Saratoga's First Green Home Tour: A Social Experiment

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ABSTRACT

Your single most significant impact on the environment is your home. As a result, the residential sector in the United States accounts for 40% of our carbon footprint and 68% of national energy consumption. But if energy-efficient homes have a smaller environmental impact and save residents money in the long-term, why don't more people build green homes or retrofit their existing ones? In this study, we explore the perceptions and behaviors of Saratoga County residents in New York State. Through a focus group with homeowners living in old, inefficient houses, we found that barriers to green building and retrofitting are perceptions of cost, time commitment, and aesthetics. From interviewing green homeowners, we found that the motivations for building green and retrofitting include long-term savings and investment, reducing reliance on fossil fuels, and health and accessibility. Understanding these competing perspectives, we planned and organized Saratoga's first Green Home Tour to evaluate whether or not a tour would change people's perceptions and resolve this dissonance. It did. For almost fifty participants, the tour educated them about the true cost of retrofitting, renewable energy systems, and green building design, ultimately convincing them of the feasibility and importance of living in a green home. Moving forward, we recommend hosting more green home tours and incorporating green homes into traditional home tours that occur throughout the country, as well as implementing local and federal policies that allow green construction to grow and flourish.

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INTRODUCTION: THE RESIDENTIAL SECTOR

Your home is the most important environmental decision you will make in your life: 40% of your carbon footprint comes from your personal use of energy and materials consumed in your home. 67.9% of the nation's electricity consumption occurs within homes (Romano 2008). In 2013, the residential sector contributed 22% of the total energy consumption, 21% of all carbon dioxide emissions, and 74% of all water usage (LEED for Homes Program Pilot Rating System). This consumption isn't coming in the form of renewable energy: for heating, cooling, hot water, and electricity in 2009, 61% of homes used natural gas, 43% used propane, 12% used wood, and only .01% of homes employed solar power (US Energy Information Administration). If we are to reduce our carbon emissions and reliance on fossil fuels as we transition to a sustainable society, we must first tackle the low-hanging fruit; we must reduce resource consumption in the residential sector by changing the way we currently build and develop alternative and innovative methods for design and construction.

DEFINING GREEN BUILDING

Green homes, also referred to as sustainable homes or high performance homes, are defined by how efficiently they use energy, resources, land, water, and materials, but the definitions are broad and different organizations and stakeholders define the concept differently. According to the EPA, these homes emphasize "protecting and restoring human health and the environment, throughout the building life-cycle: siting, design, construction, operation, maintenance, renovation and deconstruction" (EPA website). Thus, these homes attempt to use sustainable, renewable, or clean energy, are often built into the landscape with regard to the natural habitat, maximize the energy that the earth provides and that they use, minimize pollution and waste, prioritize the health of the residents living in them, extend the life cycle of the materials they use, and "expand

and complement the classical building design concerns of economy, utility, durability, and comfort" (EPA Website).

Private companies and green building professionals also employ a variety of definitions. For example, Four Walls and a Roof (FWR) Group Pty Ltd, an environmental consulting firm, expands the definition, stating that green homes "also require a holistic approach, beginning at the design stage and continuing on through the construction process and the eventual day-to-day running of the home. The main goal of these characteristics is to reduce the environmental impact a home will have over the course of its lifetime" (FWR Group). This definition differs from the first because it incorporates a more inclusive approach to the design and construction process, with concern for the entire lifecycle of the home. The Leadership in Energy and Environmental Design (LEED), the United States' Green Building Council's evaluating program, uses a specific set of measurements to assess green homes: energy, innovation and design process, sustainable sites, locations and linkages, water efficiency, materials and resources, indoor environmental quality, and awareness and education (Gardner 2011). With these similarities in defining what makes a home green, all of them share the basic tenets of minimizing fossil fuel usage, materials and resources, pollutants, and water throughout the designing, building, and construction processes, while also designing the home to maximize the earth's renewable energy in that particular location or ecosystem. Because the definition is broad and because there is such a wide spectrum of how green a home can be, we wanted to be inclusive in our definition throughout this Capstone project in order to showcase the many ways in which homeowners can interpret and execute green building designs.

If the goal of green building is to reduce the significant energy consumption in the residential sector, we must also remodel existing homes. The process of updating old or existing homes, called retrofitting, is an effective method to turn energy-hoarding, drafty houses into more sustainable resource-users, while saving existing structures, and therefore, materials. From the resource perspective, retrofitting is more environmentally conscious than building a new house

from scratch, as most of the materials and embodied energy already exist. Retrofitting encompasses a wide range of actions, from weather-stripping doors to installing new windows to insulating the frame of the house to replacing heating, cooling, and electricity systems. Like new green homes, retrofits seek to minimize energy consumption, water consumption, input materials, and pollutants, they just do so within the confines of a pre-existing structure (REgreen Program 2009). In a case study of a 1914 house in Massachusetts, a design and build team were able to do just "the easy things" to bring a house that was using about 20 percent more than an average home built today to reduce its energy consumption by 80 percent. They were able to accomplish this goal by insulating the outside of the house, screwing in new windows in front of the old ones, insulating the attic, and installing both solar electric and solar thermal for electricity and hot water. By keeping the integrity of the interior fully in tact, this team was able to add an extra few inches of insulation to the frame of the house and attic to reduce the energy consumption by eighty percent (Case Study—A Retrofit in Somerville, Mass). For existing construction, it makes both economical and environmental sense to save the plethora of embodied energy that already exists in a house and retrofit accordingly.

SO WHY AREN'T PEOPLE BUILDING GREEN? WHY ARE THEY?

Homeowners who have shown a desire to live more sustainably and see the consequences of climate change as our responsibility consider the environment when building and fixing their homes: "They constructed homes and lifestyles that were intended to serve as literal demonstrations for others, and they felt that living by example was an important type of activism" (Woodruff et. al 2008). These efforts are the most energy-conscious, cost effective, and logical building practices as we transition to a post-carbon economy. But green building isn't just for a niche market; for it to be effective for our environment and communities, the technologies have to be adopted as everyday practices: "The benefits of green homebuilding must be accessible, and

affordable, for every American family," agreed Michelle Moore, senior vice president of the U.S. Green Building Council.

To assess how accessible and affordable green homes currently are, organizations have conducted surveys to illuminate what motivates homeowners to build or renovate sustainably. In 2011, McGraw-Hill Construction surveyed one million green households in the U.S. to gauge their attitudes about their green home. The study found that 90% of the homeowners saw high quality and health of the home as important factors of green homes that are not guaranteed in a traditionally built home. The second was the affordability and savings that are byproducts of green building and remodeling. The vast majority (83%) said their new homes would lower operating costs; lower energy bills within the first year after purchase (79%); and also lower water bills within the first year after purchase (68%) (Malangone 2012). This survey shows that people are ultimately building green to save money, not to save the environment. Frightened by fluctuating gas prices and an unsustainable energy infrastructure, homeowners turn to energy-efficient technologies that are cost-effective and bring long-term savings.

While green homeowners see cost as their main reason for building green, cost, or perceived cost, is also the most significant barrier for those who choose not to build green and retrofit. Though there are a lot of new green technologies and design concepts, not enough people, including architects and builders, are educated about the offsets, investment, and savings to take advantage of the growing industry: "'Cost is the primary issue and is related to availability. High cost is also due to the unfamiliarity of the design team and contractors with sustainable methods'" (Landman 1999). Moreover, the lack of awareness has led many people to be wary of green homes: "'By far, the number one barrier that remains is lack of education about the economic benefits of this approach'" (Landman 1999). The myths and misconceptions regarding the price and investment cost of green building creates hesitant consumers who will simply build with conventional methods.

A University of Michigan journal study suggests that the barrier to building green goes beyond technology and economics into social and psychological reasonings. Today's lifestyle calls for fast solutions with simple strategies, a term called cognitive heuristics. Although these heuristics are frequently useful for short-term thinking, they can lead to decision-making biases that may prevent long-term, sustainable thinking (Bazerman 1998; Hoffman, Henn 2008). One of the most prevalent biases in green building is the perception of cost. On average, green buildings were thought to have a "higher capital or construction cost than conventional buildings, on the order of 2 percent, or $2 to $5 per square foot" (Bazerman 1998, Kibert 2007, Hoffman., & Henn 2008). Many people believe that to build green, you need a large budget and a lot of time. From the McGraw Hill survey, however, 56%, of those surveyed who bought a green home earned less than $75,000 per year; 29% earned less than $50,000. More recent studies have shown the capital cost of green building declining as the industry expands. A study by Davis Langdon concluded that "Many projects are achieving LEED within their budgets, and in the same cost range as non-LEED projects" and that "there is no significant difference in average costs for green buildings as compared to non-green buildings" (Hoffman, Henn 2008). Therefore, increasing the green building industry and encouraging people to build green will require more than simply changing policy or expanding markets; it will require dispelling popular myths about higher costs and more effort on the part of the homeowner.

The assumption that investing in environmentally friendly technologies will create negative economic impact is also a longstanding theory for many hesitant to invest in green technologies. A survey by the World Business Council on Sustainable Development (WBCSD) found that people commonly overestimate the cost premium of green building to be between 11% and 28% more than a normal building, with an average overestimation of 17% (WBCSD 2007). In reality, the cost difference is close to zero when comparing traditional and LEED-certified homes. Again, these

common misconceptions demonstrate the lack of accessible information about the costs of green building options and technologies.

