SUSTAINABLE CITIES INSTITUTE℠
Built by The Home Depot Foundation

CASE SUMMARY

PROJECT AT A GLANCE

Location: Charleston, SC

Population: 122,689

Area: 134 square miles

Timeline: 2010 – 2012

Main Partners: The Sustainability Institute, the City of Charleston, Southface Energy Institute

The Sustainability Institute (SI) is an award-winning, nonprofit, 501c(3) organization with a mission of empowering South Carolina communities to transform their homes and workplaces to conserve energy and reduce their overall environmental impact.

Charleston is the oldest and second-largest city in South Carolina.

Southface is a nonprofit organization that for more than 30 years has promoted energy, water, and resource efficient workplaces, homes and communities throughout the Southeast.

CharlestonWISE Impact Project

Charleston, SC

HELPING RESIDENTS REDUCE THEIR ENERGY USE AND HAVE HEALTHY, COMFORTABLE, ENERGY EFFICIENT HOMES

South Carolinians use more electricity per capita than 33 other states. The hot and humid climate presents unique challenges when tackling residential energy efficiency improvement issues. The CharlestonWISE Impact Project (CWIP) is a community-wide initiative to build the knowledge, awareness and workforce to help all residents have healthy, comfortable, and energy efficient homes.

The Impact Project:

- Conducted outreach and education to teach residents how to reduce energy use, save money and have more comfortable, healthy and energy efficient homes;
- Collected data on the most cost effective improvements to increase energy efficiency and reduce utility costs;
- Grew a skilled workforce to offer quality energy efficiency services and great customer experience;
- Developed special resources to address energy efficiency in our historic buildings while preserving these cultural treasures;
- Conducted 152 home energy assessments and 17 home energy retrofits on a variety of housing types and ages.

EDUCATION & OUTREACH

Outreach Strategies

The purpose of outreach and education was to engage the public and grow awareness about the benefits and opportunities for home energy improvements. Outreach was executed in a three-phased approach:

- **Phase One:** Solicit volunteers for 200 home energy assessments.
- **Phase Two:** Educate and raise awareness of home energy efficiency, and help advertise the CharlestonWISE program as a resource for residents to make home energy improvements.
- **Phase Three:** Share successes and broadcast findings and outcomes of the project to illustrate the effect and value of energy efficiency improvements.

A goal of the first year was to reach 1,000 residents through outreach efforts. Outreach activities contributed to over 450 direct contacts and an estimated 8,000 touches including circulation of earned media, viral marketing, and participation in community events and activities.

Outreach: Phase One

The first phase of the project focused on recruiting 200 participants and we quickly found that the more direct the contact was, the more likely people were to sign up and apply to become a part of the project. We had a good number of applications come in through the early press and word of mouth surrounding the grant award announcement, and built our base from there. Neighborhood associations were the next major target and we sent an email out to the City's official email list of association presidents and followed up with attendance at neighborhood meetings and a brief presentation at the Mayor's Roundtable, an annual meeting of community leaders, where we gave out numerous applications and made appointments to visit future meetings. A line was added to the applications about two weeks into phase one that asked, "How did you hear about the Impact Project?" This was incredibly helpful in tracking which of our outreach efforts were effective. Most participants filled out this section.

When a participant applied to the program a confirmation letter was sent to them that included another copy of the application along with a note encouraging them to pass it on to a friend or family member who may be interested. These were very successful, many people noted on their applications who referred them to the project in the "How did you hear about us" section. These word of mouth and direct solicitations proved to be one of our most successful outreach methods.

We also reached out to our partner and affiliate organizations including College of Charleston, Medical University of SC, City employees and other organizations to include information in their e-mail blasts and

PRESS COVERAGE

Starting with the charrette, we were able to get strong and continuous press coverage during the first phases of the Impact Project.

In phase two of the outreach campaign we gained more publicity in the local newspapers, including a story in a special "green edition" of the local weekly Charleston City Paper and two stories in the Charleston Post and Courier. One of the stories focused on the expansion of CharlestonWISE beyond the city limits and into Charleston County and resulted in over 300 applications for the program within two weeks.

