

# Evaluating Usage and Impact:



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The “Towards Zero Energy Homes” Workshop and Other Professional Development Opportunities in High Performance Green Building on Cape Cod

Prepared for the Cape and Islands Renewable Energy Collaborative

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November 2007

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# Executive Summary

In October, 2007, the Cape and Islands Renewable Energy Collaborative (CIREC) hired Aceti Associates to evaluate the impact of the workshop, “Towards Zero Energy Homes,” as well as to gather feedback on several other professional development opportunities in high performance green building that had been offered to design and building professionals on Cape Cod in Massachusetts. The primary focus of the evaluation was “Towards Zero Energy Homes (ZEH),” a full-day workshop for architects, engineers and homebuilders that took place in January of 2006. Sixty-five architects, builders, consultants, students and others attended the workshop. Evaluations of the workshop were very positive.

Subsequent to the ZEH workshop, various members of the Cape and Islands Renewable Energy Collaborative joined forces to offer additional opportunities for building and design professionals to learn about green building practices and to promote their green building and design services. The current evaluation also assessed awareness of, participation in and satisfaction with these additional opportunities.

The evaluation was carried out by conducting phone interviews with participants of the 2006 ZEH workshop. The interviewee recruitment pool consisted of a subset of 53 workshop registrants who best represented the audience targeted by the workshop planning committee. Thirty-one workshop registrants were interviewed, constituting over half of the individuals in the recruitment pool. While the limitations of this qualitative research should be kept in mind, the results described below can serve as a guidepost to understanding the experiences, barriers and needs faced by building and design professionals in regards to using green building practices.

## Goals and Key Findings

The evaluation was designed to achieve a number of goals. Each goal is stated below, along with the key findings that pertain to it.

### **Goal: Assess the extent to which participants in the ZEH Workshop subsequently applied information from the workshop in their work**

A majority of interviewees have incorporated green building practices into their work, but over a third of those attributed their activities, at least in part, to education or training they have received prior to or since the workshop. Most of the interviewees who have not applied the workshop information gave one of three reasons: 1) being retired/not practicing architecture; 2) a lack of client demand and/or limited client budgets; and 3) a lack of relevance to their current work.

Among those interviewees who could attribute their application of green building practices at least in part to knowledge gained from the workshop, almost all had specified and/or installed envelope solutions. Solar thermal and photovoltaic technologies were the next most commonly mentioned green building applications. Interviewees have used a number of other technologies as well, with the exception of biomass and wind energy sources.

**Goal: Assess the level of satisfaction with green building practices among workshop participants, in terms of implementation difficulty and performance**

It was most common for interviewees to report that implementing green building practices was harder than they had expected. It was relatively common for interviewees to say that implementation of some or all practices was “easy enough” or no harder or easier than they had expected. The most common reason, by far, for stating that implementation was harder than expected was dealing with contractors who were resistant to using new practices or who didn’t have the necessary expertise.

Some interviewees stated that they did not have information on client satisfaction or on the performance of the green building practices used. Others reported that the practices had met their own and their clients’ expectations. No negative results were noted.

**Goal: Gain information about the factors that have stopped workshop participants from integrating green building practices more fully into their work**

The vast majority of interviewees indicated that they are not satisfied with the degree to which they have been able to integrate green building practices into their work and would like to do more. A significant number of interviewees cited multiple barriers to using green building practices. Table 1 provides an indication of the more and less commonly expressed views.

Table 1. Barriers to Green Building

Barrier	Number of Comments Received
Lack of Client Demand/Need for Client Education/Client Budget Limitations/Client Priorities	23
High Up Front Cost/Long Payback Periods	11
Barriers Associated with the Construction Process	9
Barriers Caused by and Faced by Architects	8
Aesthetics Issues	6
Product Availability Issues	4
Risk Aversion	3
Concerns about Product Performance or Repair Infrastructure	3
Need for More Professional Education	2
Lack of Availability of Expertise	1

**Goal: Gain information on the mechanisms through which workshop attendees have obtained clients for green building projects, and on the motivations that influence clients’ desire for green building practices**

Inclusion of green building elements in a project most commonly resulted from a proposal made by an interviewee to a client. However, it was also relatively common for projects with green building elements to follow from a client’s request. Interviewees

reported that when clients come to them with a request for green building practices, the most common motivation is a desire to do the right thing.

**Goal: Gauge the extent to which applying green building practices has changed the way that workshop participants market their services**

Very few interviewees advertise their green building services in any significant way.

**Goal: Gauge the extent to which applying green building practices has affected the bottom line for workshop participants**

Interviewees overwhelmingly indicated that the application of green building practices has not discernibly impacted their bottom line.

**Goal: Assess usage by workshop participants of resources provided at the workshop**

Although a double-sided page of resources for high performance building was handed out at the workshop, interviewees frequently could not recall it. Among those who could, only a few reported using it. Interviewees said that if the resource list were web based, it would be easier to find when they needed it.

Interviewees were also asked if they had collaborated with any of the other professionals who attended the workshop. Among those asked, about a third had collaborated with people they had met at the workshop, and all reported that the collaborations were valuable. Another third contacted someone from the workshop, either to ask a quick question or to attempt a collaboration.

**Goal: Assess workshop attendees' awareness of, participation in and satisfaction with a number of other opportunities to learn about green building practices on the Cape**

Interviewees were informed that, subsequent to the ZEH workshop, the planning committee had offered a number of other opportunities to learn about green building. Interviewees were asked if they were aware of specific opportunities, and if so, if they had participated in them. If they had participated, they were asked if the opportunity had been useful, and if they had any suggestions for improvement.

***Email Alert Service from Joan Muller at the Waquoit Bay Reserve***

The email alerts inform recipients about upcoming opportunities to learn about green building, including tours, workshops, meetings, etc. Awareness and usage of this service was high. Recipients of the service overwhelmingly stated that it was useful. When asked to suggest improvements, most could not think of any, and some reiterated that the service is very good. However, a few commented that more lead time before events would sometimes be helpful.

***Green Building Workshop Series***

Awareness of additional offerings as part of the Green Building Workshop Series was high. About half of those who were aware of the workshops had attended one or more. Interviewees overwhelmingly described the workshops as useful. The most common

suggestion for improving the workshops was to include more specific information, such as wall section drawings that show how certain techniques are done.

#### ***Networking sessions/tours of sustainable buildings***

Awareness of the sustainable building tours was high. Over half of those who were aware of the tours had attended one or more. Most found them useful, but some stated that the practices featured in the commercial buildings on the tours were not relevant to the additions and single-family homes that they design or build for clients.

#### ***Green Buildings (Sustainable Homes) Open House Events***

Awareness of the Sustainable Homes Open House events was moderate. Among those who were aware of the events, about a third had attended one. Attendees overwhelmingly found the Open Houses useful. Interviewees suggested including more homes featuring sophisticated green building practices in the events, as well as homes that are more inspiring architecturally. Providing information on the costs and savings associated with the green building elements featured would also be helpful.

#### ***CIREC Chapter Meetings***

CIREC Chapter meetings bring the CIREC community together around a specific topic, while providing opportunities to share experiences and learn about local renewable energy programs, projects, and activities. Awareness of CIREC Chapter meetings was relatively low, and among those interviewees who were aware of them, attendance was low. Suggestions for improvement included tailoring the meeting content to the type of audience in attendance and continuing to recruit new attendees.

#### ***The Cape and Islands Go Green Guide***

The guide, consisting of a brochure and a website, features examples of green buildings. Businesses and organizations that provide green building services may also list themselves in the Guide. Awareness of the Guide was moderate. Among those who were aware of the Guide, less than half indicated that their firm had listed itself in the Guide as a green building services provider. When asked if listing in the Guide had been worthwhile, none indicated that it had generated any calls or customers as far as they knew. However, several acknowledged that the Guide is fairly new. Among those who were aware of the Guide, but who are not listed in it, the most common reason was that they were not aware of the listing opportunity.

#### ***Other Training and Coursework***

Interviewees were also asked if the ZEH workshop had led them to pursue any training or coursework in green building other than what had already been discussed. A small percentage had, but in some cases, it wasn't clear that it was the ZEH workshop that had led them to do so. Several interviewees mentioned that they had attended seminars offered at the annual Build Boston Conventions.

**Goal: Gain information from workshop participants about what would help them integrate high performance green building practices into their work and what advice they would have for others who are interested in doing so**

A significant number of interviewees provided multiple suggestions on what would help them integrate green building practices into their work. Table 2 provides an indication of the more and less commonly expressed views.

Table 2. Suggestions for Fostering Green Building Practices

Topic	Number of Comments Received
Initiatives to Increase Client Demand and Resources for Gaining Client Buy-In	23
Opportunities to Gain Knowledge and Experience	14
Product Information/Product Affordability/Independent Product Assessment	6
Provision of Detailed Information about Implementation	6
Ways of Getting Contractors Committed and Up to Speed	5
Examples and Success Stories	4
Green Consultation Services	2
Mechanisms for Increasing Business Opportunities	1

***Initiatives to Increase Client Demand and Resources for Gaining Client Buy-In***

Interviewees frequently expressed the view that creating a market for green building would help them integrate these practices into their work. Most respondents suggested educating the public to achieve this goal. A few interviewees advocated for incentives or regulation. Most of the calls to educate the public focused on the need to communicate that green building is increasingly mainstream and that it works.