Another one of these misconceptions revolves around the concept of payback period: "Respondents feel that significant economic barriers remain—particularly in terms of first cost problems and perceptions, as well as the lack of accounting for and recovery of long-term savings" (Landman 1999). Homeowners commonly believe that a long payback period will impede on aspects of today's average American lifestyle, like mobility. About 1 in 6 Americans move each year, and with the average tenure in a single home being 6 years, consumers often assume that returns must be close to immediate (Lautz 2008; Hoffman, Henn 2008). The economic benefits may not be realized if the payback period is longer than residents are planning to live in their homes, and there is even more resistance to invest when the energy saving techniques are not aesthetically pleasing or are hidden. Investing capital in upgrades that are hard to see (extra insulation, tighter windows, energy-efficient water heaters), does not compare to the psychological payback of tangible items like a new jacuzzi, kitchen renovation, or new addition (Hoffman, Henn 2008). These perceptions imply that traditional homeowners are shortsighted in terms of costs, while preferring tangible, more visible home improvement projects.

Another observation of the resistance to green building is the association of green building with a certain subculture: the hippie culture. They often recall cheese wedge house forms or commune-style living popular during the 1970's energy crisis and create the unsubstantiated assumption that all green buildings involve unconventional aesthetics, alternative lifestyles, and non-traditional building materials (such as straw bale and rammed earth) (Hoffman, Henn 2008). For many, the term 'green' is linked with the environmental movement that attracted a lot of liberals, potentially alienating conservative citizens to whom the environment has become a political issue.

A final reason why people aren't building green is because the industry is still so young. Green homeowners reported that they 'had faced numerous challenges in their efforts to become more environmentally responsible, and expressed that support from community, government, corporations, etc. was generally inadequate (Woodruff et. al 319). These larger, institutional barriers include a lack of green building curricula for architects and contractors, little, if any, standard operating procedures within construction and real estate, and inconsistent local policies including design guidelines from planning boards, zoning boards, and building codes (Hoffman, Henn 2008). Many small architectural and construction firms do not yet implement green building techniques, and therefore consumers are not yet aware of alternative building methods and materials.

While there are many energy and financial savings from building green and retrofitting, the inaccurate perceptions about cost prevent these actions from becoming mainstream, as traditional homeowners associate them with environmental action rather than choices that are fiscally responsible. And because green building is still so new, existing perceptions about the inability to find green contractors and the extra effort green homeowners might endure merits some of the hesitancy expressed by the general public. Thus, green building and retrofitting are considered an ideological choice as opposed to an economic one. If we're going to truly reduce the energy consumption in the residential sector by building green and retrofitting, it is clear that education with an emphasis on fiscal responsibility, dispelling of popular myths, and educating the construction workforce will have to be the first part of the transition.

CAN A GREEN HOME TOUR CHANGE PEOPLE'S PERCEPTIONS?

One method that has worked to change some of these existing perceptions is through the presentation of green houses through home tours. Conventional home tours occur in cities and towns throughout the world; their purpose is to feature and promote architects, builders, products,

furnishings, and interior and exterior design (Saratoga Builder's Association 2012). Modeled off these popular events, green home tours are recently being implemented around the country to help raise awareness of green homes, to showcase examples of existing success in green homes, and to provide experiential workshops and demonstrations of sustainable home features for the public (Green Home Tour-Northwest Ecobuilding Guild 2012). In order to understand the potential success of sustainable homes, past researchers have attended green tours and interviewed homeowners. Woodruff et. al found that sustainable homeowners routinely give tours of their homes to inform the public about its features (2008). The American Solar Energy Society (ASES) holds an annual Solar Tour, showcasing energy-efficient homes in Boulder, Colorado. DiGrazia, the ASES Solar Tour manager, elaborates in his article that in the survey that 600 attendees completed after the tour, 80 percent admitted that they were more likely to invest in renewable energy technology and production (DiGrazia 2005). Similarly, the Solar and Green Buildings tour in Buffalo, New York experienced its 17th annual tour this past year. By showcasing 35 homes and institutions, the group increased the public's knowledge about solar power and energy-efficient home renovations (Watson 2012).

These tours are one approach to raising awareness of sustainable opportunities for the built environment, and can also serve as models to replicate elsewhere. For example, a study completed by Mary E. Lane in 2010 evaluated the possibility of building green housing in New Orleans' Lower Ninth Ward by using green tours to provide examples of the developmental possibilities in the city (Lane 2010). Ultimately, these studies demonstrate that tours are useful in advertising for and promoting green technologies. However, it is unclear whether or not these tours are effective methods of educating homeowners and changing their perceptions about the innovations and cost-effectiveness of green home building and retrofitting. Thus, it is imperative to know whether or not a home tour is an effective method of education, what aspects of a tour are most convincing, and ultimately, by what margin green home tours actually change people's perceptions and behaviors.

THE EDUCATIONAL POTENTIAL OF A GREEN HOME TOUR IN SARATOGA SPRINGS

Saratoga Springs, NY is a historic small city in Upstate New York that has recently seen the influx of a booming technological industry, bringing in a diverse group of residents both socio-economically and politically. The population is growing, increasing the demand for houses, but the history, like the old houses, is still very much embedded into the culture of the town. To celebrate this history, there are many annual home tours, none of which showcase specifically green homes. Additionally, because of the proximity to the Adirondacks, the strong community feel, and the well-educated residents, there is a lot of engagement with environmental concerns (Johnson et. al 2013). Thus, Saratoga Springs is the perfect place to study the barriers to building green and retrofitting, the specific reasons as to why some people *do* build green, and to study the effectiveness of how a green home tour can resolve the dissonance between these competing perspectives.

For the purpose of this study, we divided our research into three main methods to understand and evaluate the different reasons for green building in Saratoga Springs. First, we held a focus group of traditional homeowners who live in old, energy-inefficient homes to learn what their perceptions are of retrofitting and the barriers that prevent them from doing so. Second, we interviewed green homeowners and green builders to understand why they chose to build green and the challenges they faced along the way. Finally, we organized a Green Home Tour as a social experiment to find out to what degree we could educate residents and influence their perceptions and behaviors regarding green building and retrofitting.

WHY AREN'T DRAFTY HOMEOWNERS RETROFITTING?: FOCUS GROUP

METHODS

To have a better understanding of why green building and retrofitting isn't more popular, we needed to gauge the perception of conventional homeowners to see why there is such hesitancy

to invest in energy-efficient and cost-effective retrofitting techniques. On February 15, 2013, we conducted a two-and-a-half hour focus group session with nine educated women homeowners between the ages of 35 and 55, who currently live in old, "drafty" homes in Saratoga Springs, New York. We interviewed women because a Lloyd TSB survey showed that 52% of the household economic decisions, like future savings and spending, are decided by the head female (Marsden 2012). We asked them questions on the state of their current home, how they heat their houses, different home improvement projects they've completed, their knowledge about home energy audits, and their pre-existing ideas about green homes and technologies.

RESULTS

One of the first things we discovered was that most of the focus group women paid unnecessarily high heating bills, ranging from $600-800 dollars during the winter months. Noting these high costs, we asked the homeowners if they had conducted home energy audits to pinpoint the aspects of their houses that could be insulated or renovated to reduce their utility bills. Eight of the nine women said they would not conduct and had not heard of an energy audit: "We know what we would find in an audit, and we think it would be expensive." One of the women had researched how to conduct an energy audit, but could not find a local professional who could perform it.

When asked about energy-saving projects, such as insulating walls and replacing windows, the women were completely uninformed about the processes and the costs. Most of the women saw these changes as insignificant projects that would ultimately cost them more money than they would save. Some thought that "It is physically impossible in an old home." Others thought that the projects would be too difficult and require more work than they were willing to put in; one woman expressed, "I would think that you would just have to tear the whole house down!" They believe that their older homes have layers of problems which, once uncovered, opens a "pandora's box,"

revealing other projects that are finicky, costly, and timely (Focus Group with Drafty Homeowners 2013).

We also found that the women deeply valued the aesthetics and historic preservation of their homes. For example, many expressed sentiments that "Windows are too expensive to replace, and the ones that the house came with are beautiful and fit in with the historic design." In general, they believed that retrofitting and green building would undermine the historic integrity of their house, and that the two cannot coincide. Their concern with aesthetics also had to do with their allocation of money for other, more visible home improvement projects. One woman said, "[Retrofitting is] not a satisfying use of my money, I can't show it off to my friends. I would rather go on a trip or redo my kitchen."

Each of these women viewed their current houses as temporary, and only one planned on living in her house for more than 10 years. Thus, they thought that the payback period of retrofitting would be longer than they were planning on living there. Lastly, we asked a question pertaining to everyday sustainable behavior, like composting, buying local food, and riding a bike as a form of transportation, because we wanted to see if they practiced environmentally altruistic behavior or engaged in other pro-environmental practices. All of the women try to consistently buy local food from the Farmer's Market and had exchanged light bulbs for more energy-efficient ones; a few of the women compost, all of them recycle, and three of them drive Toyota Priuses. But to them, the house itself is not part of their environmental consciousness, nor is it a canvas for practicing pro-environmental behavior (Focus Group With Drafty Homeowners 2013).