CHARLESTON CITY PAPER

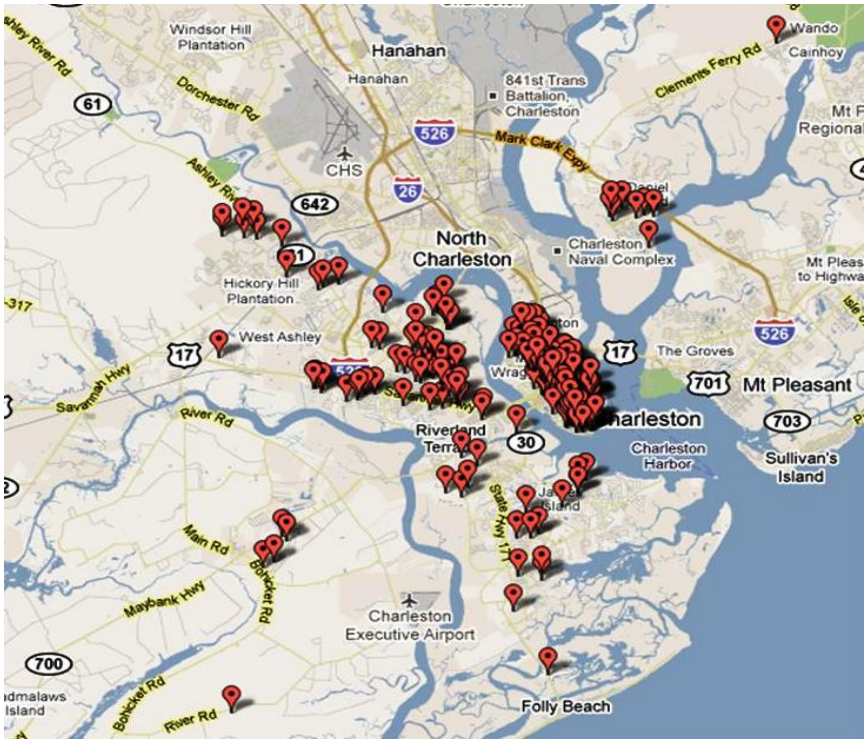
The Post and Courier

Historic Charleston

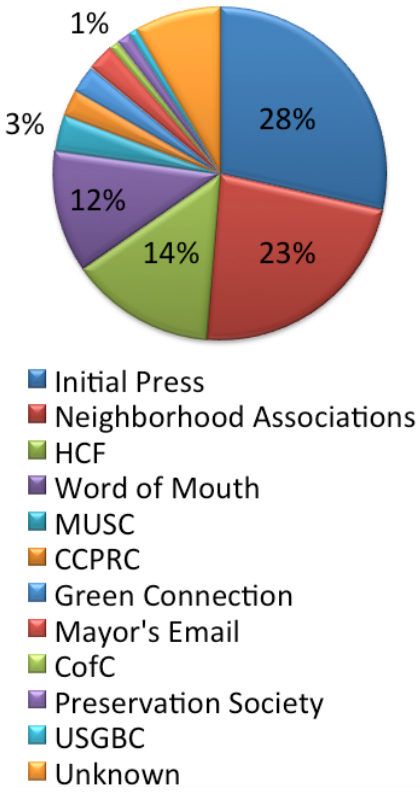
newsletters. We attended local events including the Charleston County Parks employee fair and MUSC's Green Day event and recruited applicants on site. Historic Charleston Foundation (HCF) was key to bringing in our historic homes. They sent a letter including an application to their easement holding properties and encouraged them to participate. That, coupled with presentations made to strongly rooted neighborhood associations in the historic districts of the city, led to a very high rate of interest from historic home owners. We had anticipated including 25 historic homes and ended up with 59.

Outreach: Phase Two

The focus of phase two was to educate both CWIP participants and the public about energy efficiency in their homes. The primary platform for outreach had been our workshops. All participants are required to attend a one-hour Home Energy Conservation Workshop offered regularly at venues across the city. All CWIP participants received a workshop schedule with their acceptance letter, and reminders were emailed and mailed out throughout the process. Workshops are also publically advertised through e-mail blasts, Facebook, Twitter, The Sustainability Institute website, the local weekly newspaper and word of mouth. One hundred and fifty five people have attended the workshops, meaning that at least thirty additional people attended (125 open call selections were made), many of these were additional members living in the same household, but some were new to the program and came to learn more about energy efficiency in the home.



PARTICIPANT LEADS



Above: *The chart shows the responses to the question "How did you hear about the Impact Project?" that was asked on the application form.*

This homeowner received a deep energy retrofit in 2012, projecting a 63% energy efficiency improvement.

Left: *Shows all of the households that applied to the Project. It is in part a reflection of the sprawling boundaries of the City and diversity of its geography. Efforts were made to hold workshops in all areas of the City.*