A number of interviewees suggested that some variation on a “green building options package” would help them gain buy-in from clients. They wanted something they could provide to clients that would outline the costs, savings, payback periods, environmental benefits and potential increases in home value that would result from incorporating different green building technologies into a typical home.

***Opportunities to Gain Knowledge and Experience***

Interviewees felt that additional learning opportunities would help them integrate green building practices into their work. Several interviewees believe that having multiple opportunities to hear the same information is helpful when the information is new. Others had suggestions about effective venues, conveners and incentives. Numerous interviewees suggested specific workshop topics that would help them. Finally, several interviewees stressed that it would be helpful to have more hands-on workshops.

***Product Information/Product Affordability/Independent Product Assessment***

Several interviewees said that providing more information about local (East Coast) green building product suppliers at seminars would be very helpful. Being able to find products

and equipment at lower costs would help, too. Several architects expressed a need for trusted sources of information that could help them identify the better performing products and service providers and validate green claims.

#### ***Detailed Information about Implementation***

Interviewees said that they need to know not just how a particular technology works (e.g. geothermal heat pumps), but how to make it happen. They need detailed information on how to work with consultants. They need case studies, drawings, models and hands-on activities. They need less problem identification (why to do it) and more practical solutions. They want to hear about options for making a particular technology work and the pros and cons of those options. The requests for more detailed information about implementation were all from architects.

#### **Ways of Getting Builders Up-to-Speed and Committed to Green Building Practices**

One builder stated that mandatory building codes are an extremely important influence on the materials and methods that builders use. On a related note, persuading building inspectors to go to green building seminars may help them see green building practices as legitimate, safe and mainstream. Several architects felt that as builders hear that others are successfully using green building techniques, it will become accepted practice. Disseminating examples and case studies will help this process along. Educational opportunities for builders were also proposed, preferably in conjunction with the builders association.

#### ***Examples and Success Stories***

A number of interviewees said that hearing about more examples, case studies and success stories would help them integrate green building practices into their work.

#### ***Green Consultation Services***

Two architects expressed a desire for a green consultation service. The service would provide experts who could lay out possible green building strategies, or review a design to ensure that a green building technique had been properly applied.

Finally, interviewees were asked what advice they would have for other architects/builders who are interested in using high performance green building practices in their work. Advice for others fell into two categories: 1) Get educated and 2) Sound your client out and push green building practices.

#### **Final Words**

At the end of each interview, the interviewee was asked if there was anything else that they wanted the workshop organizers to know about their experiences and views. One large builder took this opportunity offer a pessimistic assessment of the current status of green building, but others expressed optimism about the future. Finally, a number of interviewees expressed their appreciation to the workshop planning committee for their efforts in providing professional development opportunities in green building on Cape Cod.

# Background

In October, 2007, the Cape and Islands Renewable Energy Collaborative (CIREC) hired Aceti Associates to evaluate the impact of the workshop, “Towards Zero Energy Homes,” as well as to gather feedback on several other professional development opportunities in high performance green building that had been offered to design and building professionals on Cape Cod in Massachusetts. The evaluation was funded by a grant from the Massachusetts Technology Collaborative and coordinated through Waquoit Bay National Estuarine Research Reserve.

The primary focus of the evaluation was “Towards Zero Energy Homes (ZEH),” a full-day workshop for architects, engineers and homebuilders that took place at the Woods Hole Research Center Gilman Ordway Campus on January 6, 2006. The workshop was intended to provide participants with:

- an understanding of the basic design considerations for achieving homes that require little or no non-renewable energy to power them;
- opportunities to network with other architects, homebuilders, engineers, renewable energy consultants and regional organizations; and
- resources on sustainable building, including information on tax credits and other incentives.

The topics covered in the workshop were:

- Residential energy loads
- Envelope solutions
- Conservation strategies for lighting, appliances, domestic hot water and ventilation
- Passive solar strategies
- Energy supply options for thermal and electrical energy, including
  - Fossil fuel
  - Biomass
  - Solar thermal
  - Ground source heat pump
  - Solar electric
  - Wind

The workshop concluded with a number of case studies featuring zero net energy homes and other buildings.

The workshop planning committee consisted of architects Alison Alessi (A&E Architects) and Susan Buchan (Sage Design), Stephanie Brady and Mary Jane Curran, Cape Cod Community College, Megan Amsler, Cape and Islands Self Reliance, Dan Dray from the Cape Cod Economic Development Council and Joan Muller and Tonna-Marie Rogers, Waquoit Bay Research Reserve. Overall coordination and leadership was provided by Waquoit Bay Reserve through the Massachusetts Coastal Training Program. The workshop was sponsored by Cape Cod Community College, Cape Cod Economic Development Council, Cape and Islands Self Reliance, Home Builders and Remodelers

Association of Cape Cod and Waquoit Bay National Estuarine Research Reserve. Marc Rosenbaum, P.E., founder of Energysmiths, delivered the workshop.

In addition to the members of the workshop planning committee, sixty-five architects, builders, engineers, consultants, students and others attended the workshop. Fifty-one attendees completed an evaluation survey at the end of the workshop. Among those who completed evaluations, 24 identified themselves as architects, 4 as engineers and 9 as builders. Some evaluators identified themselves as “Other,” including non-profit, building product supply, consultant, project manager, etc. It is not known whether the occupational breakdown among those who evaluated the workshop matches the occupational breakdown among the participants as a whole. Architects could receive 7 health, safety and welfare (HSW) continuing education credits from the American Institute of Architects for completing the workshop. Twenty-five evaluators indicated that they had taken the workshop for continuing education credits.

Evaluations of the workshop were very positive, with 48 of 51 evaluators giving their satisfaction with the workshop content a rating of 4 or 5 out of 5, where 5 meant “very highly satisfied.” Similarly, 45 evaluators indicated that their satisfaction with the workshop format rated a 4 or 5. Furthermore, between 45 and 48 evaluators indicated that they had an increased understanding of Zero Energy Homes, an increased ability to access resources, and that they intended to apply the information in their work. It is not known whether the levels of satisfaction, understanding and intentions expressed by those who completed an evaluation match those of the workshop participants as a whole.

Subsequent to the ZEH workshop, various members of the Cape and Islands Renewable Energy Collaborative joined forces to offer additional opportunities for building and design professionals to learn about green building practices and to promote their green building and design services. The current evaluation also assessed awareness of, participation in and satisfaction with these additional opportunities, which included:

- A monthly email alert service provided by Joan Muller, Education Coordinator at the Waquoit Bay National Estuarine Research Reserve. The email alerts inform recipients about upcoming opportunities to learn about green building, including tours, workshops, meetings, etc.
- Additional offerings as part of a Green Building Workshop Series, organized by Cape and Islands Self Reliance. Specifically:
  - An Energy Star workshop, held on October 27, 2006;
  - ZEH Phase II, (ZEH2), that took place on January 12, 2007. While ZEH covered the basic design considerations most helpful in building a home from scratch, ZEH2 covered upgrading an existing home to improve efficiency. Led once again by Marc Rosenbaum, ZEH2 also focused more specifically on employing green building practices in the context of the resources available on Cape Cod and in the climatic conditions there.
  - A workshop on a set of standards for superinsulated homes that has been promoted by the Passivhaus Institute of Darmstadt, Germany. Architect Katrin Klingenberg, who has designed and built her own “Passivehaus” in Urbana Illinois, delivered the workshop.

- Networking sessions/tours of sustainable institutional buildings, including Cape Cod Community College's Larusso Applied Technology Building and the Wellfleet Audubon Center;
- Green Buildings Open House events, conducted each October by the American Solar Energy Society (called National Solar Homes Tour) and organized regionally by the Northeast Sustainable Energy Association and locally by Cape and Islands Self Reliance. Residents open their homes to allow members of the public to tour and ask questions.
- CIREC Chapter meetings. Open to the public and held at varying locations, these events are held monthly. They bring the CIREC community together around a specific topic while providing opportunities to share experiences and learn about local renewable energy programs, projects, and activities.
- The Cape and Islands Go Green (cigogreen) Guide, a CIREC project coordinated by Chris Powicki. The guide, consisting of a brochure and a website, features examples of green buildings and historic and modern renewable energy installations. Businesses and organizations that provide green building services may also list themselves in the Guide. The brochure and website were soft launched in summer of 2007.

## Evaluation Goals

The goals of this evaluation were to:

- Assess the extent to which participants in the ZEH Workshop subsequently applied information from the workshop in their work;
- Assess the level of satisfaction with green building practices among workshop participants, in terms of implementation difficulty and performance;
- Gain information about factors that have stopped workshop participants from integrating green building practices more fully into their work;
- Gain information on the mechanisms through which workshop attendees have obtained clients for green building projects, and on the motivations that influence clients' desire for green building practices;
- Gauge the extent to which applying green building practices has changed the way that workshop participants market their services;
- Gauge the extent to which applying green building practices has affected the bottom line for workshop participants;
- Assess usage by workshop participants of resources provided at the workshop;
- Assess workshop attendees' awareness of, participation in and satisfaction with a number of other opportunities to learn about green building practices on the Cape;
- Gain information from workshop participants about what would help them integrate high performance green building practices into their work and what advice they would have for others who are interested in doing so.