DISCUSSION

The focus group illuminated common reasons as to why traditional homeowners don't invest in energy-efficient technologies. Although none of the women had conducted an energy audit, all of the participants thought they had the best understanding of their homes, where the energy

losses occur, and thought an energy audit would cost them money to tell them information that they already know. In reality, an energy audit supplies detailed information about specific locations of home energy loss and provides suggestions for improvements with effective results and quick payback periods. The $600-800 monthly heating bill provides proof that all of the women were somewhat content with their energy losses and saw it as constant problem that they didn't want to fix with more upfront costs. The homeowners' lack of interest and personal beliefs that they already know their home better than a professional demonstrates their ignorance when it comes to the potential to save money and energy. In fact, energy audits are free for residents of New York under a certain income bracket in which all of these women fall under (NYSERDA 2013).

A lot of the women believe that insulation and other less-visible improvements are not worth the time or money. From the results, many of the homeowners agreed that if the renovation is not visible or aesthetically pleasing it will not be as appealing to them as renovating a kitchen or bathroom. Thus, many of the women saw the aesthetics of their home as the most important feature, which implies short-term thinking and a "keeping up with the Jones"' attitude.

With that, these women live in homes more than 50 years old, and preserving the traditional features, like the windows and doors, are significant to the structure of their houses. But they also believe that by applying even the smallest renovation like attic insulation, they will unlock a "Pandora's box" full of problems. Again, these misconceptions demonstrate these homeowners' ignorance regarding what retrofitting actually entails. Many historic buildings have been retrofitted without opening this pandora's box, yet the focus group women were convinced that retrofitting a historic home would undermine its integrity. Moreover, these misconceptions demonstrate the negative perceptions historic homeowners might have with retrofitting and are reflective of the myths and misconceptions about retrofitting throughout the country (Landman 1999). Finally, these misconceptions imply the dearth of education there is for conventional homeowners about money- and energy-saving techniques in their homes (Woodruff et. al 319).

One of the more surprising analyses we found was that all of the participants plan to move out of their current houses in the next ten years. This finding correlates well with the fact that one in every six Americans move every year (Hoffman & Henn 2008). But the fact that all of the women wanted to move out allowed them to justify their reasonings for not seeing green home improvements as financially feasible; visible home renovations are easier to sell to potential buyers. These ideas demonstrate the lack of education in the real estate industry, which is also focused on aesthetics and not necessarily the long-term savings for potential buyers.

In attempting to better understand the environmental motivations of the focus group women, we asked them what kind of sustainable behavior they *do* engage in, and many of them are actually trying to live environmentally conscious lifestyles. They compost, buy local food, recycle, and three of them even drive Toyota Priuses. Thus, they're not unaccustomed to potentially paying a higher premium for being environmentally friendly. What's surprising, though, is that they have no idea that the biggest part of their environmental footprint—their house—is probably undoing all of the pro-environmental behavior that they go out of their way to do. This demonstrates a complete lack of awareness and education and the true discrepancy between what they think they are doing to help the planet and what they are actually doing in terms of energy consumption and pollution.

Through the focus group, we realized conventional homeowners' complete lack of credible knowledge about green building and retrofitting technologies. After hearing the negative perceptions of these technologies, we realized the importance of educating homeowners about retrofitting opportunities. The opinions of these nine women mirror other homeowners' fears about energy and monetary saving techniques for older homes (Landman 1999).

WHY *DO* SARATOGIANS BUILD GREEN HOMES?: INTERVIEWS

METHODS

In order to gain an understanding of why homeowners would decide to build a green or retrofit a house, we interviewed green homeowners and green building professionals. We interviewed Karen Kellogg and Sean Crotty, two homeowners who are currently building in Greenfield, and Liz Kormos, who is almost finished building her home in Ballston Spa. These interviews were used to understand the current process of building a green home and the motivations and challenges of building in a green market. Next, we spoke to green homeowners Nancy and Don White and Tom Stock, who were directly involved in designing and building their own green homes to learn what drove their decisions for the different technologies used and their building techniques. We interviewed homeowners Joanne and Paul Coons, Justin Bergin, and Polly Windels and Steve Stark to learn why they retrofitted their houses and implemented the specific practices that they did. Finally, we spoke to green professionals John Blough, Bruce Brownell, and Karen Totino to gage the awareness and demand for their services and products.

RESULTS

We interviewed Karen Kellogg, who is in the process of building a green home in Greenfield, NY. Karen wants to build a green home to lower her personal carbon footprint as a commitment to the environment. Her home will not only incorporate energy-efficient technologies, but will also encompass the aspects of sustainability including supporting the local economy by buying locally-sourced materials. Karen is currently facing difficulty in finding a general contractor to build and design her home, so she conducted her own extensive research (Kellogg 2013).

Sean Crotty is also currently in the process of building a green home, which he's using to justify his career as a pilot: "I pull people and commodities around the world; I will never offset the carbon that I have emitted. I want to show what is possible on this smaller end." Not only is Sean dedicated to offsetting his emissions, but he is adamantly against the use of oil: "I have spent a lot of time flying troops to and from places where I thought we were just there because of oil. These

repeated trips got to me and I began to think of what we can do ourselves to show what is possible, maybe not fiscally responsible, but possible." Sean takes the holistic approach to building, including the use of sustainable materials for his future home. He has found difficulty in finding contractors to build his house and has taken on the role of general contractor on his home project (Crotty 2013).

Liz Kormos and her husband Sander Bonvell, residents of Ballston Spa, are in the final stages of building their new green home with the help of contractor John Blough at Ethos Design, LLC. With an MBA degree, Liz cares about money and the economic factors contributing to her home. She plans to "age in place" in her last home and not worry about climbing utility bills. Liz plans for the future with accessibility in her home to accommodate old age and lack of physical mobility; similarly to his client, John started early in the house design thinking about the structure's orientation, insulation, and windows. With Liz's concern about the price of her new home, she has been careful and aware of every purchase that she makes and wants to inform the public that "the connotation that building green is for the rich and subsidized, is untrue...it can be affordable for the middle class, too" (Kormos and Blough 2013).

Nancy and Don White designed and built their green home in Rexford, NY in 2009. They encountered difficulty in finding contractors to build the home that suited their needs. Thus Nancy, after nine months of reading, took on the role of general contractor. The main goals when building their home included: the ability to move around the house with ease without obstructive barriers, a space in the room large enough to serve as a classroom for Nancy's free weekly classes, and a home that would be energy-efficient, making use of both a passive solar design and PV and solar thermal technology. Additionally, they selectively chose materials to build the house with low embodied energy, which means the material itself does not require a lot of energy to create and install (White and White 2013).

Tom Stock, another green homeowner, built a home that is completely off the grid in Corinth, NY. The reasons for disconnecting from the electric grid stem far back into his childhood

growing up among seven siblings, where frugality was drilled into his head. When he bought the property for his house and learned that he would have to pay $70,000 to install a new power line to provide energy for his home, he chose instead to pursue alternative and cheaper energy sources such as wind, solar, and thermal mass. In response to why he chose the technologies that he did, Tom states, "If you could build a new house, and you could build it anyway you want, why wouldn't you build it more efficiently and cheaper to operate?" In response to a question about his mission to save the environment through his minimal energy use, "it just seemed smart." Tom encountered many barriers from architects and contractors not understanding his design and energy requests, so he became the general contractor of his house. He chose to plan ahead for the future and create a home that he could live and grow old in. Yes, Tom admits to altering his lifestyle a little with his home's alternative adjustments: "if you only have 3 kwh/day, you conserve them and use them sustainably; you have to change the perceived notions of what you need" (Stock 2013).

Joanne and Paul Coons call themselves "energy nuts and house fixer-uppers." As residents in Clifton Park, they looked to downsize after their children moved out and started the search for a new home that suited their needs. They found an old dilapidated house built in 1830 that was deemed historic, and they chose to renovate it and move in. When retrofitting and building, they had three main goals: to maintain the historic character of the building, to create a green home that would be sustainable, and to make their home net-zero to generate more energy than they would use. When asked about the costs of retrofitting and implementing their photovoltaic panels and geothermal heat, Joanne states, "we invest our savings in energy, not stocks, like most people." Joanne and Paul no longer wanted to pay a utility bill every month when they'd be on fixed incomes. Joanne explains, "Back in the day they called it being frugal; now they call it being sustainable" (Coons 2013).

We also interviewed Justin and Susan Bergin, a young engineer and doctor living in Saratoga Springs, currently implementing changes and retrofitting their recently purchased home. As a new

couple, the Bergin's bought their home with the intention of raising kids and living in it forever: "We wanted a forever home, and we are more willing to invest in something that we will live in for a while." They had recently conducted an energy audit in their home and had begun to tackle the energy inefficiencies. Justin, as an engineer, spearheaded the research on retrofitting, but found that many contractors couldn't complete his requests or didn't know about the technologies he wanted. Through their research, they found many grants and tax credits through NYSERDA. Their motivations for retrofitting included their altruistic beliefs in protecting the environment, but were coupled with the monetary benefits: "We were willing to pay a price to be green, but it just so happens that it is also economical" (Bergin 2013).

