenlining applauds this work and encourages public sector stakeholders to build upon these efforts. As

programs such as LIEE adopt new approaches like retrofitting entire neighborhoods, the public sector should provide additional support for CBOs experienced in the energy efficiency field to develop creative outreach strategies targeted at low-income communities of color. Program administrators should also streamline the low-income energy efficiency application process, which households feel are confusing and time-consuming.

A recent survey from 40 of the nation's largest cities found that few cities were making efforts to link new green jobs with the under- and unemployed (Living Cities, 2009). To maximize benefits to poor and underserved residents, retrofit programs should be aligned with green collar jobs programs. Furthermore, policy makers and administrators should build upon programs and policies that provide incentives for multi-tenant building retrofits such as the Weatherization Assistance Program, which qualifies multi-tenant buildings if 66% of units are eligible and PG&E's California Multifamily New Homes Program.

Program Administrators Should Improve Resources for Energy Efficiency Stakeholders

Given its numerous benefits, various actors in the public, private and nonprofit sectors are developing interest in residential energy efficiency. Policymakers and energy efficiency program administrators should develop resources to better link stakeholders to retrofit incentives. For example, established and respected community-based organizations can act as informational hubs regarding opportunities and incentives for home energy efficiency retrofits.

Conclusion

Compared to investments in renewable energy sources that have greater buy-in from private investors, like wind turbines and solar panels, residential energy retrofitting presents more viable opportunities to democratize the green movement. Retrofits of homes, office buildings and schools generate benefits in the form of reduced energy use, lower utility costs, improved health and safety conditions, job creation and community participation. To realize these opportunities, public, private, and nonprofit actors must collaborate to implement retrofit programs in local neighborhoods and to study their environmental, economic and health impacts.

With improved knowledge about the costs and benefits of retrofit measures, stakeholders can scale up these programs and include all communities across the state and nation in substantial efforts to reduce climate change.

The American Recovery and Reinvestment Act will facilitate the implementation of energy efficiency efforts on a national scale over the next two years. As California, like other states, reflects on its own emission reduction goals and sets policy to achieve its goals, finding sustainable solutions that bolster the local economy, influence policy, encourage investments, enhance education and job creation is fundamental. The Greenlining Institute encourages projects like the WNA, that bring together and benefit many diverse stakeholders.

Methodology

The estimates generated by our research result from a hypothetical study of a low- to moderate-income community in the Bay Area. Recognizing that several uncertainties about actual home energy use do exist, Greenlining embarked on this research to examine the potential of energy retrofits in underserved neighborhoods and to motivate actual implementation and monitoring of retrofit pilots in such communities across the state.

Our study utilized a sample of 36 single-family homes in census tract 3790 located in the City of Richmond in the San Francisco Bay Area. This data was provided by Rising Sun Energy Center, a Bay Area non-profit that surveys homes and installs energy and water efficiency devices. The data included home square footage, number of bedrooms, number of bathrooms, and year built.

Greenlining entered this data into formulas and online energy calculators provided by Lawrence Berkeley Lab, Pacific Gas and Electric , EnergyStar and the East Bay Municipal Utility District.
Since information regarding specific home features, appliances, lighting and insulation were unavailable, Greenlining assumed several home attributes based on characteristics of low-to-moderate income homes: possession of one refrigerator, one clothing washer, a central gas furnace, R-11 attic and roof insulation, two light bulbs per bedroom and one light bulb per bathroom. Please see the appendix for more information on the formulas and energy calculators used to quantify carbon emissions reductions from various energy retrofits.

References

California Public Utilities Commission. *CPUC Makes Largest Commitment Ever Made by a State to Energy Efficiency*. Press Release. September 24, 2009. Available at www.cpuc.ca.gov.

California Public Utilities Commission Energy Division. *Draft Whole Neighborhood Approach White Paper*. April 2009.

California Air Resources Board. *Climate Change Scoping Plan: Pursuant to AB 32 The California Global Warming Solutions Act of 2006.* December 2008. Available at www.arb.ca.gov.

Community Preservation Corporation. "CPC Launches $1 Billion Lending Program to Retrofit Existing Buildings." Press Release. September 30, 2009. Available at www.communityp.com.

Environmental Defense Fund. *Climate For Community Regulatory Proposal*. Available at http://edf.org/documents/8956_C4C-Regulatory-Proposal.pdf

Fuller, M. UC Berkeley Energy and Resources Group for the California Institute for Energy and Environment and Efficiency Vermont. *Enabling Investments in Energy Efficiency: A Study of Energy Efficiency Program that Reduce First-Cost Barriers in the Residential Sector*. May 2009. Available at www.uc-ciee.org.

Greenlining Institute. *Reduce Emissions, Retrofit Our Homes and Revitalize Our Neighborhoods.* 2008.

Green For All and Center on Wisconsin Strategy. *A Short Guide to Setting Up a City Scale Retrofit Program*. Available at www.greenforall.org.

Green For All and Policy Link. *Bringing Home the Green Recovery: A User's Guide.* 2009. Available at www.greenforall.org.

Hodges, J. for the Association of California Community and Energy Services, Communication Action Agency of San Mateo County, East Los Angeles Community Union (TELACU), and Maravilla Foundation. *Joint Reply Comments to the CPUC Energy Division's Draft Whole Neighborhood Approach White Paper*. July 2009. Available at www.cpuc.ca.gov.

KEMA for the California Public Utilities Commission. *Final Report on Phase 2 Low Income Needs Assessment*. September 2007. Available at www.cpuc.ca.gov.