# Methodology

The evaluation was carried out by conducting phone interviews with individuals who participated in the 2006 ZEH workshop.

## The Interviewee Recruitment Pool

Including members of the workshop planning committee, 74 individuals registered for the ZEH workshop. Twenty-one of these individuals were excluded from the pool from which interviewees were recruited. Those excluded fell into two categories: 1) individuals who were not building or design professionals and 2) renewable energy consultants who had been installing renewable energy systems before the workshop took place. It was felt that excluding these individuals would allow for a more efficient and focused assessment of the impact of the workshop on the target audience. Interviewees were recruited from among the remaining 53 workshop registrants.

## Recruitment Procedures and Interview Protocol

An introductory email was sent to the ZEH workshop registrants by Joan Muller of the Waquoit Bay Reserve, from whom many workshop participants had received regular emails following the workshop. The email, shown in Appendix A, notified workshop registrants of the upcoming calls and their purpose, let them know who would be calling and assured them of the confidentiality of their individual responses.

Interviewees were recruited by calling the 53 workshop registrants in the recruitment pool. A message was left for each of those not reached initially. The message described the purpose of the call and requested that they return the call from the interviewer. Those who did not call back were called again one week after the initial call.

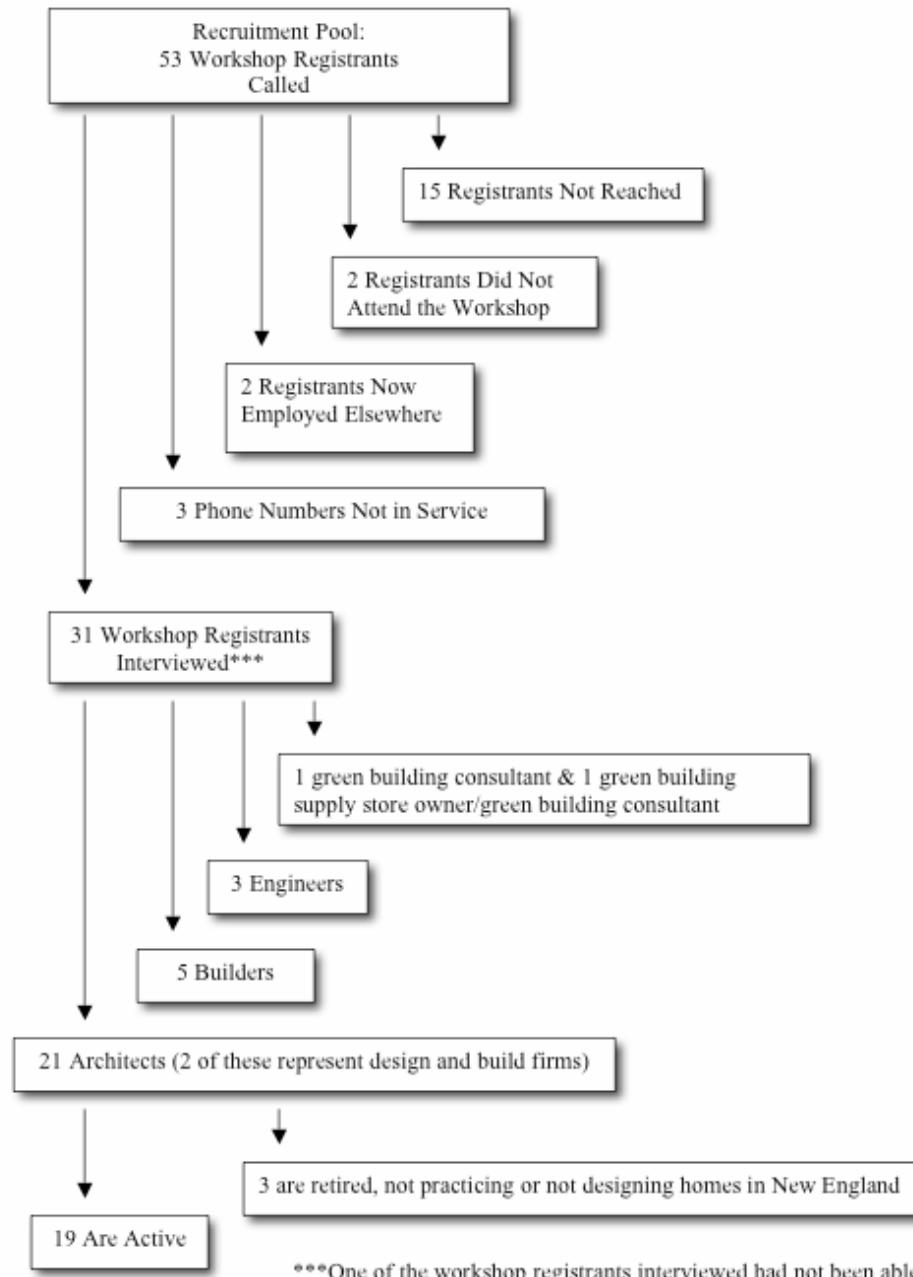
The interviews were conducted between October 24<sup>th</sup> and November 5<sup>th</sup>, 2007. Most of the interviews lasted about 30 minutes. A few interviewees were willing to have a more extended conversation about their experiences, views and suggestions, and those interviews lasted up to 60 minutes. A few interviewees were available to talk for only 5 to 15 minutes. In these cases, priority was given to questions about their application of green building practices since the workshop, factors that have stopped them from integrating green building practices into their work and feedback on what would help them to do so.

At the initiation of each interview, interviewees were reminded that individual responses would not be identified in the report prepared for the workshop planning committee. Given that the ZEH workshop took place almost two years ago, interviewees were also asked if they would like to hear a quick listing of the topics covered in the workshop. Some wanted this refresher. Others felt they had sufficient recall of the workshop content. The full text of the questionnaire, including introductory remarks made to interviewees, can be found in Appendix B.

# Characterization of Interviewees

Figure 1 displays the outcome of the recruitment effort and characterizes the interviewees.

**Figure 1. Call Results and Characterization of Interviewees**



\*\*\*One of the workshop registrants interviewed had not been able to attend the workshop, but was willing to answer questions about the other professional development opportunities offered by the High Performance Building Planning Group.

Over half of the individuals in the recruitment pool were interviewed. While this is a significant percentage, it is not known if the responses of the interviewees reflect the experiences, participation rates and opinions of those who chose not to respond to the interview request. It is possible that those who responded have a greater interest in green building practices than those who did not. Making follow-up phone calls to those who did not respond to an initial call is likely to have countered this potential self-selection bias to some extent. While the limitations of this qualitative research should be kept in mind, the results described below can serve as a guidepost to understanding the experiences, barriers and needs faced by building and design professionals in using green building practices.

## Detailed Findings

The detailed findings pertinent to each evaluation goal are described below. The findings are presented as summaries of the responses to each interview question that is relevant to a particular goal. For each question, both commonly held and minority views are discussed. Where it could be discerned that architects, builders or engineers tended to respond differently to a particular question, these differences are noted.

### **Goal: Assess the extent to which participants in the ZEH Workshop subsequently applied information from the workshop in their work**

**Question:** Have you been able to apply information from the workshop in your work since then?

This question was posed to the 30 interviewees who attended the workshop. Four architects responded that while the workshop inspired them, reinforced their knowledge, or informed the product that they offer, that they had begun educating themselves and incorporating green building practices into their work long before the workshop took place. Similarly, an interviewee whose consulting company focuses on green building practices indicated that the workshop added to the knowledge he already had. Two other interviewees, a builder and an architect, did not mention extensive experience with green building prior to the workshop. However, they were not sure whether the impetus for their current use of green building practices was the ZEH workshop or other learning experiences they've had.

Twelve interviewees stated that they have been able to apply information from the ZEH workshop in their work, although three of those described the extent of the application as minor. Twelve respondents indicated that they have not been able to use information from the workshop in their work, although three of these did say that they had used some of the information in retrofitting their own homes.

Therefore, a majority of interviewees have incorporated green building practices into their work, but over a third of those attributed their activities, at least in part, to education or training they have received prior to or since the workshop.

**Question: If you haven't been able to apply information from the workshop in your work, what has stopped you?**

Most of the twelve interviewees who have not applied the workshop information gave one of three reasons: 1) Being retired/not practicing architecture; 2) A lack of client demand and/or limited client budgets; and 3) A lack of relevance to their current work. In this last category there was an architect who designs commercial and retail space, a site civil engineer who attended out of personal interest and an industrial controls engineer who would like to do business in the solar energy field in the future.

Other reasons given by interviewees who have not applied the workshop information included: lack of sufficient expertise, doubt about the energy efficiency value of green building techniques when applied only to home additions, and a negative impression of the ZEH workshop.