Polly Windels and Steve Stark, the third retrofitting homeowners we interviewed, reside in the town of Ballston. Both are retired and purchased their dream home, a farmhouse in which they plan on living in forever. They are inclined to environmentally friendly behaviors and were involved in the beginning of the recycling initiative in Saratoga Springs. Their reasons for implementing their solar system were that they wanted to minimize their fossil fuel usage and to save on their utility bills., They were able to slash two thirds of their bill each month. In response to the money invested versus saved, Polly says, "the money you save becomes another source of income. We had some money in a mutual fund and found that after fifteen years we had made $125. We invested in solar and now we make that amount back every month" (Windels and Stark 2013).

Finally, we interviewed Karen Totino and Bruce Brownell, both involved in the green business industry. Karen owns Green Conscience in Saratoga Springs, a home and garden store that strives to be a leading source of sustainable building materials and natural products. She notices that most of her clients "buy my products because they are concerned about the health effects of the materials rather than about the environment" (Totino 2013). Bruce Brownell is the founder of Adirondack Alternative Energy, a firm that specializes in building passive solar homes. Bruce, a product of the sixties, has supported solar energy for decades. He spoke at the first Earth Day in

1970 on the benefits of solar power. He adamantly stated, "if we had followed the road to solar back then, we would have saved ourselves from a couple wars today" (Brownell 2013).

DISCUSSION

Many consistent themes surfaced when speaking to the green homeowners and builders; many of the interviewees shared the same motivations for entering the world of building a green home or retrofitting their existing one. When questioning and listening to the homeowners, economics and the monetary value of their homes became the most obvious priority in building green, and many of the homeowners described their conserving habits as frugal rather than sustainable. Polly Windels and Steve Stark, the Coons', the White's, and Liz Kormos and Sander Bonvell are all retired or soon to be living on fixed incomes. At this point in their lives, they wanted to minimize their expenses and cut down or eliminate their utility bills. While Tom also wanted to eliminate his bills, he initially invested in alternative energy because it was actually cheaper for him than to install a power line connected to his house in an undeveloped and forested area. Sean specifically was disinterested in handing over checks to national grid each month when he knows there are more fiscally responsible methods of powering a home. Justin, as an engineer, was naturally interested in alternative technologies and decided to reap the benefits of the state grants and tax credits while also minimizing his monthly bills. While most homeowners and builders are skeptical of green building because they perceive it to be more expensive than building or renovating a standard home, these green homeowners validated that a legitimate reason to build green is to save money. This dissonance between cost perceptions of conventional homeowners and green homeowners illustrates the need for education that focuses specifically on resolving this discrepancy by focusing on long-term savings.

Another common motivation for building green that appeared throughout the interviews was building a new home for health and accessibility. All of the homeowners we interviewed plan

to live in their house for the rest of their lives, so they want their home environment to complement their aging process; they used terms like "aging in place" and "forever homes" to describe the ability of their houses to adapt to their physical condition. Because these homes are built to suit the needs of old age, they are built for accessibility, including features such as one-level homes and wider spaces for wheelchairs. Liz Kormos, Nancy White, Tom Stock, and the Coons' specifically addressed the anticipation of functionality of old age in their homes. Included in their desire to age-in-place is their intention to live in a healthy house that has good indoor air quality and is non-toxic. As Karen Totino mentioned when talking about her primary clientele, people, especially those living in air-tight houses, are willing to pay a higher premium for non-toxic paint, non VOC-emitting furniture, and even the installation of a plant ventilation system (White and White 2013). While health and accessibility are not necessarily characteristic of a green home in particular, this long-term thinking perspective embodies the practices of sustainability (Slaughter 1996).

Finally, many of the homeowners were motivated to build green for altruistic reasons to protect the environment by conserving resources such as fossil fuels and minimizing their carbon footprints. Sean specifically experiences a passion for using alternative energy in his new home because he feels personally responsible as a pilot flying abroad to countries that were exploited for oil. Additionally, he feels guilty for the quantities of carbon he has emitted into the atmosphere through flying and wants to personally offset this pollution. Similarly, Karen Kellogg and Joanne Coons' careers revolve around sustainability and environmental science. They are knowledgeable in the fields of the state of the environment, and their education has influenced their decisions to build more responsibly. Although environmental factors were certainly motivations for the homeowners' actions, for most homeowners these benefits followed the monetary incentive.

While most of the homeowners fell into the category of older, retired couples, Justin and Susan Bergin were the exception. Like the rest of the couples, they share the commitment of living in one house for their entire lives, but they are young, and most couples their age don't have this

perspective. Additionally, Justin and Susan seem to be more motivated by the environmental benefits than the monetary benefits. They expressed that they were interested in purchasing alternative energy equipment before they knew it would be economically beneficial for them. Justin and Susan seemed to be anomalies among the interviewees, which is not particularly surprising given the fact that most of them had to put in a lot time doing their own research, time that young couples might not have.

All of the homeowners, however, shared the characteristic of long-term thinking rather than planning for the short-term. These homeowners are looking into the future to solve their problems of paying bills, living functionally in their homes when aging, conserving resources, and protecting the future state of the environment by moving away from burning fossil fuels. This shared long-term perspective embodies environmental thought and sustainability in planning for future generations.

Additionally, many of those interviewed had analogous experiences and challenges throughout the process of building green and retrofitting. Many homeowners had difficulties finding qualified and knowledgeable builders and architects in this field, resulting in extensive independent research and many homeowners taking on the role of general contractor for their projects. Often, the homeowners were actually instructing the builders. For example, Nancy White's contractor thought that she was playing a practical joke because she built the majority of her house out of cement. Similarly, Tom Stock experienced several disagreements with his builders when they didn't understand his requests. Sean Crotty, who has six-month vacations from work each year, has spent months reading and researching possibilities for his new home. Justin not only encountered lack of knowledge in the industry, but also discovered that the likelihood of scam is high. Therefore, he actually partook in the manual labor in building his systems to ensure that they were installed correctly.

These interviews and experiences show that building green in this political and economic climate where sustainability is not yet the norm is quite difficult. The industry is lacking knowledge and experience in the field, and the field is also relatively small. At the moment, consumer demand for these technologies and innovations is not high enough for businesses to become profitable by offering green services, So all of the homeowners had to be extremely proactive about their processes; they did most of the research themselves and even helped manually build their houses. The homeowners were inspiring in their motivations and dedications to building, however many people are not as proactive. Therefore, the market for green building must expand to make building in this way easier—even encouraged—for the conventional homeowner. Lack of education about green technologies makes traditional homeowners hesitant to invest. But showing them the benefits—especially the economic rewards—might encourage them to build green from the start. Like most of the homeowners concluded, green building just makes sense; we just have to get the word out.

SARATOGA'S FIRST GREEN HOME TOUR: WAS IT AN EFFECTIVE VEHICLE OF EDUCATION? OF CHANGING PERCEPTIONS?

METHODS

In order to resolve the apparent dissonance between conventional homeowners' perceptions of green building/retrofitting and green homeowners' success with green building/retrofitting while subsequently benefitting the Saratoga Springs community, we planned and executed a Green Home Tour and Reception for city residents to attend. In order to find homeowners to participate in the tour, we attended green building events, talked to Green Conscience, a green home and garden store in Saratoga Springs, and asked Skidmore professors who knew of such homeowners. We chose a date for the event and worked with our four homeowners to ensure that they were available. We met with them at their houses, where we

received a preliminary tour, interviewed them, and decided on what they would be discussing the day of the tour.

To advertise for the tour and reception, we created a logo, a poster, a Facebook page, and a Google Form where people could register. We emailed our poster to everyone we'd been in contact with throughout the year, giving them details about the tour. We created a Facebook page and event that we shared with groups and people we had connected with. We printed non-digital posters with rip-away tabs at the bottom, and hung 30 of them up in downtown Saratoga Springs and downtown Ballston Spa. We secured funds from the Environmental Studies Department to pay for the posters.

To execute the tour, we used our Google registration form to email the participants who registered, sending them a place to meet, an itinerary of the day, and directions to all of the houses. We also handed out brochures, which had descriptions of each house and the different green building techniques they used. Again, the Environmental Studies Department paid for our brochures.

The tour was on Saturday, April 6, 2013 from 12-5pm. It started at Skidmore College's Case Lot, where we handed out directions to our almost fifty participants and began the caravan to our first house. We spent 45 minutes at each house, where the homeowners spoke about the different technologies, designs, materials, and other green features they implemented. Participants gave themselves self-guided tours around the houses and the properties, asking the homeowners questions and talking with each other about what they were seeing. When the tour completed in Ballston Spa, we headed to Green Conscience for the reception.

The reception was planned as a means of giving tour-goers an easy way to take the next step towards their green home projects. We planned the reception with Karen Totino at Green Conscience, and contacted local green home businesses including a solar installation company, green builders and contractors, and someone who could perform home energy audits to come and promote their businesses while networking with potential customers. For the reception, we

secured Student Opportunity Funds to pay for light platters featuring local food from the Mouzon House.

In order to assess whether or not the tour affected people's perceptions of and behaviors towards green building, we designed before and after surveys, which the participants filled out. We created the surveys using Survey Monkey, and sent the before survey via email to all of the registered participants. The day of the tour, we handed out more before surveys to the people who never filled one out. At the reception after the tour, we handed out our after surveys. We also emailed the list of registrants the exit survey in case they left the tour before the reception. We analyzed the surveys using the Survey Monkey analysis tools, and with the help of Jennifer MacDonald, input our data into SPSS software for further analysis.