Living Cities. *Green Cities: How Urban Sustainability Efforts Can and Must Drive America's Climate Change Policies*. May 2009. Available at www.livingcities.org.

Morello-Frosch, R., Pastor, M., Sadd, J. *The Climate Gap: Inequailities in How Climate Change Hurts Americans and How to Close the Gap. 2009.* Available at www.*college.usc.edu*

Oakland Tribune. "Berkeley High School to open yet another academy -- for green energy." October 1, 2009. Available at www.insidebayarea.com.

Pacific Institute for Studies in Development, Environment, and Security. *Neighborhood Knowledge for Change: West Oakland Environmental Indicators Project* January 2002. Available at www.pacinst.org.

"Putting Renewable to Work: How Many Jobs Can the Clean Energy Industry Generate?" By Daniel M. Kammen, Kamal Kapadia, Matthias Fripp – Energy Resource Group Goldman School of Public Policy (2004)

"Rebuilding America A Policy Framework for Investment in Energy Efficiency Retrofits," Bracken Hendricks, Benjamin Goldstein, Reid Detchon, Kurt Shickman, August 2009.

US Census Bureau. American Community Survey 2005-07. City of Richmond, California. Table B25091.

US Census Bureau. Census 2000. Census Tract 3790. Table DP-2, Table DP-3, and Table DP-4.

US Department of Energy. "DOE to Fund up to $454 Million for Retrofit Ramp-Ups in Energy Efficiency." Press Release. September 14, 2009. Available at www.energy.gov.

U.S. Energy Information Administration. *Short Term Energy and Winter Fuels Outlook.* July 2009. Available at www.eia.doe.gov.

U.S. Conference of Mayors, Mayors Climate Protection Center. *U.S. Metro Economies: Current and Potential Green Jobs in the U.S. Economy*. October 2008. Available at www.usmayors.org.

Appendix

Retrofit	Source	Source Address	Specifications
Attic Insulation	Home Energy Saver, Lawrence Berkeley Lab	http://hes.lbl.gov	Increase to R-30 attic floor insulation
Slab Insulation	Home Energy Saver, Lawrence Berkeley Lab	http://hes.lbl.gov	Apply R-5 grid foam insulation to exterior edge of slab foundation
Wall Insulation	Home Energy Saver, Lawrence Berkeley Lab	http://hes.lbl.gov	Insulate exterior walls to R-11
Exterior Door Weatherization and Window Caulking	Home Energy Saver, Lawrence Berkeley Lab	http://hes.lbl.gov	Weatherize doors and windows to reduce air leakage by 25%
Double Pane Windows	Environmental Protection Agency	http://www.epa.gov/climatechange/emissions/downloads/GHGCalculator.xls	Install Energy Star Model double pane windows
Refrigerator Replacement with Energystar Model	Energy Star	http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/Bulk_Purchasing_Residential_Refrig_Sav_Calc.xls	Replace inefficient model with Energy Star model with top mount freezer and through the door ice
Clothes Washer Replacement with Energystar Model	Pacific Gas & Electric	http://www.pge.com/myhome/saveenergymoney/analyzer/en/	Replace inefficient model with Energy Star model
Water Heater Blanket Installation	Pacific Gas & Electric	http://www.pge.com/myhome/saveenergymoney/analyzer/en/	Wrap water heater with an insulating blanket
Shower Head Replacement with Low Flow Shower Heads	East Bay Municipal Water District	http://www.documents.dgs.ca.gov/bsc/2009/part11_2008_calgreen_code.pdf	Install Low Flow Shower Head with 1.81gpm. Assumed 8.2 minutes per show and .74 showers per person per day.
Toilet Replacement with High Efficiency Toilets	East Bay Municipal Water District	http://www.ebmud.com/about_ebmud/publications/technical_reports/residential_indoor_wc_study.pdf	Install High Efficiency Toilet with 1.34 gallons per flush. Assumed 6.4 flushes per person per day.
Light Bulb Replacement with CFL	Energy Star	http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/CalculatorCFLsBulk.xls	Assumed 2 bulbs/bed and 1 bulb/bath; Light bulb use of 3 hrs/day
Dishwasher Replacement	Home Energy Saver, Lawrence Berkeley Lab	http://hes.lbl.gov	Replace inefficient model with Energy Star model with .58EF rating
Dryer Replacement	Home Energy Saver, Lawrence Berkeley Lab	http://hes.lbl.gov	Replace electric dryer with natural gas model
Furnace Replacement with Energy Star Model	Energy Star	http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/Calc_Furnaces.xls	Replace inefficient gas furnace with Energy Star model with 90% Annual Fuel Utilization Efficiency
HVAC Duct Insulation	Home Energy Saver, Lawrence Berkeley Lab	http://hes.lbl.gov	Insulate exposed ducts in unconditioned spaces to R-6
HVAC Duct Sealing	Home Energy Saver, Lawrence Berkeley Lab	http://hes.lbl.gov	Reduce leakage to 6% air flow
Programmable Thermostat	Home Energy Saver, Lawrence Berkeley Lab	http://hes.lbl.gov	Install Energy Star programmable thermostat

Inside back

THE GREENLINING INSTITUTE

The Greenlining Institute
1918 University Avenue, Second Floor
Berkeley, California 94704
T: 510-926-4001
F: 510-926-4010
www.greenlining.org

Contact:
Tara Marchant
Green Assets Program Manager
T: 510-926-4017
taram@greenlining.org