**Question: If you have been able to apply information from the workshop in your work, how have you done so?**

Responses are compiled here from 12 interviewees who could attribute their application of green building practices at least in part to knowledge gained from the workshop. Ten of these interviewees had specified and/or installed envelope solutions. Some had specified or installed more than one type. All 10 mentioned insulation as a solution they have used. Other solutions, such as framing techniques, energy-efficient windows/doors and reducing air infiltration were each mentioned by 3 or 4 interviewees.

Eight interviewees reported specifying or installing solar thermal and photovoltaic technologies. Three reported using passive solar elements in their designs.

Three interviewees mentioned installing high efficiency boilers, or putting in radiant heating systems as often as they can. Three interviewees have designed or built one or more homes with ground source heat pumps. Interviewees did not mention biomass or wind as energy sources they have used in their work. Conservation strategies for lighting, appliances and ventilation received a couple of mentions.

**Goal: Assess the level of satisfaction with green building practices among workshop participants, in terms of implementation difficulty and performance**

**Question: Were the green building practices easier or harder to implement than you expected? Why?**

It was most common for interviewees to report that implementing green building practices was harder than they had expected, although some differentiated between various practices in their assessment. It was relatively common for interviewees to say that implementation of some or all practices was “easy enough” or no harder or easier than they had expected. Only one interviewee said that implementation was easier than she expected.

The most common reason, by far, for stating that implementation was harder than expected was dealing with contractors who were resistant to using new practices or who didn't have the necessary expertise. This frustration was cited by architects, builders and consultants. One interviewee, a green building consultant, designed his own Zero Net Energy Home and served as the general contractor for the building process. As the homeowner, he also held the purse strings. However, he still found the contractors resistant to using new practices. He speculates that the resistance is due to the fact that contractors are expected to guarantee their work. They are uncomfortable providing a guarantee if they are using a technique they're not familiar with. "They've been using a particular construction adhesive for 20 years. They don't know if a new adhesive will work right." When they are not familiar with a particular building technique, they must build in extra safeguards. Doing so increases their costs, and therefore their bids. They don't want to bid high. They may also be able to increase their profit margin by sticking with tried and true ways of doing things that they know how to do well. When using a new building practice, both their reputation and profit are on the line.

Another interviewee, a builder, stated that there is a lack of contractors and engineers who are familiar with green building products, so he has to do more legwork himself. For example, the heating installer has an engineer who answer questions about heat loss, but can't answer questions about insulation.

Less common reasons why implementation was more difficult than expected included the inavailability of materials, the complexity of some systems, such as geothermal heat pumps and solar domestic hot water, and the need to learn the tricks of the trade when a technique is first used.

**Question:** Did the practices and technologies you applied meet your expectations for results? Your clients' expectations for results?

Some interviewees stated that they did not have information on client satisfaction or on the performance of the green building practices used. Others reported that the practices had met their own and their clients' expectations. No negative results were noted.

### **Goal: Gain information about other factors that have stopped workshop participants from integrating green building practices more fully into their work**

**Question:** Are you satisfied with the degree to which you've been able to incorporate green building practices into your work since the workshop?

This question was posed to all interviewees who are employing green building practices in their work. The vast majority replied that they are not satisfied and would like to do more. A few indicated that they are satisfied with their progress to date, or that they are realistic about how quickly progress could be made. However, they plan to continue pushing ahead.

**Question: What has stopped you from integrating these practices more fully into your work?**

Interviewees had extensive comments about the barriers they face in integrating green building practices more fully into their work. A significant number of interviewees cited multiple barriers to using green building practices. Table 1 provides an indication of the more and less commonly expressed views.

**Table 1. Barriers to Green Building**

Barrier	Number of Comments Received
Lack of Client Demand/Need for Client Education/Client Budget Limitations/Client Priorities	23
Higher Up Front Cost/Long Payback Periods	11
Barriers Associated with the Construction Process	9
Barriers Caused by and Faced by Architects	8
Aesthetics Issues	6
Product Availability Issues	4
Risk Aversion	3
Concerns about Product Performance or Repair Infrastructure	3
Need for More Professional Education	2
Lack of Available Expertise	1

**Lack of Client Demand**

Interviewees cited a lack of client demand as a barrier to green building. Some see growth in green building practices as being completely customer driven. Others see green building as an easier sell if the customer is already on board, but believe they *may* still be able to persuade a client who is not initially receptive. One interviewee mentioned that while remodelers wish to provide green services, the end goal is harder to see, so it is harder to get buy-in from clients. For example, a remodeling project can't be LEED certified.

Most of the comments focused on how client demand influences whether green building practices are included in the building *design*. However, one architect saw an important role for the homeowner in ensuring the *implementation* of these practices. The builder is under contract to the owner, not to the architect. If the owner makes it clear to the contractor that he wants something done, the contractor will generally do it, because the contractor wants to please the owner. As a caveat, however, it was noted earlier that contractors may resist using practices that are unfamiliar to them, even if directed to do so by the owner.

**Need for Client Education**

In general, interviewees cited a lack of education among clients about the options, the costs and the savings associated with green building practices. In specific comments, interviewees suggested that the public doesn't know what can be done with energy efficiency techniques because the focus has been on renewable energy technology. The

public is also unaware of reuse options for unneeded construction materials that can be rescued during renovation or demolition.

### **Clients' Budget Limitations**

Interviewees made a number of general references to clients' budget limitations as a barrier to green building. Several interviewees made specific references to homes that they designed to include active solar systems. Although the homes were built to accommodate the systems ("the pipes are in the walls"), the construction budgets ultimately couldn't accommodate the solar panels, and they have not yet been installed. Another interviewee noted that he specified better insulation in one case, only to have the contractor take out the specification. What often happens, he said, is that the contractor runs into a problem finding someone to do part of the project for a reasonable price. So, the contractor comes up with several alternatives and presents them to the owner, who generally will go along with one of the suggested alternatives.

### **Clients' priorities**

A number of interviewees made reference to clients' emphasis on finishes and other luxuries. The result is that the homeowner can't fit both solar panels and granite countertops in their budget. Clients need on-demand hot water. "I have people using houses only in the summer, but heating all year so that they don't have to turn the water off," said one interviewee. Several interviewees described the difficulty of overcoming clients' sense of entitlement to recessed lighting.

Because they use the home for only a few weeks or months per year, the priorities of clients owning vacation homes on the Cape may be less amendable to green building practices. People don't want a hassle in their home, especially their second home. With solar panels, for instance, there is a concern that they are a fad and that there won't be anyone around in the future to fix them if they break.

### **Higher Up-Front Cost**

Interviewees referred to both the perception and the reality that green building practices can cost more up-front. Alternative energy technologies, such as solar and geothermal, were specifically mentioned as costing more. One builder stated that he ends up selling the low cost end of the technological spectrum, such as insulation. A customer is going to be more willing to spend \$5,000-\$6,000 for insulation than \$25,000-\$30,000 for a geothermal heat pump.

### **Long Payback Periods**

One builder mentioned that for someone like him, who has a 98% efficient boiler in his house, the payback period for solar panels might be 20 years. Payback periods may be a particular problem on the Cape. For second homes, which are generally not occupied in the winter, the savings in heat is lower, making the payback time for solar thermal systems much longer. Further, it was suggested that people don't own their second homes as long as they own their primary homes, lessening the payback period that they find acceptable. Finally, one architect remarked that she doesn't know enough about the pay offs to speak definitively about them with clients.

## **Barriers Associated with the Construction Process**

The need to get builders up-to-speed and committed to green building practices was mentioned by a number of interviewees.

Several interviewees specifically mentioned barriers to incorporating efficient heating systems into buildings. While the architect may specify the **type** of heating system (e.g. radiant heat or electric heat), the choice and size of unit are determined by a heating system supplier. The plumber provides the house plans to the supplier, who chooses the heating system on that basis. Interviewees suggested that the choice is often not well thought through. Further, systems are frequently oversized, because the supplier and contractors want to make sure that the house is warm enough.

One interviewee also stated that the nature of the construction process presents barriers to green building. The general contractor is responsible for ensuring that each piece of the construction process is completed. However, it is not his responsibility to ensure that all the elements of the house work together as an energy efficient whole. For example, the way that the framer does his job can make the insulation installer's job easier. But no one is responsible for making sure the framer prepares properly for the insulation installer, and all sorts of inefficiencies happen as a result. No one picks up on the small tricks of the trade that would make it easier for everyone to do the right thing, and that would make the house more efficient overall. It is unlikely that most general contractors are even aware of what needs to be done or what to watch for. One architect expressed a related concern, which is that it can be difficult to check a contractor's work to make sure a green building practice has been carried out and done correctly. For example, if the work is to be done inside a wall, it is not visible once the wall is built.

Two interviewees commented on spec building, in which a builder builds to his own specifications based on what he thinks will sell. Alternatively, a custom home is designed for a specific client, typically by an architect. Custom homes are a small percentage of all homes built. One interviewee speculated that probably more than 80% of new homes on the Cape are built by spec builders.