RESULTS

In order to accurately gauge people's initial perceptions about green building, how they changed throughout the tour, and thus how effective the tour was at changing their perceptions and ultimately their behavior, we surveyed our participants both before and after the tour. While some questions were present on both surveys in order to compare them, we also asked different questions before and after to better understand who was attending. Our survey results indicate that the two main reasons people were attending the tour were "to learn about sustainable design, technology, materials, and building science" (80.6%) and "to better understand the economics of green building and efficient/renewable energy investments" (58.1%). The participants themselves were somewhat already engaged in sustainable behaviors and practices. 100% of them recycle, 57.6% of them grow their own food, 91% of them buy local/organic food, and 97% of them are conscious of their heating and cooling (Figure 1).

We also found that the factors that were most important to our participants when buying a house are location and price, respectively (Figure 2). Further, most of our participants (46.7%)

were only planning on living in their current houses another 1-5 years, while only 10% were planning on living in their homes forever. Finally, before the tour, our qualitative survey data indicated that if they were to build a green home or retrofit their existing one, people's main reasons for doing so would be to save money, environmental altruism, and to save energy, respectively.

During the tour, we noted qualitative data in the form of questions that people asked, most of which related to cost, measuring heat and other resources more specifically, and what green building professionals can do to expedite the process of building or retrofitting. There was *a lot* of information being relayed at each house, yet the participants asked very pointed questions. They wanted to know specifics about how much certain technologies and products cost, what the payback periods of solar photovoltaic and solar thermal were, and how well the houses stayed warm. These findings reflect our quantitative data, below.

In order to gauge how perceptions, environmental consciousness in the home, and potential behavior changed because of the tour, we compared a series of questions that we asked in both our before and after tour surveys. All of our findings were statistically significant, with a p-value of <.001. In the comparisons regarding perceptions, we found that across the board, people disagreed more with the statements that expressed negative sentiments about green homes after they attended the tour (Figure 3). With retrofitting, homeowners originally agreed with or were neutral towards the statements before the tour, but after the tour they disagreed. With the other factors, though participants originally disagreed with the statements, they disagreed *more* with them after the tour. In assessing their green building and retrofitting behaviors before and after the tour, participants were more likely to participate in these behaviors after the tour (Figure 4). While they were originally slightly likely to engage in these behaviors anyway, they were *more* likely to engage in them after the tour.

Before the tour, participants also had a different perception of the cost of many pro-environmental behaviors in the home (Figure 5). Before the tour, people thought that certain actions would cost more money than they thought they would after the tour. Though after the tour they still thought that solar photovoltaic and solar thermal would end up costing them money, they thought it would cost them *less* than they previously believed. For replacing old windows/ doors and insulating/weatherizing, they originally thought that they would save money, but after the tour believed they'd save *more* money than originally believed. Finally, they originally believed that hiring someone to conduct a home energy audit would cost them money, but after the tour they believed it'd save them money.

Qualitative data taken during the reception in the form of statements we overheard or that were said to us directly reflect the change in perceptions indicated in the results of the quantitative data. When discussing how the tour has changed her behavior, one participant noted, "I wish more people could see this. It makes all the difference in person. I did an energy audit a while ago, but this is inspiring to finally do the things it recommended." Another participant noted, "I now have so many tools with which to implement small changes in my current living situation, but even more importantly I have the tools for how to envision what my future home will look like." Again, these qualitative results reflect similar changes in perceptions as the quantitative survey data.

Some of our questions asked in the after-tour survey were not duplicates of the before-tour, and thus we received stand-alone information about the success and effectiveness of the tour. Most importantly, 100% of the tour participants agreed that they found the tour to be an effective vehicle for education about green building and design. Further, 81.4% of the tour participants indicated that they would be implementing the knowledge they learned on the tour in the near future. Participants found that seeing different designs, seeing the implementation of different technologies, and listening to the homeowners were the most effective parts of the tour at educating them about green building and design (Figure 6). Qualitative data we asked about in our

survey reflected the quantitative data: participants responded that the most significant things they learned were that there are a plethora of options and choices when building green/retrofitting, the cost is no longer prohibitive for building green, they will continue to research the many options they have, and 23% of responses indicated a home energy audit as a next step.

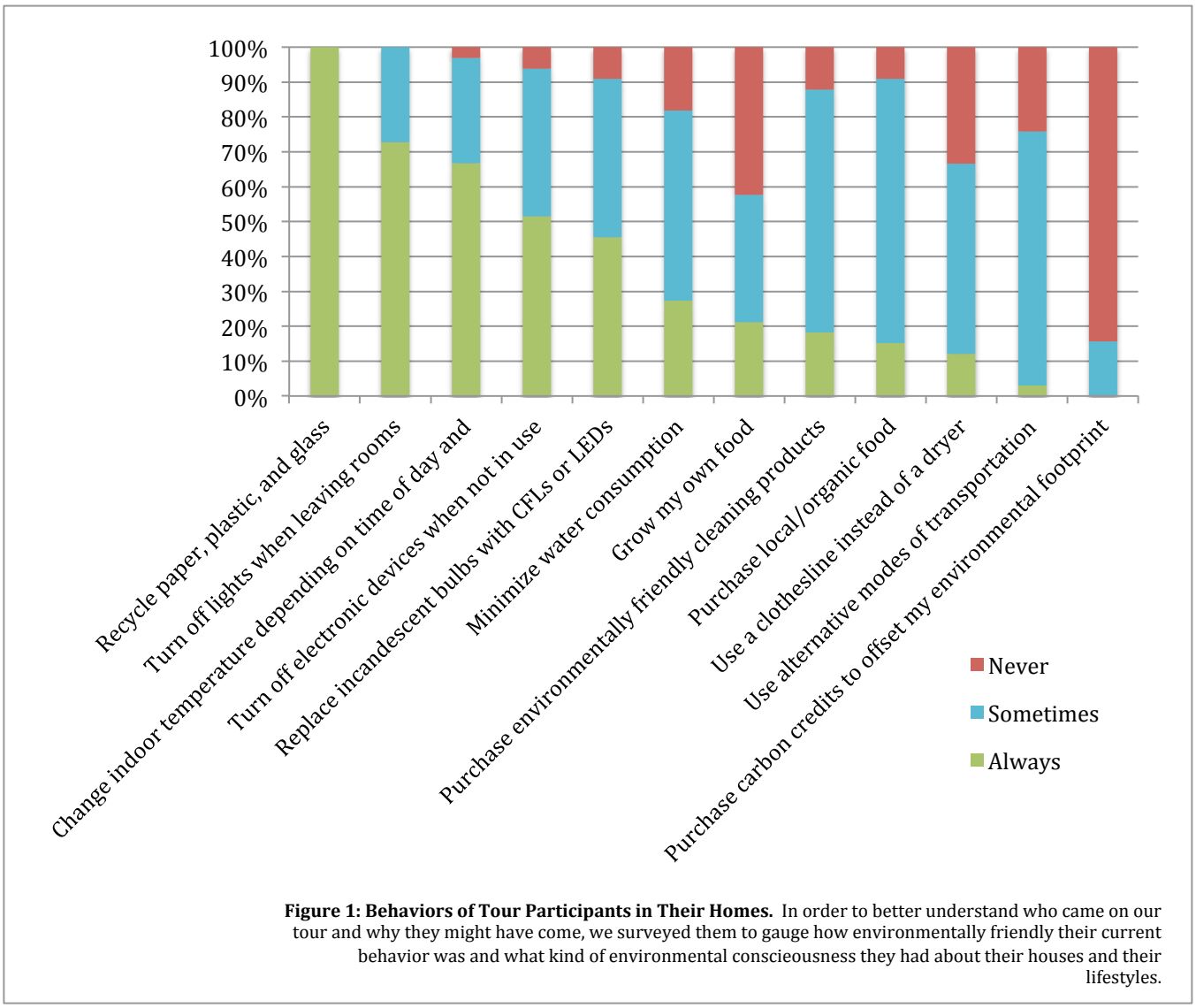

Figure 1: Behaviors of Tour Participants in Their Homes. In order to better understand who came on our tour and why they might have come, we surveyed them to gauge how environmentally friendly their current behavior was and what kind of environmental conscieousness they had about their houses and their lifestyles.