Outreach: Phase Three

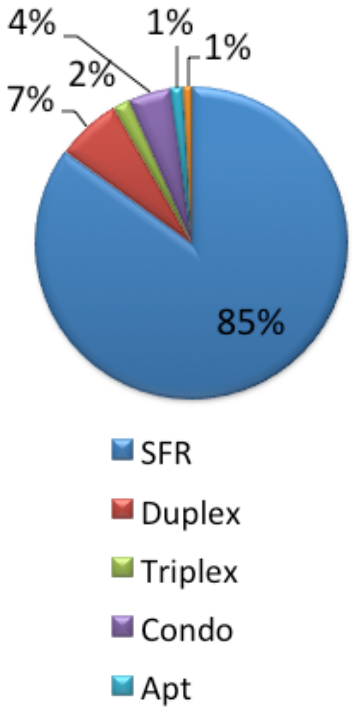
The third phase consisted of sharing our successes and broadcasting findings and outcomes of the project to illustrate the effect and value of energy efficiency improvements in Charleston houses. We broadcasted our progress on the Sustainable Cities Institute blog, documenting milestones in the project such as number of assessments completed, historic structures training being conducted and the visit of a great program advocate, the Reverend Jesse Jackson. We determined that a great deal of our information would be most appreciated by our peers and focused second year outreach efforts on spreading the word in a professional setting. The Local Project Coordinator attended several local and regional professional conferences, presenting sessions addressing the program and its findings. The focuses of these sessions ranged from the creation and teaching of the *Efficiency Improvements for Historic Structures in Warm and Humid Climates* to an overview of the intentional learning process to exhibiting the preliminary results procured from our energy assessments. These conferences included the South Carolina State Historic Preservation Conference, the U.S. Department of Energy's Better Buildings Residential Energy Efficiency Solutions Conference, the Association for Preservation Technology International 2012 Conference, and the EPA's Sustainability & Historic Preservation Conference.

Outreach: Key Contributors

As mentioned in the first phase of outreach, we did reach out to many local organizations and attended local events in order to recruit participants for the project. Upon analyzing our selected participant pool, we found that of these organizations, we had the most success in working with neighborhood associations. Working through these organizations gave us the most intimate connection with participants. Generally, neighborhood meetings were smaller groups of about 20-30 attendees, all there because they have a vested interest in their homes and their communities and are more likely to participate in a program like this. The second most effective outreach group was the Historic Charleston Foundation. Their messaging about the program and hosting of a workshop helped bring in a large number of historic homeowners.

We were fortunate to form a solid relationship with a local newspaper columnist who profiled the Impact Project and later CharlestonWISE in three stories in the local paper; this press was a huge benefit to both programs and led to most of the notoriety we received. The importance of word of mouth communication can never be overlooked, as in our case, giving out additional applications in reply letters and at neighborhood groups led to a very high rate of participants who knew each other and lived very close to one another. As the project proceeded, many would also tell friends, family and neighbors about the assessments and retrofits and we continuously had people calling to apply well into the project.

BUILDING TYPES



Above: *Most of our applicants live in single-family residential (SFR) housing, compared with the census report of 53% of city housing being SFR.*

Reverend Jesse Jackson visits with the team during a home energy retrofit

227 households applied to the Impact Project, a breakdown of their economic levels and building types, were two of the most important factors used in selecting participants.

Outreach: Target Groups

One goal of the Impact Project was to get an accurate portrait of Charleston households, so our target groups were vast in order to meet that goal. We aimed for and successfully procured participants from each City Council district, giving us geographic diversity; sought out houses of different age ranges and sizes, hoping to align with census figures and looked for households of varying income levels to represent different aspects of Charleston. We were successfully able to meet these goals in the pool of applicants that were selected, but out of 173 selected applicants, 43 dropped out, which altered the final pool of participants.

Education: Intentional Learning

The purpose of the intentional learning component of the project was to:

- purposefully chronicle the development of the project;
- track issues and challenges as well as success and solutions;
- harvest lessons learned and artifacts to inform other local programs as well as share with other communities seeking to implement a similar initiative.

The Intentional Learning aspect of the Impact Project was not as vital to the second year of the program. We were able to move into a more active period of the program where the focus was on getting participants moving through the process by executing their energy assessments and retrofits. By the end of the first quarter of 2012, we had a fairly solid workflow as follows:

Customer Preperation

- Regularly Scheduled Workshops
- Gather Customer Data (utility bills, household information)
- Assign an Energy Advocate

Advocate Involvement

- Advocate Preforms Energy Assessment
- Advocate Submits Report to Impact Project Staff
- Report Sent to Third Party for QA, then returned to Advocate as necessary

Final Report

- Advocate Sends Completed Report Back to Impact Project Staff
- Impact Project Staff packages Advocate's Scope of Work, REM/Design or REM/Rate Report and Home Energy Dashboard along with information on rebates and sends it to the participant
- If the Participant is Selected for a Retrofit they receive a home visit and are notified of their selection.

PROJECT PARTNERS

The Sustainability Institute

City of Charleston

Southface Energy Institute

Trident Technical College

Historic Charleston Foundation

Charleston Housing Authority

Preservation Society of Charleston

Center for Neighborhood Technology

Home Depot Foundation

QUALITY ASSURANCE

During the project, Quality Control and Assurance was monitored closely by the project team and also by third party verifiers. A comprehensive review process was established to analyze the energy assessment and retrofit quality. Performance testing was utilized for every home and REM/Rate software used for modeling purposes.