Spec builders, suggested several interviewees, have no particular incentive to switch to other building techniques. They know they can make money doing what they've always done. Financial gain may be a more prominent motivation for them than for custom builders. Spec homes typically meet minimum building codes, but generally do not exceed them. Sometimes, minimum building codes are not met. Even when they are, building codes change very slowly, and are often behind the curve when it comes to fostering progressive building practices. In addition, building inspectors may not be knowledgeable about newer building techniques. Building inspectors' old fashioned ideas, combined with the considerable leeway they have to interpret the code, can be a barrier to green building practices.

### **Barriers Caused by and Faced by Architects**

Several builders mentioned their lack of control over the home design as a barrier to using green building practices. However, an architect and a green building consultant also stressed that architects need to make the effort to detail green building elements in the design of the home. If the architect doesn't specify them, the builder won't go out of his way to include them.

One architect stated that, unfortunately, strategizing about green building practices is not typically done in the initial stages of designing a house. If the architect designs a house with thin walls, and then later starts to think about using thicker walls to accommodate insulation, there will be less floor space. The architect might end up having to suggest to the owner that something be sacrificed, like a bedroom. Those are difficult suggestions to have to make, and serve as a deterrent to green building. Up-front inclusion of green building practices would overcome that barrier.

A number of architects said that they often face time constraints in the design stage, a barrier that makes it difficult to do research into new technologies.

### **Aesthetics**

Numerous interviewees mentioned aesthetics as a barrier to green building. "People are expecting a beachy, thin-walled house," said one. "We design high end custom homes, and design is the foremost objective," said another. "These are buildings that look beautiful. We wouldn't participate in something that looks experimental. There is a perception that renewable energy has to look like a 1970's hippie commune. This is the challenge. For more contemporary homes, it would probably be easier to integrate these technologies into the design. But, for some traditional homes, it might be harder to meld beauty and function." Several other interviewees also expressed concern about the aesthetics of solar panels, including objections that have been encountered from neighbors. Constraints on modifying the appearance of historical structures can also be a barrier.

One architect mentioned that he is aware of where to find high efficiency windows, but "they are just so ugly!" Another problem is that the windows that are typically installed in homes have low coefficients of solar heat gain, because people don't want their rugs to fade.

### **Product Availability**

Some interviewees indicated that lack of availability of green building products was a barrier for them. Further, one builder said that much of the product information available is from manufacturers, so it is hard to get objective assessments of quality and performance.

### **Risk Aversion**

"People like what they know," said several interviewees. People are deterred by the risks they perceive to be associated with products that they are not familiar with, or that do not carry a widely known, respected brand name. An interviewee who owns a green building

supply store carries a full line of low VOC paints. However, not a single paint contractor on the Cape will offer them to his customers. The paint contractors stock Benjamin Moore and Sherman Williams. They have the perception that customers want only the best-known brands. Contractors also get familiar with the people who sell products to them. They don't want to leave them. "They treat me right," contractors say. "They get me what I want, when I want it and at the right price."

### **Concerns about Product Performance or Repair Infrastructure.**

One architect expressed concern about the new technologies inherent in some green building practices, saying, "We don't want call backs on things that don't work." One builder relayed a concern, primarily customers' part, that solar panels are a fad and that there won't be anyone around to fix them if they break in the future. An architect described his own perception that renewable energy technology is still iffy in terms of performance, durability and economics. Another personal barrier for him is the concern that product evolution will make equipment obsolete. "Should I wait five years before adopting?" "You need to give clients a sense of security, that they are not going out on a limb," he continued.

### **Need for More Professional Education**

Several architects mentioned that they need to educate themselves further in order to integrate green building practices more fully into their work.

### **Lack of available expertise**

One builder cited the lack of experienced experts as a barrier. He did happen to find someone who works about twenty minutes from his shop who has experience with solar energy technology. He has sought this person out for advice, but wouldn't have done so if the person were not so conveniently located.

## **Goal: Gain information on the mechanisms through which workshop attendees have obtained clients for green building projects, and on the motivations that influence clients' desire for green building practices**

### **Question: How do you get clients for green building?**

This question was posed to 18 interviewees. Eight said that inclusion of green building elements in a project generally results from a proposal they make to a client. Five said that projects with green building elements are typically initiated as a result of a client request. Four interviewees said that they drive some of their green building projects and some are client-driven.

Architects were more likely to say that projects incorporating green building elements result from proposals they've made to clients than they were to say that green building clients approach them. The green building consultants report that their clients come to them.

**Question [If clients have approached them with requests for green building practices]: Did the client tell you what motivated them to request green building practices?**

Interviewees reported that when clients come to them with a request to build green, the most common motivation is a desire to do the right thing. A smaller number reported that clients are motivated by monetary savings, or a combined desire to save money *and* be a good steward. One architect described a client, an engineer, who primarily feels strongly that things should be efficient and work well.

**Goal: Gauge the extent to which applying green building practices has changed the way that workshop participants market their services**

**Question: Has applying high performance green building practices impacted how you market your firm's services?**

Eighteen interviewees were asked this question. Only two advertise their green building services in a significant way, and one of those includes a caveat regarding their current level of expertise. Four interviewees do mention their green building experience and services to clients, but not as part of a systematic marketing effort. Three interviewees implied that they would like to market their green building services in the future. One architect feels that the “green angle” is a little overdone right now. Another wants to be labeled a “good architect,” not a “green architect,” and feels that green building practices should just be part of the way things are done. Among those who don’t publicize their green building experience, several indicated that they don’t do any marketing at all.

**Goal: Gauge the extent to which applying green building practices has affected the bottom line for workshop participants**

**Question: Would you say that applying high performance green building practices has had an impact on your bottom line? Positive or negative?**

When asked this question, interviewees overwhelmingly replied that no impact was discernable. Three interviewees indicated that applying green building practices had had a positive impact on their bottom line.

**Goal: Assess usage by workshop participants of resources provided at the workshop**

**Question: At the workshop they handed out a double-sided page of resources for high performance building on Cape Cod. These included coursework and additional workshops on green building, rebates and tax credits, websites, books and organizations. Have you used or tried to use any of the resources that you learned of at the workshop?**

Interviewees frequently could not recall the resource sheet. Among those who could, only a few reported using it. Among those who reported using it, several described accessing resources that were not actually listed on the resource sheet. When asked why

they hadn't used the resource sheet, a number of them responded that "it becomes a filing problem if it is paper." Interviewees said that if the resource list were web based, it would be easier to find when they needed it. A few interviewees hadn't used it because they hadn't had call to provide green building services.

**Question:** Have you since collaborated with any of the other professionals who attended the workshop?

Twenty-one interviewees were asked this question. Nine reported that they had not contacted anyone from the workshop, or at least no one that they hadn't known previously. Twelve reported contacting someone from the workshop. Three of these contacts were attempts at collaboration that did not go anywhere. Two of the contacts were quick questions sent to Marc Rosenbaum, to which he provided quick but helpful responses. One contact was to the Woods Hole Research Center ground source heat pump installer to obtain a quote. However, the proposal for which the quote was sought was not accepted. Six interviewees did report collaborating with others who attended the workshop and all reported that the collaborations were valuable. Five of these six were architects who hired a professional they met at the workshop. One of the six was a green building consultant who was subsequently hired by someone he met at the workshop. One of the architects also noted that he has exchanged ideas with some of the other workshop attendees. "There is a lot of informal comparing of notes that goes on at various seminars," he said.

**Goal: Assess workshop attendees' awareness of, participation in and satisfaction with a number of other opportunities to learn about green building practices on the Cape**

In this part of the interview, interviewees were informed that, subsequent to the ZEH workshop, the workshop planning committee had offered a number of other opportunities to learn about green building. Interviewees were asked if they were aware of specific opportunities, and if so, if they had participated in them. If they had participated, they were asked if the experience had been useful, and if they had any suggestions for improvement. The findings pertaining to each learning opportunity are described below. Due to individual time constraints, not all interviewees were asked about each learning opportunity.

**Email Alert Service from Joan Muller at the Waquoit Bay Reserve**

Twenty-seven interviewees were asked if they were aware of this service and 22 responded that they were. All of those stated that they receive it, except for one who was unsure. Recipients overwhelmingly stated that the service was useful. They appreciate knowing what is going on, even if they are not always able to attend events. One interviewee passes the emails on to the local chapter of the National Association of the Remodeling Industry (NARI).

When asked to suggest improvements, most could not think of any, and some reiterated that the service is very good. Three interviewees did say they could sometimes use more lead time before events. One interviewee commented that receiving an email from the Waquoit Bay Reserve may not alert people that it is about green building. If people don't

realize that the email is of interest to them, it may get deleted. One interviewee suggested that it would be helpful to get a heads-up on what's going on in towns regarding regulatory initiatives, legislation and bylaws. His own town recently held a public hearing on a wind turbine bylaw that he hadn't known about. He is concerned about the value of the bylaw as written, and would have provided some input if he had known about the bylaw and the hearing in advance. Another interviewee suggested making the email format simpler and cleaner, with less information on any one page.