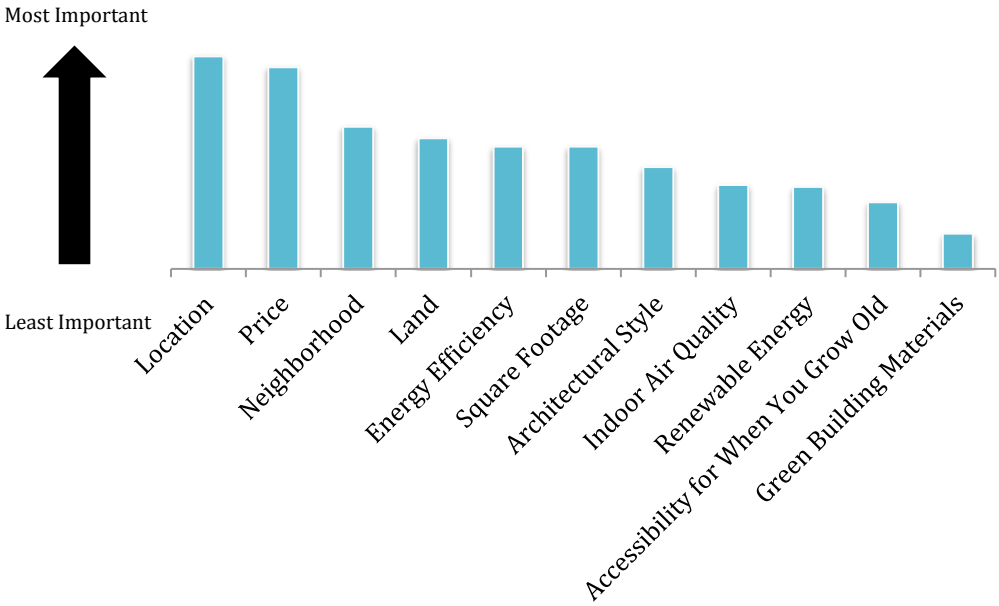

Figure 2: Importance of Factors When Buying a Home. When we surveyed tour participants, we wanted to know what they cared about when buying a home. These factors, ranked in order from most important to least important, represent what they prioritize when

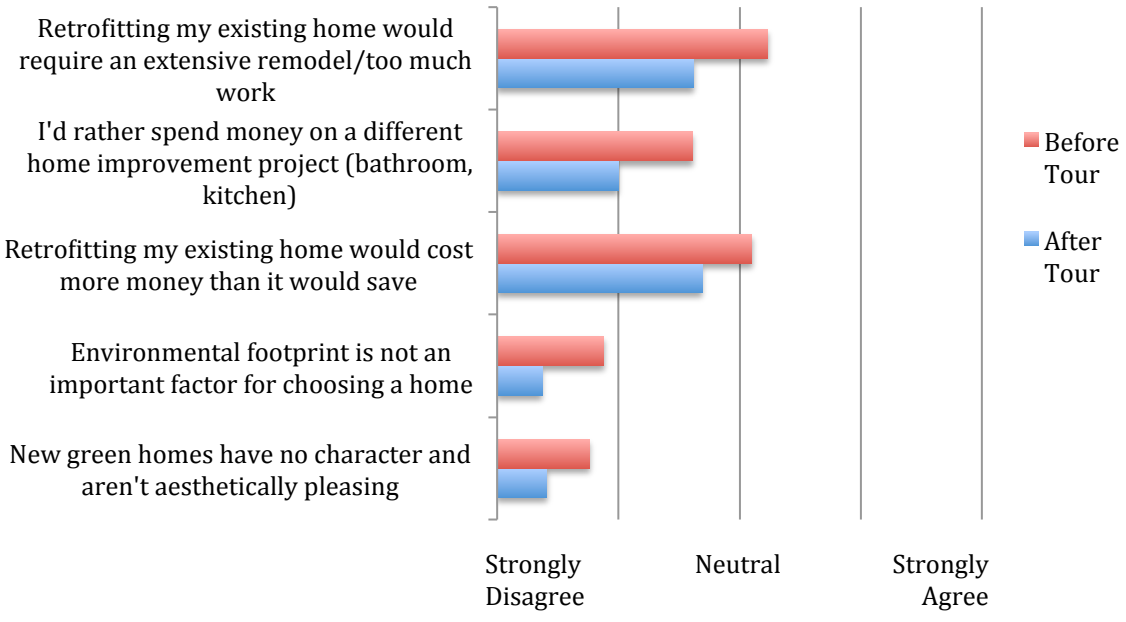

Figure 3: How the Green Home Tour Changed Participants' Perceptions. This graph displays the comparisons between the Pre- and Post-Tour surveys regarding people's perceptions about green homes and how they percieve the environment when choosing a home. The question asked was "On a scale from strongly disagree to strongly agree, rate how you percieve the following."

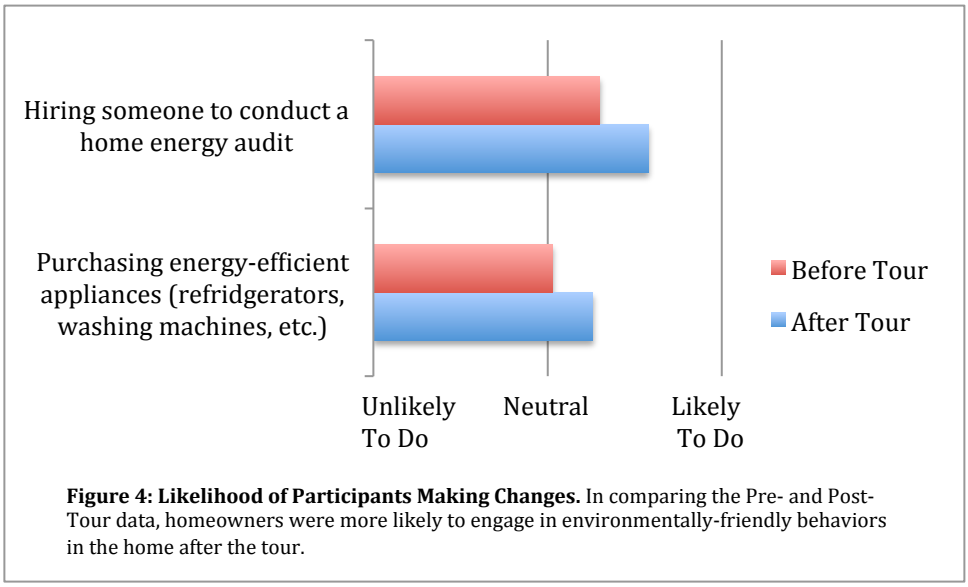

Figure 4: Likelihood of Participants Making Changes. In comparing the Pre- and Post-Tour data, homeowners were more likely to engage in environmentally-friendly behaviors in the home after the tour.

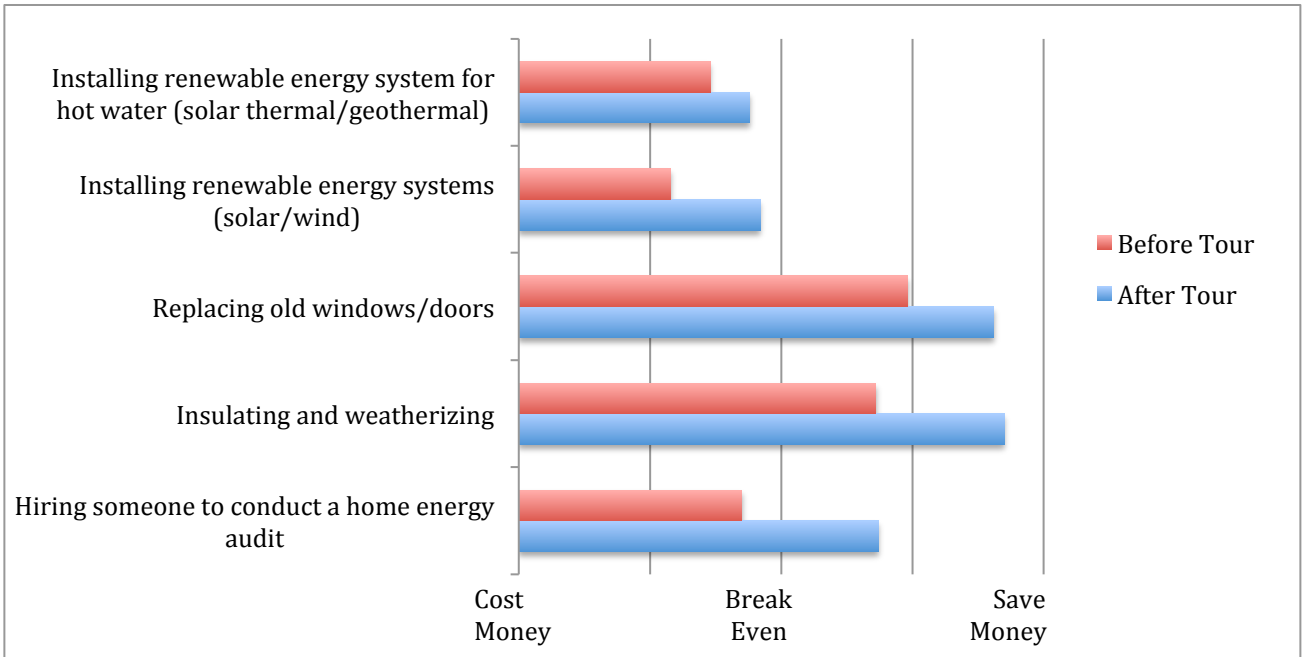

Figure 5: Cost Perceptions of Various Pro-Environmental Behaviors in the Home. Before the tour, people percieved that, in general, pro-environmental behaviors would end up costing them money. After the tour, however, the perception changed, and everyone moved in the direction of saving money.