Above: The historic structures training moves from the classroom to the field for some visual inspections

HOME ENERGY ASSESSMENTS

The Impact Project conducted **152** home energy assessments on a variety of housing products and of varying household income levels. House ages ranged from being built in 1790 to 2006.

Average Age of Homes That Received Energy Assessments:

Project	vs	City Average
39%	1939 or earlier	14.5%
21%	1940 - 1959	13.5%
18%	1960 - 1979	22.1%
8%	1980 - 1989	15.7%
5%	1990 - 1999	14.9%

Note: More historic homes (built 1939 or earlier) were accepted to increase the ability to study historic homes and the historic homeowner market

Square Footage of Homes That Received Energy Assessments:

55%	1000 - 1999 sf
20%	2000 - 2999 sf
10%	3000 - 3999 sf
6%	less than 1000 sf
5%	4000 - 5000 sf
3%	unknown
1%	5000+ sf

Energy Costs

- Average Annual costs before CWIP: **$2,367**
- Average Annual costs 1 year after CWIP: **$2,060**
- Average Annual savings per household: **$307**
- Potential Annual savings predicted w REM/Beacon: **$475**
- Potential % of Annual Cost savings as predicted by REM: **19.8%**
- Potential % of Annual EE Improvements predicted by REM: **23%**

- Heating and cooling costs account for the highest energy expenses among participating homes followed by base load demands. The least expensive energy cost is water heating.

- Most common improvements include envelope air-sealing measures, insulation, duct sealing measures and installation and use of programmable thermostat (in that order).
    - 83% of houses had air-sealing recommendations, averaging 33% potential improvement in air penetration, ranging between 3% and 70% possible improvement levels.

ASSESSMENTS OVERVIEW

152 ***Completed Assessments***

Including:

59 *Historic Homes*

17 *Community Development Block Grant Homes*

49 *Charleston Housing Authority Homes*

By Income Level:

94 *Low income*

36 *High income*

21 *Moderate income*

1 *n/a*

Note: CWIP open call applicants were asked to identify income according to City of Charleston AMI levels and categorized under low (60% AMI or below), moderate (80% AMI), or high (median: 100% AMI or above)

IMPROVEMENT RECCOMENDATIONS

Envelope Air sealing	***83%***
Attic Insulation	***78%***
Duct Sealing	***76%***
Programmable Thermostat	***44%***
Baseline Improvements	***36%***
HVAC replacement	***26%***
Crawl Space Insulation	***24%***
Tankless Gas Water Heater	***18%***

Of the home assessment reports completed, the above is the order of most commonly recommended cost based improvements

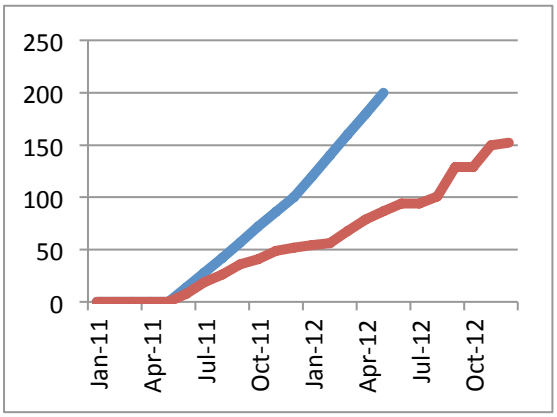
  - Attic Insulation was the next common recommendation, at 78%
- 26% of the homes tested would benefit from a complete replacement of the HVAC system, 4 % from an HVAC tune-up.
- Hot water heater replacement to instant tankless was a less common measure, being recommended for 18% of participants, but showed a high return for those it was recommended for.

Energy Assessments Post Year One

All Impact Project participants agreed to send in their utility data one year after receiving their energy assessment. By the time that 2012 came to an end, there were 53 participants who had reached the one-year point. Several attempts were made to contact these participants, via phone and email, to receive their 1-year post assessment utility data and to have them fill out a brief survey asking about any behavioral or physical changes they may have made to their houses. The Impact Project staff was able to obtain utility data from 26 participants and get survey responses from 17 of them. While this was far lower than the 100% response rate originally hoped for, it is a 49% response rate for the utility data and 32% for the survey. We feel that both of these response rates are enough to give us a solid foundation to understand how these houses are currently functioning and what kind of effect the Impact Project has had on their energy consumption.

Charleston City Paper – Jonathan Noncek

Part of the Project Team takes a break while reviewing plans



Left: This chart shows the projected number of completed energy assessments versus the actual number of assessments completed (200 vs 152).