### **Green Building Workshop Series (Energy Star, ZEH, ZEH2, PassivHaus)**

Twenty-five interviewees were asked if they had heard about other offerings in the Green Building Workshop Series, besides the ZEH workshop that they had attended. Twenty-two had. Eleven had attended a workshop in the Series other than ZEH. A few others were not sure if workshops they've attended were part of the Green Building Series or not. All but one described the workshop(s) they attended as useful. One architect mentioned that he felt that the sequence of the workshops was good. The information provided in each workshop built on the previous workshops. Another architect described the workshops as incredibly interesting, inspirationally, educationally very good.

However, one architect indicated that the Passivhaus workshop had not been especially worthwhile. It was not very well structured, in his opinion. It had seemed kind of disjointed, sort of scattered and not very instructive. A green building consultant, who had found the workshops useful overall, also singled out Passivhaus as interesting, but less practical. PassivHaus didn't have the nuts and bolts solutions that some of the other workshops did, he said. It was more of an academic exercise. "This is what we do in Europe." On the other hand, another architect who had attended the Passivhaus workshop described it as particularly intriguing: "The Passivhaus concept grabbed me because it involved doing the design right from the start. It made a lot of sense. It was a contrast to the information Marc Rosenbaum offered, which had too many pieces to it. Passivhaus offered a much simpler way of achieving a sustainable building. The simple design doesn't offer many opportunities for architectural creativity, but I am more interested in function."

Interviewees had a variety of suggestions for improving the workshops. The most common request was for more specific information. "It would be helpful," said one architect, "to be given wall section drawings that show how certain techniques are done. Or drawings that show how windows and doors are properly sealed. For example, moisture control and air filtration are very tricky. I'm still getting the idea of it. There are a lot of detailed elements that have to be done and done right. Things could easily go wrong. You also have to watch the contractor carefully to make sure they carry out all instructions properly. If it went wrong and there were damage to a building (e.g. due to moisture building up in the walls), I'd be upset. I'm not sure yet that I know enough to do it right." Others echoed her view.

On the other hand, one architect felt that would be useful to have more of an overview that compared the different strategies. She needs to know the pros and cons, benefits and costs of different strategies. In contrast, ZEH2, which she attended, got very specific

about how to implement particular strategies.

Finally, one interviewee had a comment on tone. It needs to be easier for people to be part of the solution. If the tone is more positive (e.g. “It’s not that hard.”), it gives people the motivation to go to workshops.

#### **Networking sessions/tours of sustainable buildings (i.e. Cape Cod Community College, Wellfleet Audubon Center)**

Twenty-six interviewees were asked if they had heard of the sustainable buildings tours. Twenty-two had. Thirteen had gone on a tour. Most found it useful. However, several interviewees indicated that the tours were not particularly helpful. One said that what was done at Cape Cod Community College was of such a different scale that it was not applicable to the residential work she does. Another interviewee concurred, saying that the Community College tour was interesting but not useful. There are not many projects of that size happening or going to happen on the Cape. Home building is what’s happening. And, if similar projects are built on the Cape, a very large firm will be hired to design/build it, not the small local firms. A third interviewee had a similar comment about the Wellfleet Audubon Center tour. This tour featured a very rigid whole-house passive solar design that his firm would not use. His clients are not looking to completely rely on solar energy. Therefore, the practices featured were not relevant to the additions or single family home designs that he prepares for clients. Another interviewee also found these commercial building tours less useful to him personally. “When you have a commercial building, it’s hard to relate to it and what makes it green; hard to figure out what you like or don’t like.”

#### **Green Buildings Open House Events**

Twenty-four interviewees were asked if they had heard of the Sustainable Homes Open House (Green Buildings Open House) events. Fifteen had and one thought he had. Five had attended the events, and attendees overwhelmingly felt that they had been useful. One architect who mentioned that she had gone on the National Solar Homes Tour (this is the same event as the Green Buildings Open House) praised the tour because it was “hands-on and in your face.” She appreciated the fact that the owner of one featured home offered her house as a place to show a client. It is important for an architect to be able to show a client a home where solar energy technology is used and where it works.

When asked for suggestions for improving future Open Houses, one interviewee mentioned that some of the homes have only Energy Star appliances or CFLs. “It’s too bad,” he said, “that there aren’t more impressive examples available.” Another interviewee commented that a lot of the homes on display had bland architecture. He felt that there are some inspiring homes out there that use green building techniques. Including some of these homes in future Open Houses would make green building more appealing. Finally, one person suggested that it would have been helpful to have information on cost of installation and utility cost savings.

#### **CIREC Chapter Meetings**

Twenty-three interviewees were asked if they had heard of these meetings. Eight had.

Two of those have attended meetings. One declared them useful and the other said they are sometimes so. It was suggested that the meeting organizers identify who is in attendance at each meeting, and based on that assessment, provide content that is relevant to either homeowners or professionals. Finally, continue to reach out to a broader audience. “I always see the same faces.”

### **The Cape and Islands Go Green Guide**

Twenty-five interviewees were asked if they had heard of the Guide. Twelve had. Five of those are listed in the guide. When asked if listing in the Guide had been worthwhile, none indicated that it had generated any calls or customers, as far as they knew. However, several acknowledged that the Guide is fairly new. Given their limited experience with it, none had suggestions for improving the listing feature. One person expressed concern that he didn’t know how people can find copies of the Guide.

Among those who were aware of the Guide, the most common reason given for not being listed was that they had not been aware of the listing opportunity. Several interviewees indicated that they would like to be listed, but that time constraints had prevented them from taking the necessary steps. One interviewee felt that he doesn’t have enough experience yet to list his firm as a green building services provider.

### **Other Training and Coursework**

Twenty-two interviewees were also asked if the ZEH workshop had led them to pursue any training or coursework in green building other than what had already been discussed. Five individuals indicated that they had pursued (or will be pursuing) additional training, but in some cases it wasn’t clear that it was the ZEH workshop that had led them to do so. Several of these individuals had pursued more than one training opportunity. One architect will be attending a seminar on mechanical systems at the Build Boston Convention in November, 2007. Several others also mentioned that they have attended trainings at Build Boston or Residential Build Boston, trainings offered by the American Institute of Architects (AIA) or building design workshops organized by the Boston Society of Architects. One architect has attended hour-long and half-day workshops at the annual Northeast Sustainable Energy Association (NESEA) conference.

One architect attended a 40-hour PV Installation course conducted at the Cape Cod Community College, co-taught by Richard Lawrence and Megan Amsler of Cape and Islands Self Reliance and Tom Wineman of Clean Energy Design.

**Goal: Gain information from workshop participants about what would help them integrate high performance green building practices into their work and what advice they would have for others who are interested in doing so**

**Question: At this point, what would best help you integrate high performance green building practices into your work?**

Interviewees had extensive comments about what would help them integrate green building practices into their work. A significant number of interviewees provided

multiple suggestions. Table 2 provides an indication of the more and less commonly expressed views.

**Table 2. Suggestions for Fostering Green Building Practices**

Topic	Number of Comments Received
Initiatives to Increase Client Demand and Resources for Gaining Client Buy-In	23
Opportunities to Gain Knowledge and Experience	14
Provision of Detailed Information about Implementation	6
Product Information/Product Affordability/Independent Product Assessment	6
Ways of Getting Contractors Committed and Up to Speed	5
Examples and Success Stories	4
Green Consultation Services	2
Mechanisms for Increasing Business Opportunities	1

### **Initiatives to Increase Client Demand**

Not surprisingly, given their earlier comments on the lack of client demand, interviewees frequently expressed the view that creating a market for green building would help them integrate these practices into their work. Most respondents suggested educating the public to achieve this goal. A few interviewees advocated for incentives or regulation.

#### *Education*

Most of the calls to educate the public focused on the need to communicate that green building is increasingly mainstream and that it works. Several interviewees suggested ads or publicity on TV or in newspapers. “Promote the fact that the stuff has been used in Germany for many years. It works. People do it.” Another interviewee recommended more publicity on programs like This Old House. “There needs to be more public consciousness so that green building doesn’t seem like an odd thing to do. We need reliable guides to help us change.” In the same vein, one builder suggested that if you could go to Home Depot and see a solar panel for sale, it wouldn’t seem like exotic technology that hippies use. Similarly, a green building consultant said that it would be helpful to get the word out that you don’t have to build a LEED Platinum home. There are lots of smaller things you can do.

An engineer suggested that people need to be educated that that the upfront costs may not be as high as they think, and that even a 10 year payback may be worth it.

One builder recommended tying into the “buy local” theme, by promoting the idea of buying solar panels built here in MA, installed by local professionals. Along these lines, another interviewee pointed out that if you purchase a green building product from a distant locale, a big portion of the costs may be in shipping.

An architect suggested that a clearinghouse of ideas and resources would be helpful. He described PG&E in California as a good example of such a clearinghouse. "You can walk into PG&E's offices off the street and take courses, or find a solar installer. They have engineers on staff that do consulting to the public. They have on-line courses. They have wonderful displays in the lobby. One shows how different types of lights – fluorescent, incandescent, etc. -- change the colors on a color wheel, giving you a sense of how the light would illuminate the colors in your home. You don't have to be an architect to understand it. There is also a model of a house with meters on each side showing how much sunlight is hitting each side of the house. These types of demos are needed to make the concepts accessible to people on the street."