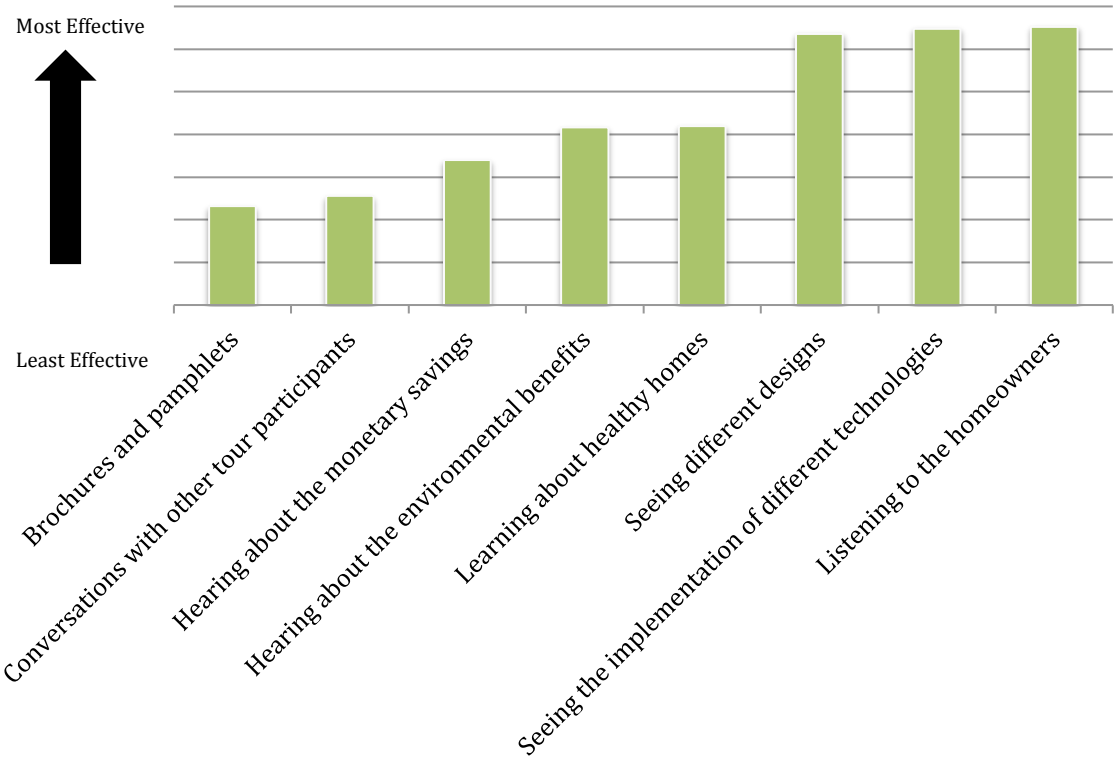

Figure 6: Effectiveness of Specific Components of the Green Home Tour. In the Post-Tour survey, respondents were asked to rank the effectiveness of various aspects of the tour in educating them about green building and design.

DISCUSSION

The participants who attended our Green Home Tour seemed to already have an environmental consciousness and engage in pro-environmental behavior (Figure 1). But even still, their main priorities for choosing a house were not about sustainability; in fact, renewable energy and green building materials, respectively, were 9th and 11th out of 11 (Figure 2). Moreover, the pre-tour survey data indicates that while they were, in general, likely to be interested in green homes and interested in engaging in green behavior before the tour, they were much *more* likely to respond favorably after the tour, which indicates that while they might have been interested in green building beforehand, the tour itself taught them how to apply it. The data supports this interpretation in that out of all of the pro-environmental behaviors, the participants tended to do

more of the easier behaviors, while the more difficult actions were performed less (eg. Recycling vs. offsetting their carbon footprint). These results indicate that our participants were similar, albeit slightly more likely to engage in pro-environmental behaviors than conventional homeowners before being subjected to the educational tour.

The data we collected that compared the results of three questions before and after the tour informed both how the participants felt before the tour, and how effective the tour was in changing some of their perceptions. In general, people tended to disagree with the popular myths we presented about green building before the tour, but they disagreed on average 20% *more* after the tour, implying that the tour was successful in changing their understanding of what green building looks like, what it entails in terms of process and logistics, and how difficult/expensive it is (Figure 3). One of the most compelling pieces of evidence we found was not just that their perceptions changed, but their values did, too. Before the tour, the average participant somewhat disagreed with the statement "environmental footprint is not an important factor for choosing a home." But after merely looking at green homes and talking to homeowners about the process and the cost, they disagreed 27% more with that statement ; thus, simply looking at green homes changed people's idea not only of how much less expensive green building is, but what a home itself should actually be and the importance of the environment in that decision.

After the green home tour, participants were 11% more likely to hire someone to conduct a home energy audit and 11% more likely to purchase energy-efficient appliances (Figure 4). The significance of these changes represents how well the green home tour was able to educate participants of the environmental and economic benefits of these actions, and that participants were convinced to implement the changes in their own homes.

Throughout our research both in the literature and with conventional and green homeowners alike, we found that cost was the ultimate reason for why people do or don't build green and retrofit (Landman 1999). Thus, it was significant to our findings that tour participants

thought they'd save more money after the tour than before the tour (Figure 5). The changes in perceptions of cost indicate, again, that the green home tour was an effective method of educating homeowners about the true costs of the many different green technologies. Specifically with solar photovoltaic, wind electric, solar thermal, and geothermal, our findings demonstrate that participants maintained some of their original perceptions about the cost of renewable energy systems, because even though with these four categories they thought they'd save more money than before the tour, they still didn't quite think they'd break even, as these systems do have a high initial investment costs. Interest in cost was also demonstrated during the tour through the questions that many tour-goers asked. Again, people asked about payback periods, investment costs, the comparisons of cost between different technologies, and about the feasibility of leasing some of the systems.

The strong agreement with the participants' thinking that replacing windows/doors and insulating/weatherizing would save them so much money suggests that homeowners see the value and would probably be willing to invest in the low-hanging fruit that is basic retrofitting (Figure 5). This finding also reflects participants' change in perception that hiring someone to conduct a home energy audit would actually save, not cost, them money (Figure 5). Again, this finding was echoed in our qualitative survey data, where 23% of the participants noted that a next step for them was an energy audit. Thus, the tour was effective at changing people's perceptions about basic retrofits, and as participants see the economic value in tackling these small changes, they will hopefully change their behavior.

Surprisingly, though the changes in cost perceptions were some of the most significant, participants noted that the effectiveness of hearing about the monetary savings on the tour wasn't very high. Rather, seeing the technologies, designs, and listening to the homeowners is what made the tour so effective in changing their perceptions (Figure 6). This demonstrates why a tour, as opposed to a presentation or website, can be so much more effective at educating people:

participants can experience things in person, actually walking around a house and feeling how comfortable it is, seeing solar panels in a backyard and assessing their reaction, or experiencing how little artificial light is needed to illuminate a room. These physical experiences are what are really effective, and thus we need to continue investing in this kind of experiential education in order to change people's perceptions and behaviors regarding green home building and retrofitting.

WHAT DOES THIS MEAN FOR SARATOGA SPRINGS? FOR THE US RESIDENTIAL SECTOR?

Clearly, the Green Home Tour was an effective method of educating tour participants about the potentials and benefits of green building and retrofitting. Learning took place through the obvious engagement of the tour participants, their excitement, the questions they asked, and the positive feedback we received after the tour. Additionally, our qualitative data supported our quantitative findings and our initial hypothesis that a tour would indeed be effective; the data visibly showed the change in the participants' perceptions towards a better understanding of the benefits of sustainable building and design while hinting at potential behavior changes and implementation of what participants saw on the tour.

While the tour did present significant change in the participants' perceptions, there still are many ways in which the tour could improve to further resolve the dissonance between their initial perceptions and the realities of green building. The tour participants were very interested in the costs of different projects that the homeowners undertook, and the biggest criticism of our tour was that the homeowners did not focus on the costs of their building and retrofitting processes. In future tours, homeowners should be encouraged to emphasize the prices and payback periods in more specific detail. Additionally, the tour would also benefit from showcasing a more traditionally retrofitted house. The Coons' 1830's retrofit was an extreme case of a historical retrofit, while Polly Windels' house simply installed a renewable energy system rather than something more universal. Presenting a home that includes insulation, the replacement of old heating and cooling systems, and

an installed renewable energy source could improve the tour by showing participants a variety of realistic projects for their own homes.

Ideally, Saratoga's first Green Home Tour will not be its last. Continuing the tour would not only effectively promote learning in the future, but would also serve as a base for Saratoga community members to get more involved with the education and promotion of the green building industry. One outlet to continue the tour could be through Karen Totino of Green Conscience, who could use the tour as one of her store's events. Another option would be to pass the tour information down to next year's Environmental Studies Capstone students. Perhaps a group could build upon the tour, add and replace houses, and organize the continual and more frequent endurance of this successful event. In this way, the Green Home Tour would continue to educate residents and promote the investment in green homes in Saratoga.

Saratoga Springs' motto is "Health, History, Horses;" this small city is scattered with buildings more than a century old, adding character and story to this summer getaway. Thus, historic preservation is important to both the residents who live here as well as the economic development and tourism industry. Therefore, preservation of homes through retrofitting should be promoted as a way to keep the historic aesthetics while simultaneously decreasing energy consumption and maintaining Saratoga's commitment to the environment (Donohue 2009). Furthermore, there needs to be more advertising of government programs and tax incentives like NYSERDA. Because cost is one of the biggest barriers, we must disseminate information about the available programs and incentives to encourage more green building and retrofitting. Finally, there needs to be a citywide commitment to show residents the fiscal and environmental importance of green building and retrofitting in the Saratoga Springs area.