POST ONE YEAR UTILITY DATA

Pre CWIP Avg Energy Bills	One Year Post CWIP Avg Energy Bills
Overall Monthly $177.67	Overall Monthly $170.85
Open Call Monthly $173.29	Open Call Monthly $163.16

Most of the year one utility data that was collected came from participants who came through the CDBG program and were not required to attend an Energy Efficiency Workshop, therefore they did not receive any information on behavioral and do it yourself changes that can be made to their houses. A smaller number of responses came from open call participants who were required to attend a workshop and did learn simple ways that they can improve the energy efficiency of their homes.

Only two of our retrofit households had met the one-year mark and both of them saw reductions in their annual utility bills, one at an annual savings of $80 and one at $236.51.

These costs do not take into account the recent SCE&G rate hike of 7% that took place this year, a lesson to be learned is that in the future the emphasis on data collection should be focused on kilowatt hours rather than dollar amounts and this will be a more accurate account of utility usage.

HOME ENERGY RETROFITS

Of the 152 homes that received energy assessments, 17 were chosen to receive energy retrofits. The homes chosen needed to represent a diverse product type, age, and geographic location. Home types included traditional Charleston single, stick framed, ranch, brick, and multi-story. The average square footage was 1433 sf with a range between 600 and 2794 sf. 12 contractors were utilized, 4 energy advocates, and 3 Quality Assurance groups during the retrofit process. The average cost of a retrofit was $5,626. The range varied from $850 per home to $20,000 reflecting a diversity of energy efficiency, comfort and health needs. Quality Assurance performance testing was conducted on each home.

Purpose of Retrofits

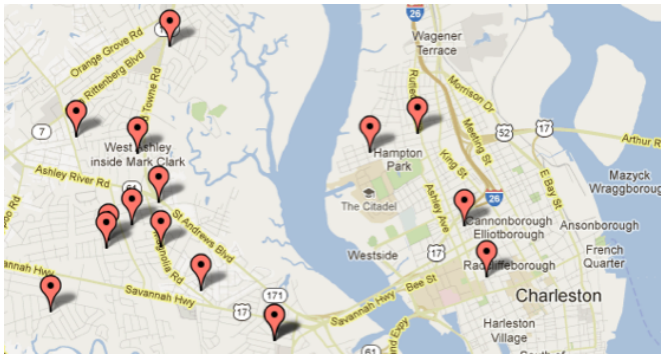
- Test real effect of suggested improvement measures, versus deemed savings
- Assist households less likely to be able to invest themselves in energy efficiency retrofits
- Develop workforce flow and labor force management systems to provide quality improvements and good customer experience
- Improve health, comfort issues, reduce utility costs and improve energy efficiency

Retrofit Selection Criteria

- Income (must be low or moderate)
- Geography (disburse across entire city)
- Age (include homes for each historic period)
- Fuel Source (include variety of HVAC systems)
- Health or Comfort Concerns

Projected Retrofit Savings

- 27% average energy efficiency improvements
- 22% average energy cost savings
- $570 average projected annual cost savings per home
- $9,683 total annual savings
- Average payback period of 10 years



Retrofit Locations

RETROFITS OVERVIEW

17 *Completed Retrofits*

Including: 4 Historic Homes (considered 1945 or earlier)

By Income Level:

14 *Low income*

3 *Moderate income*

Note: Participants were asked to identify income according to City of Charleston AMI levels and categorized under low (60% AMI or below), moderate (80% AMI), or high (median: 100% AMI or above)

Retrofitted Homes By Decade (1880 – 1973)

1880s	1
1900s	1
1930s	1
1940s	1
1950s	5
1960s	6
1970s	2

Average age of home - 62 years

This home built in 1959 received a energy retrofit that projected a 46% energy efficiency improvement and a 47% cost savings of $2,159 per year.

HISTORIC STRUCTURES CURRICULUM

The purpose of the Historic Structures curriculum was to fulfill a specific deliverable of this project by creating a resource that is currently unavailable in our region- a Building Performance Institute certified training class addressing how to make energy efficient improvements in historic houses in warm and humid climates. This training is geared towards contractors, energy auditors and historic preservation professionals. It combines the basics of historic preservation, including policy, architecture and materials with the principles of building science, including heat and moisture transfer. The crux of the class focuses on common energy efficiency improvements such as air sealing and insulation as well as suggested techniques that can be used to increase the energy efficiency of these buildings while maintaining their historic integrity and reversibility.

Curriculum Development

The process of the curriculum development was as follows:

- Assembled team of 6 building professionals to craft curriculum content
- Provided BPI training through Trident Technical College (TTC) to all team members not certified.
- Drafted curriculum and released to 30 local and regional individuals and organizations to vet and review the curriculum content.
- Hosted local vetting meeting including 11 local contractors, architects and craftsmen.
- Completed final curriculum, including feedback from vetting
- Taught the class to local building science professionals in January 2012, and a larger more geographically diverse group in January 2013.