#### *Incentives or Regulation*

One interviewee suggested that higher energy costs would be most helpful to his efforts to increase the use of green building practices. Others advocated for tax credits and for government and utility incentives. "There is a town somewhere in the country," said one architect, "that is waiving property taxes for LEED platinum homes." Connecticut's 40% subsidy for solar panels was mentioned as the kind of thing that is needed here. One architect, decidedly the contrarian among those interviewed for this evaluation, stated that money spent on seminars for building professionals is a waste of time. Create the demand through regulation or education and the professionals will learn what they need to learn.

#### **Resources for Gaining Client Buy-In**

A number of interviewees had specific ideas about tools that would help them gain buy-in from clients on green building. Most of these ideas shared common themes.

One architect wanted literature that he could share with his clients in order to get them on board. "It needs to be black and white on the cost benefits and environmental reasons for doing this. We would love to have examples of payback periods for different technologies and practices at our fingertips. We get a lot of information from vendors, but this is not the best way to get balanced information."

Similarly, another architect suggested that it would be very helpful to have a green buildings options package that he could present to clients: "Here are the things you could do, here are the costs you can expect, based on a 3,000 sq. ft. house." It should provide information on rebates and tax credits. It should include some good glossy photographs of houses that have done it right. Something that is Cape-specific would be good. This interviewee said that he hasn't seen one good, solid resource that sums it all up.

This green building options package also has the potential to be used by spec builders. A spec builder could show the options package to a buyer before the buyer purchases a house. The purchase might occur before the house is framed, or before the kitchen goes in or at some other point. At any of those points, there are green building practices that could be incorporated, if the buyer wants them. If the spec builder has the options package, at least he could give the buyer some choices.

Another architect wanted to be able to send someone to a website that would quickly convince them that they would be improving the value of their home, making it easier to resell, if they use green building practices. That's why people install things like soaker tubs, in order to increase the value of their home. If the website could also quickly tell them how much money they can save as a result of green building practices, that would be very helpful as well. "The committee should take a look at the Paul Lukez Architecture website (<http://www.lukez.com/>). It's as easy as using an ipod to look around that site and find things. It needs to be easy for people to find the information they want."

An engineer recommended that a web-based tool be provided that would allow members of the public or architects to do simulations in order to look at the economics of using solar energy in their particular situation. Each house is different. The National Renewable Energy Laboratory has a tool that could serve as a model.

### **Opportunities to Gain Knowledge and Experience**

Interviewees felt that additional learning opportunities would help them integrate green building practices into their work. Several interviewees believe that having multiple opportunities to hear the same information is helpful when the information is new. "It is the steady drip, drip, drip of information that works."

Others had suggestions about effective venues, conveners and incentives. One engineer stated that continuity is needed in educating the various players. One workshop won't do it. He feels that this continuity should center around Cape Cod Community College. A builder proposed asking architectural schools to incorporate renewable energy technologies into their curricula. Continuing education credits are a powerful incentive for architects to attend workshops. Bringing experts in from different parts of the country was also suggested. Someone who really knows what they're doing is a big draw. One interviewee suggested that workshops be held on weekends to make it easier for busy professionals to attend. Another suggested spreading the venues around. There is a nice venue at the National Seashore. Communities have venues that can be rented.

An architect said that his firm incorporates spray-on insulation into building designs as a result of a lunch workshop that was held at their offices. He is convinced that while in-office workshops may seem redundant, they are more effective in the long run. They can be tailored to the firm in question. They expose more than one staff member to the new idea. This is more successful than having one individual go to an outside workshop and then try to get others in the firm off their current track and onto a new one. They allow staff to bounce ideas off each other about the topic covered in the workshop. Finally, getting the firm's principals involved in the lunch workshop was efficient in terms of getting their buy-in.

Numerous interviewees suggested specific workshop topics that would help them. They include:

- A LEED course geared towards small buildings and houses. Longer workshops (day-long) are more useful than shorter workshops;

- A seminar on projects with modest goals. A Zero Energy Home is an important aspiration, but “Better Energy Homes” are what people are willing to adopt (two interviewees made this suggestion);
- A separate workshop on alternative energy technologies;
- A workshop that takes a design for a typical cape or colonial, perhaps a 1,500 sq. ft. home for a family of 4, and shows how it could be designed (rethought) using green building practices within the same budget or a slightly higher budget. Provide a 10 year overview of the utility and other costs compared to an identical house with traditional design, and show whether higher up-front costs are paid back over time. Or, if the up front costs are not higher, show the net cost savings over time.
- More information on lighting, appliance and heating products. Information on what’s available and how the products work;
- More information about good building envelope solutions with ventilation solutions. Envelope solutions are lowest on the technological totem pole, but trigger other issues, especially in renovation. What makes sense and what is going to cause problems down the road?
- More information about landscaping issues that relate to solar energy use and to moisture control. How do a home’s wooded surroundings affect moisture control? If the home you are renovating is on a wooded lot, what do you have to cut down? What can you leave? How should landscapes be designed to maximize solar energy use and moisture control?

Finally, several interviewees stressed that it would be helpful to have more hands-on workshops. For example, a workshop in which the participants actually construct a wall using green building techniques would be instructive. Hands-on workshops with actual products that you can touch and feel would be useful as well.

### **Provision of Detailed Information about Implementation**

The desire for more hands-on workshops overlaps with an expressed need for more detailed information about the implementation of green building practices. Interviewees said that they need to know not just how a particular technology works (e.g. geothermal heat pumps), but how to make it happen. They need detailed information on how to implement these practices and how to work with consultants. They need case studies, drawings, models and hands-on activities. They need less problem identification (why to do it) and more practical solutions. People understand the problem, but going from theory to practice is the issue. They want to hear about options for making a particular technology work and the pros and cons of those options. For example, with PV panels and wind energy, what are the pros and cons of having a battery room vs. going back to the utility? Costs are always useful, too. If you shop around, what can you expect to pay? Information on tax credits and rebates and cost comparisons with traditional building methods would also be welcome.

The requests for more detailed information about implementation were all from architects.

### **Product Information and Costs**

Several interviewees said that providing more information about local (east coast) green building product suppliers at seminars would be very helpful. Being able to find products and equipment at lower costs would help, too.

### **Independent, Third Party Assessment of Products and Practices**

Several architects expressed a need for trusted sources of information about green building products, service providers and practices. One architect said, “We find that there are quite a few different opinions out there about the technologies. We are trying to wade through the information out there, particularly around green products. We are trying to identify the better performing products and trying to validate green claims. It would be very helpful if some independent, third party entity had done an assessment of good products and practices and created a database of recognized, approved products.” Another architect wanted “clear information that will help us separate fact from fiction, myth from reality.” “For example,” she said, “consultants say that geothermal doesn’t work on Cape Cod. We know that’s not true, but we’d need to do the research in order to back it up. It’s a deterrent, because we can’t clearly recommend to the client what we know to be the best choice. It’s hard to get a handle on that.” A third architect would like to know that there are vetted insulation installers and vetted solar installers. He’d like to be able to turn to some sort of clearinghouse where he could find five good installers to talk to.

### **Ways of Getting Builders Up-to-Speed and Committed to Green Building Practices**

A number of suggestions were made for engaging builders and contractors in using green building practices. One builder stated that mandatory building codes are an extremely important influence on the materials and methods that builders use. On a related note, persuading local building inspectors to go to green building seminars may help them see green building practices as legitimate, safe and mainstream.

Several architects felt that as builders hear others are successfully using green building techniques, it will become accepted practice. Disseminating examples and case studies will help this process along. People build quite differently on the Cape than in the Boston area, so Cape-specific examples would be best.

Educational opportunities for builders were also proposed, preferably, as suggested above, in conjunction with the builders association. Suggested workshop topics might include the following: “Simple things you can do.” “Steps for taking green building further.” “How to apply green building techniques to the 5000 sq. ft home you’re building right now.”

A green building consultant with prior experience as a builder provided some insight into a segment of the building community that might be more amenable to using green building practices. Some builders are interested in the science of buildings. It gives an added dimension to their work. Heat loss. Moisture flows. How the building performs is interesting to them. For that reason, they might be more likely to implement green building practices. How can these builders be identified? They subscribe to trade

magazines. They are interested in gizmos. The Journal of Light Construction has a very active online forum on building science. It is this segment of builders that is active on the building science forum. Also, smaller builders are sometimes more passionate about building performance.

### **Examples and Success Stories**

A number of interviewees said that hearing about more examples, case studies and success stories would help them integrate green building practices into their work. “I need to know what’s out there, who’s doing it and whether it’s successful,” said one builder. He’s involved with the National Association of Home Builders, and would like the Planning Committee to work with them to disseminate the needed information. Suzie Roetige would be the one to contact.

An architect suggested that a session devoted to networking would be helpful to see how people are doing with green building practices. An hour of presentations on what has worked for people could be followed with time for people to talk informally.

### **Green Consultation Services**

Two architects expressed a desire for a green consultation service. One architect thought it would be very helpful to have a free green consultation service. In the schematic design phase, an architect could bring in an expert who could give him ten possible strategies he could use, along with their costs. That would enable an architect to get these elements on the boards right away. Trying to incorporate green building practices after an initial design is completed can be difficult, because it may then involve sacrificing something in the original design.