Another option to continue green building education through tours is to incorporate green homes in traditional home tours. The Parade of Homes Tour in the Albany area showcases homes as well as building professionals with the latest technology and design strategies. This event is the

most sophisticated home tour in the area, and has the potential to truly influence people's decisions throughout the building and design process. Not only should this Green Home Tour continue in Saratoga County, but there should also be more Green Home Tours throughout the country. If these green homes were to be incorporated into traditional home tours, all types of homeowners would have the opportunity to learn about the benefits of green building and retrofitting, especially conventional homeowners who are completely uninformed about green building and might not want to go on a home tour specifically for these technologies. By incorporating green homes into a traditional tour, we can spread the awareness of green building and move the perceptions away from a niche style to a smart and economical design.

If we are to actually reduce the 40% of our carbon footprint that is the residential sector, we will need to implement these educational campaigns, industry standards, and government commitments not just on a city-wide level, but a national one. While some cities are implementing green home tours, we should focus on making these events permanent features of the annual event calendars of many cities and towns across the country. Again, an even more effective tactic might be incorporating green homes into traditional home tours while focusing on education at these particular houses. If the Saratoga Springs community is any representation of perceptions about green building and retrofitting across the country, there is a lot of work to be done trying to resolve the dissonance between the cost and effort perceptions and realities.

But education is not enough. From the interviews with green homeowners, we also discovered how far the green building industry still has to come in order to meet the demand that continues to grow as education does. This gap exists both in design as well as construction, so the construction and architecture industries themselves must become more educated about how to reduce energy consumption both in the building process as well as in the life cycle of the structures they create. Green building professionals and specialists do exist, but in order to be most effective,

mainstream construction will have to adopt green building and design techniques and make it part of standard practice.

In order to ensure that industry starts adopting this way of designing, building, and remodeling, we'll need to implement laws and ordinances. In fact, many states, cities, and towns have begun to do this already. New York State, for example, passed a mandatory policy in 2001 that requires new building to be LEED certified, encourages existing structures to be retrofitted, and ensures that all buildings are using Energy Star appliances. This policy, however, is only in effect for state-owned or leased buildings. Other states and cities, such as Tuscon, Arizona, Marin County, California, and Scottsdale, Arizona all have ordinances that affect the private and residential sectors (Erpenbeck and Schiman 2009). This is the kind of government support and recognition that's needed on the local and federal level to create the avenues and incentives for the green building industry to continue to grow and prosper. When coupled with government support, educating homeowners and changing their perceptions about green building and retrofitting is what will ultimately drive the large-scale residential changes we need to improve the health and slash the carbon emissions of a sector that though currently contributes such a large percentage of our greenhouse gas emissions, has the potential to guide both our individual choices and industry standards towards more sustainable behavior.

WORKS CITED

Amann, Jennifer Thorne., Alex Wilson, and Katie Ackerly. *Consumer Guide to Home Energy Savings: Save Money, save the Earth*. Washington, D.C.: American Council for an Energy-Efficient Economy, 2012. Print.

Bazerman, M. *Judgment in Managerial Decision Making*. New York: John Wiley. 1998

Bergin, Justin, and Susan Bergin. "Interview with Justin and Susan Bergin." Personal interview. 20 Feb. 2013.

Brownell, Bruce. "Interview with Bruce Brownell." Telephone interview. 4 Feb. 2013.

"Case Study—A Retrofit in Somerville, Mass." *Green Building*. N.p., n.d. Web. 15 Apr. 2013. <http://www.greenbuilding.com/zero-energy-homes/case-study-retrofit-somerville-mass>.

Coons, Joanne, and Paul Coons. "Interview with Joanne and Paul Coons." Personal interview. 18 Feb. 2013.

Crotty, Sean. "Interview with Sean Crotty." Personal interview. 6 Feb. 2013.

DiGrazia, M. "2005 Tour Draws Record-Breaking Crowd." (2006). *Solar Today:* 20 (2) 44-45.

Donohue, Emily. "Mayor Johnson Signs Pact to Reduce Saratoga Springs' Carbon Emissions - Saratogian.com." *The Saratogian: Saratoga Springs, Saratoga County, New York Daily Newspaper Covering Local, Regional, and National News*. 25 Oct. 2009. Web. <http://www.saratogian.com/articles/2009/10/25/news/doc4ae3bdf10327f758886293.txt>.

EPA. Environmental Protection Agency, n.d. Web. 15 Nov. 2012. <http://www.epa.gov/greenbuilding/pubs/faqs.htm>.

Erpenbeck, Mark, and Colleen Schiman. "The Past, Present, and Future of Green Building." *Natural Resources & Environment* 24.2 (2009): 33-35.

"Focus Group with Drafty Homeowners." Personal interview. 15 Feb. 2013.

FWR Group. “What is the definition of a green home?” *FWR Group Website.* November 27, 2012. http://www.fwrgroup.com.au/definition-green-home.html

Gardner, Herb. “Many Components Define a LEED Green Home Besides ‘Energy.’” The Green Builder’s Journal. 23 May 2011. http://greenbuildersjournal.com/?p=40.

Goering, J. “Sustainable Real Estate Development: Dynamics of Market Penetration.” *JOSRE.* Vol 1. No 1. 2009.

Hoffman, A. Henn, R. *Overcoming the Social and Psychological Barrier to Green Building*. University of Michigan Organization and Environment. Vol 21 (4). December 2008 390-419

"Home Performance with ENERGY STAR®, Existing Home Renovations." *NYSERDA Energy Innovation Solution*. NYSERDA, 2013. Web. 29 Apr. 2013. <http://www.nyserda.ny.gov/Green-Jobs-Green-New-York/Residential.aspx>.

Johnson, Riley, Sarah Risley, and Gabriella Stern. "The Times They Are A-Changin': Shifting Environmentalism in Saratoga Springs." Capstone. Skidmore College, 2013. Print.

Kellogg, Karen. "Interview with Karen Kellogg." Personal interview. 15 Feb. 2013.

Kibert, C. J. *Sustainable Construction: Green Building Design and Delivery.* Hoboken, NJ: Wiley 2007.

Kormos, Liz, and John Blough. "Interview with Liz Kormos and John Blough." Personal interview. 13 Feb. 2013.

Landman, Miriam. "Breaking through the Barriers to Sustainable Building: Insights from Building Professionals on Government Initiatives to Promote Environmentally Sound Practices." Thesis. Ed. Ann Rappaport and Christine Cousineau. Tufts University; Master of Arts in Urban and Environmental Policy, 1999.

Lane, Mary E. “Make It Right. A Case Study Exploring An Affordable Green Housing Development in New Orleans”(2010). *Electronic Theses, Treatises and Dissertations.*

Florida State University. Paper 3295.

Lautz, J. *Home tenure: Expectations vs. reality*. Salt Lake City, UT: Weichert Realtors Towne & Country. 2008

"LEED For Homes Program Pilot Rating Systems." *LEED Rating Systems*. N.p., n.d. Web. 05 Apr. 2013. <http://www.usgbc.org/ShowFile.aspx?DocumentID=2267>.

Malangone, K. Quality and Value Driving Growth in the Green Building Market—According to New McGraw-Hill Construction SmartMarket Report on Green Homes and Remodeling. McGraw-Hill Construction Press Release. May 2012 http://www.construction.com/about-us/press/quality-and-value-driving-growth-in-the-green-building-market.asp

Marsden, S. Women Now In Charge of Major Financial Decisions. The UK Telegraph.

"REGREEN Residential Remodeling." *REGREEN Residential Remodeling*. Web. 4 Dec. 2012.

Slaughter, Richard. "Long-term Thinking and the Politics of Reconceptualization." *Futures* 28.1 (1996): 75-86. Print.

Stock, Tom. "Interview with Tom Stock." Personal interview. 24 Feb. 2013.

"The 2013 Saratoga Showcase of Homes." *Guide To The 2012 Saratoga Showcase of Homes By The Saratoga Builders Association, Inc.* Saratoga Builders Association, 2012. Web. 29 Apr. 2013. <http://www.saratoga.com/things-to-do/showcase-of-homes/>.

Totino, Karen. "Interview with Karen Totino." Personal interview. 6 Feb. 2013.

"U.S. Energy Information Administration - EIA - Independent Statistics and Analysis."*Residential Energy Consumption Survey (RECS)*. N.p., n.d. Web. 05 Apr. 2013. <http://www.eia.gov/emeu/recs/contents.html>.

Watson, S. “Saturday Tours Features WNY ‘Green’ Buildings, Solar Power. *Buffalo News*. October 10, 2012.

White, Nancy, and Don White. "Interview with Nancy and Don White." Personal interview. 1 Mar.

2013.

Windels, Polly, and Steve Stark. "Interview with Polly Windels and Steve Stark." Personal interview. 6 Mar. 2013.

World Business Council on Sustainable Development. *Energy efficiency in buildings: Business realities and opportunities*. 2007 http://www.wbcsd.org/Plugins/DocSearch/details.

Woodruff, A., et. al "A Bright Green Perspective on Sustainable Choices." (2008). Proc CHI ACM, 313-322.