Class Offerings

The first offering of the class took place in January 2012, and was hosted at Trident Technical College with three curriculum team members participating in the teaching of the class. The class was four days long with three days in the classroom and one in the field, visiting a masonry built historic house, a wood frame historic house and conducting a multiple point blower door test. A second class was offered in January 2013.

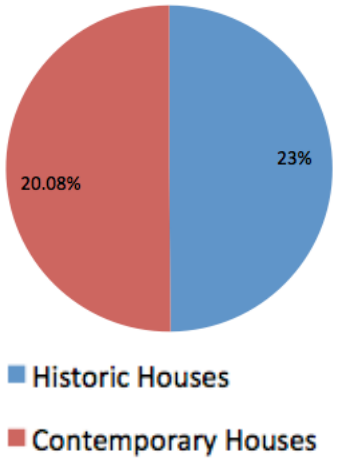
Historic Homes Findings

One of the larger goals of the Impact Project was to determine how Charleston houses are currently functioning, with a special focus on historic houses. The peninsula of Charleston consists of roughly 30% historic buildings and for any energy efficiency program to be successful

HISTORIC STRUCTURES TOPICS

- Introduction to Historic Preservation
- Historic Preservation Organizations and Resources
- Safety
- Building Codes and Regulations
- Building Science Basics
- Mechanical Systems Overview
- Historic Construction
- Weatherization Approaches for Historic Buildings
- Building Performance Institute (BPI) Blower Door Protocol
- Combustion Appliance Zone (CAZ) Review
- Field Work

PROJECTED PERCENT OF EFFICIENCY IMPROVEMENT



Above: *Historic homes were defined as any built before 1945, contemporary homes are any built from 1945 on. This date was chosen because of a change in building technique after World War II, where non-solid subfloors began to be commonly used.*

here it must understand how these buildings function and how they can be improved in a way that is reversible and sympathetic to the building materials. Another large concern for federally funded programs like CharlestonWISE is the Secretary of the Interior's Section 106, which requires each federal agency to identify and assess the effects their actions will have on historic resources. In South Carolina, the State Historic Preservation Office put into place a programmatic agreement with the Department of Energy for all efficiency programs that includes requirements on what can and cannot be done with federal funds and local contractors need to be aware of these policies when conducting work.

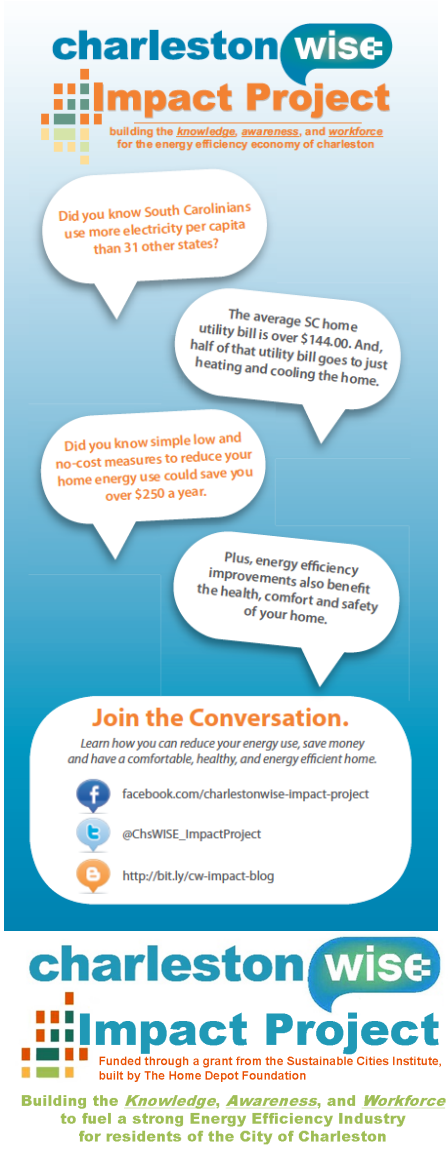
It is largely thought that all historic buildings are going to be inherently leaky and inefficient, but the findings of the Impact Project show that there may not be as big of a difference as believed. An analysis of the current energy costs of historic houses versus contemporary ones show a relatively small difference of $308.60 in annual operating costs. Partially because of this lower cost differential, it is not surprising that improvement potential does not show a great difference between housing types.