The other architect would like to be able to send her design to an expert for review, to ensure that she had used the green building technique properly. The experts could be volunteers, but she would also be willing to pay for the service. She would prefer using experts who are operating under the auspices of a trusted non-profit organization rather than a for-profit firm. She puts faith in organizations that have a mission. She would also like to know that more than one person was involved in critiquing her work.

### **Mechanisms for Increasing Business Opportunities**

One engineer suggested that someone is needed to coordinate local green builders and architects on the Cape to work together to go after larger green building projects.

**Question: What advice would you have for other architects/builders who are interested in using high performance green building practices in their work?**

Advice for others fell into two categories: 1) Get educated and 2) Sound your client out and push green building practices.

### **Get Educated**

“It takes a bit more study,” said one architect. “It takes your own personal time away from other work, but it’s one of the best things you can do for your client. It’s not rocket science. Don’t be afraid of it.” “The more that you can answer the questions the client

has, the more likely you'll get their approval to incorporate these practices," said another architect. Others mentioned that more and more continuing education credits are related to energy use, so professionals should take advantage of that. The Boston Society of Architects is getting good at providing workshops for the uninitiated. And finally, "Buy a copy of the cold weather climate guide to building."

### **Sound Your Client Out and Push Green Building Practices**

An architect advised others to sound out the client to see to what extent they are already on board and to push green building practices as much as possible without creating the perception of lecturing the client. Two builders said that architects and builders need to push green building practices with their clients, and stand firm about keeping these elements in the building plan.

## **Final Words**

At the end of each interview, the interviewee was asked if there was anything else that they wanted the workshop organizers to know about their experiences and views. For greater coherence, some of those responses have been included elsewhere in this report.

One large builder took this opportunity offer his assessment of the current status of green building: "They need to know," he said, "that green building practices are part of only a very small percentage of the projects that we do. We're still building the way we were 40 years ago." Others provided an optimistic outlook: "The widespread use of green building practices will happen eventually," one person said. He would like to see money going to local contractors and engineers, rather than leaving the community, as it does when it is spent on fossil fuels. "We're willing to learn about anything new and try anything. If it makes sense in terms of less fossil fuel, most of our clients would be interested in knowing about that," said another. "I know it works, so they should continue getting people to do it," said a third.

Finally, a number expressed their appreciation to the workshop planning committee: "I appreciate what the committee does." "I think they're doing a great job." "I very much appreciated the ZEH workshop and got a lot out of it." "I appreciate the committee's work and I will go to their offerings." "The things they've been doing are terrific. Thank you for putting the time into gathering this feedback."

## **Appendix A**

### **Introductory Email to Potential interviewees**

**From:** Joan Muller

**Subject:** Heads Up: Follow Up Evaluation for Towards Zero Net Energy Homes workshop

**Date:** October 19, 2007 11:38:46 AM EDT

Hello, I'm contacting you today to ask your assistance in a follow up survey for the building professionals who attended the Towards Zero Net Energy Homes workshop presented by Marc Rosenbaum at the Woods Hole Research Center on January 24, 2006.

Jan Aceti, from Aceti Associates, will be contacting you by phone to ask a number of questions about how useful the material presented in the workshop subsequently proved to be to you. She'll also be asking your opinion of some other follow up activities the High Performance Building Group has organized and to get your input on what else you need to implement green building techniques into your work. The survey should take 30 minutes or less. She will of course, schedule a time that is convenient for you.

We have hired an outside evaluator so you will feel comfortable sharing your honest opinions. Individual responses will not be identified in the report we receive from Aceti Associates.

We hope this feedback will help us to plan future activities that are valuable to you and others.

Thank you,  
Joan Muller

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## Appendix B: Interview Questionnaire

Hi, \_\_\_\_\_ . This is Jan Aceti of Aceti Associates calling. I believe you received an email from Joan Muller of the Waquoit Bay Reserve letting you know that I'd be calling to ask some questions about the Zero Energy Homes workshop that you attended back in January of 2006.

Did you receive that heads-up from Joan?

[If yes] Ok, well, as she mentioned, the Workshop Planning Committee is interested in knowing how useful the information from the workshop has actually turned out to be for the people who attended. This feedback will help the Committee plan future technical assistance activities that are as useful as possible for you and others. Would this be a good time for me to ask you some questions? This should take less than 30 minutes. We can chat now or schedule a phone conversation sometime soon if that is more convenient for you.

[If no] Ok, well, the reason for my call, then, is that the Workshop Planning Committee is interested in knowing how useful the information from the workshop has actually turned out to be for the people who attended. This feedback will help the Committee plan future technical assistance activities that are as useful as possible. May I ask you some questions about your experiences since the workshop? This should take less than 30 minutes. We can chat now or schedule a phone conversation sometime soon if that is more convenient for you.

[At initiation of interview] Just a reminder that individual responses won't be identified in the report that I prepare for the Planning Committee, so I hope you'll feel comfortable sharing your honest opinions, because that's what will be most useful.

So, as a very quick refresher, I'm just going to list the topics for you that were covered in that workshop almost two years ago. They were:

- Residential energy loads
- Envelope solutions
- Conservation strategies for lighting, appliances, domestic hot water and ventilation
- Passive solar strategies
- Energy supply options for thermal and electrical energy, including
  - Fossil fuel
  - Biomass
  - Solar thermal
  - Ground source heat pump
  - Solar electric
  - Wind
- The workshop wrapped up with a number of case studies featuring zero net energy homes and other buildings.

1. Have you been able to apply information from the workshop in your work since then?
    - a. If yes, how?
      - i. Were the green building practices easier or harder to implement than you thought? Why?
      - ii. Did the practices and technologies you applied meet your expectations for results? Your clients' expectations for results?
        1. If not, why not?
      - iii. Are you satisfied with the degree to which you've been able to incorporate green building practices into your work since the workshop?
        1. If no, what has stopped you from integrating these practices more fully into your work?
      - iv. How did you get clients for green building?
        1. [If clients approached them with request for green building practices:] Did the client tell you what motivated them to request green building practices?
        2. May I talk with that client if I need to get more information about what led them to request sustainable building practices?
        - v. Has applying high performance green building practices impacted how you market your firm's services?
        - vi. Would you say that applying high performance green building practices has had an impact on your bottom line? Positive or negative?
    - b. If no, what has stopped you from applying information from the workshop in your work?
  2. At the workshop they handed out a double-sided page of resources for high performance building on Cape Cod. These included coursework and additional workshops on green building, rebates and tax credits, websites, books and organizations. Have you used or tried to use any of the resources that you learned of at the workshop?
    - a. If yes, which ones?
      - i. Were they helpful?
      - b. If no, why would you say that you haven't?
  3. Subsequent to the Zero Energy Homes workshop, the Planning Committee offered a number of other opportunities to learn about green building practices. I'm interested to know if these opportunities have come to your attention.
    - a. E-mail alerts from Joan Muller at Waquoit Bay Reserve (Y/N)
      - i. [If yes] Do you receive them?
        1. [If yes] Have they been useful?
        2. Any suggestions for improving them?
    - b. Networking sessions/tours of sustainable buildings- i.e. Cape Cod Community College, Wellfleet Audubon (Y/N)
      - i. [If yes] Have you attended any of them?

1. [If yes] Were they useful?
    2. Any suggestions for improving them?
  - c. Green Building Workshop Series (Energy Star Workshop, Marc Rosenbaum, ZEH 2, Passive House) (Y/N)
    - i. [If yes] Have you attended any of them?
      1. [If yes] Were they useful?
      2. Any suggestions for improving them?
  - d. Go Green Guide
    - i. Have you listed in the Guide?
      1. If no, why not?
      2. [If yes], has it been worthwhile?
      3. Any suggestions for improving the listing feature?
  - e. Sustainable Homes Open House (October) (Y/N)
    - i. [If yes] Have you attended?
      1. [If yes] Was it useful?
      2. Any suggestions for improving future Open Houses?
  - f. Cape and Islands Renewable Energy Collaborative (CIREC) monthly meetings (Y/N)
    - i. [If yes] Have you attended any of them?
      1. [If yes] Have they been useful?
      2. Any suggestions for improving the meetings?
4. Did the Zero Energy Homes workshop lead you to pursue any training or coursework other than what we've already discussed?
    - a. If yes, please describe.
  5. Have you since collaborated with any of the other professionals who attended the workshop?
    - a. If yes, have those collaborations been valuable?
    - b. If no, any particular reason why you haven't pursued collaborations?
  6. At this point, what would best help you integrate high performance building practices into your work?
  7. [For those who have applied green building practices:] What advice would you have for other architects/builders who are interested in using high performance green building practices in their work?
  8. Is there anything else that you think it would be important for the workshop organizers to know about your experiences and views when it comes to high performance green building practices?

Thank you so much for taking the time to talk with me about this. Your feedback has been very helpful. My goal is not to take up any more of your time, but if I do find that I need to clarify something important from our conversation, may I call you back?