The findings show that historic houses in Charleston cost slightly more to heat, cool and light on an annual basis than contemporary ones, while they are averaging almost identical percentages of projected cost and efficiency improvement as contemporary houses. In this Project, 57% of our participants were low to moderate income homeowners, making less than $50,000 annually. Many of these homeowners may not have had the resources to properly maintain their houses, causing them to be less efficient than many houses of a similar age and building type. While this is more than half of the participants, the other 43% of participants make more than $50,000 annually and would have more of a chance at making regular repairs to their houses, therefore maintaining their efficiency levels. While this discrepancy exists, it is not enough to explain away the consistency of the efficiency levels seen in historic versus contemporary buildings, and does not negate the evidence that both types of buildings can easily make over 20% improvements in their efficiency levels.

In conclusion, from this pool of Charleston housing stock, 59 historic houses and 46 contemporary houses, it was discovered that the maintenance costs and efficiency improvements that are projected are not as dramatically different as may have been anticipated between these two types of houses. This is attributed to several reasons, including maintenance levels and the lack of quality construction seen in newer houses versus historic houses. More research would need to be done to profile these housing types, including size, building materials, sight orientation, equipment condition, etc would need to be perused to have a full understanding of how our housing stock is functioning.

Above: This home built in 1880 received a energy retrofit that included air sealing, insulation upgrades and a new efficient HVAC system.

Below: Project Collateral Examples



CHALLENGES & LESSONS LEARNED

- **Workforce** - Possibly the most important lesson learned in the Impact Project was the need for a stronger workforce that would be able to perform jobs and create reports in a timely manner. This lack of a robust workforce greatly slowed the overall process; because of this many participants who had been accepted to the program became unresponsive or dropped out. If we had been able to move participants through on a faster pace, we may not have had such a high dropout rate. 68 participants dropped out or stopped responding.

- **Participant Commitment** - One other presumed reason for the slow rate of matriculation is that once participants realized the level to which they had to be involved, some felt that they did not have the time to participate. The staff felt that we had communicated this level of commitment to applicants from the start, but we assumed that the potential for free home services outweighed participants rationale. A lesson learned would be to try to be more adamant in advertising the time commitment needed by participants, or to have a more in depth vetting process for applicants.

- **Historic Curriculum** - The curriculum development took longer than expected, it was originally intended to be taught in September 2011, then moved to November and finally to January, 2012. This was due to several varying reasons.

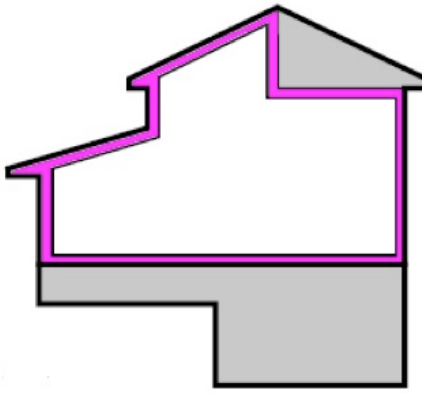
    - All team members had full time jobs and had much more limited availability than anticipated. This made it difficult to schedule meetings, for team members to work in sub-groups and to complete work in a timely fashion.
    - Team members were not proficient in transcribing the information needed to be taught as a part of the curriculum into classroom-ready materials. Therefore extra time was needed to edit and stylize the content.
    - There was a management shift with a main partner, which prevented them from being able to give the course the full support needed.
    - The vetting process was essential to curriculum development; the in-town session gave instant feedback and displayed the strengths, weaknesses and knowledge present in our workforce. It also demonstrated where resistance would come from.
    - Out of town vetting was essential for everything from catching grammatical and factual errors to giving the team the reassurance that the weatherization approaches suggested are practical and in line with federal guidelines.

Above: Project Collateral Example

Workshops were an important part of the project. Workshop audiences included contractors, energy advocates, homeowners, press, and local officials. Workshops were held in various locations around the city over a period of several months. The workshops were a great opportunity to talk about the project, educate participants about energy efficiency and a successful avenue for enlisting participants.

- **Gathering Data** - Throughout the project we have found that accessing participants' utility data is a difficult task. Many of our participants were either older or low income individuals who are not inherently computer savvy, making the process of creating an online account with their utilities, then locating, downloading and emailing their data very daunting. Many were uncomfortable with creating an online account at all, feeling that it might interfere with the way they received or paid their bill. Some did not like to have a stranger looking at their bills and payment history, while others who were computer savvy would be able to access and download the information, but then would make attempts to reformat the information, thinking it would be more helpful, but in reality, augmenting the data to the point that it was not useful. For a multitude of reasons, one of the biggest lessons learned is to give as explicit directions as possible for acquiring this data, be prepared to help participants access it, and leave more time than expected for people to turn it in. **Also,** in the future the emphasis on data collection should be focused on kilowatt hours rather than dollar amounts and this will be a more accurate account of utility usage. This will also help to better mitigate utility rate increases (a 7% rate increase went into effect during the project).

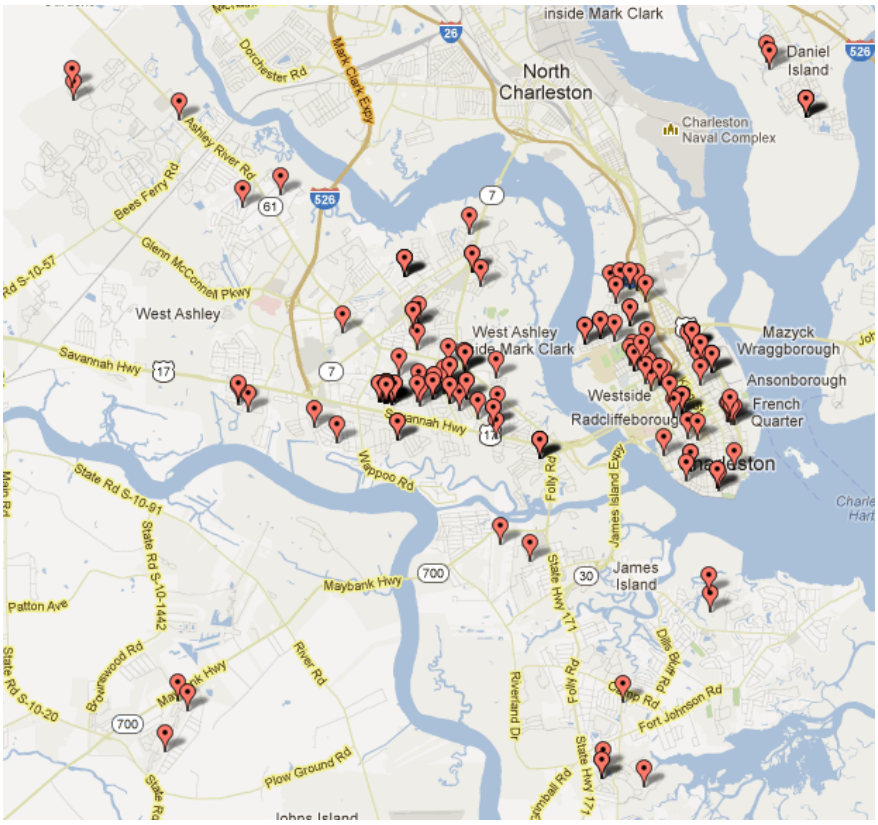
- **Workflow** - While we learned from our lessons of the first year and created a more solid workflow, it was still time consuming and subject to delays. The advocates were asked to have reports turned in within five days of completing the assessment and there were sometimes delays with this due to everything from scheduling conflicts to technical errors with the software to simple forgetfulness. The third party Quality Assurance firm was also held to a five day turn around, which they upheld on every case, but they were a bigger organization and had several people processing reports, because of this there could sometimes be confusion about what criteria were being used and how to explain errors to the advocates. Some advocates were occasionally confused and frustrated by the QA notes. Advocates were given five days to complete any necessary repairs, and did not always stick to this schedule, often times for the same reasons as listed above. The energy assessment portion of the project took longer then anticipated. The process of identifying a participant, gathering the required documentation, scheduling the assessment, conducting the assessment, performing quality assurance and reporting was lengthy and complicated, leading to delays and bottlenecks. The initial goal of 200 assessments was adjusted to 150 (we ended up with 152). The good news was that out of those 152 assessments, we were able to capture a solid representative sample of the current Charleston housing stock.



Above: The building ENVELOPE was consistently analyzed on all assessments and addressed on all retrofits. The envelope makes up the outer shell of the home: walls, ceilings, windows, floors, insulation, etc.

Above: South Carolina's energy consumption is among the highest in the U.S. The state ranks 17th in per capita energy consumption. Electricity costs are lower than the national average but the rates are rising and the need for energy efficiency awareness is growing.

The delayed assessment process in turn delayed the selection of retrofit candidates and contributed to the adjustment of retrofit goals from 50 to 17. We switched from a goal of performing a small amount of work on a large number of homes to performing a larger amount of work on a smaller number of homes. These retrofits were deeper in nature and provided opportunities to provide a more comprehensive and in-depth retrofit approach. Therefore, the reduced goal for retrofits is also a reflection of us needing to spend more money on each individual retrofit to learn the lessons we needed to learn and capture the data for the research component. At the beginning of the project, it was estimated that the retrofit jobs would cost on average $2,200 per home but the average ended up being closer to $5,600 per home. A variety of retrofit approaches were utilized on a variety of housing types. The range of cost on the retrofit jobs went from $850 to $20,000. Every retrofit job projected energy efficiency improvements of 15% or greater and we are excited to revisit these jobs after a year has passed to analyze utility data and the projected improvements.



Above: A map showing all 152 homes that participated in the Impact Project.

FOR MORE INFORMATION

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