research/into/action inc

# *Final Report*

# 2010 BetterBricks Market Progress Evaluation Report

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We would like to acknowledge the assistance of Aaron James of the Northwest Energy Efficiency Alliance, who served as our evaluation project manager. We also thank: Rob Russell, Senior Manager for Market Research and Evaluation; Peter Wilcox, Senior Manager Commercial Sector; Kim Hughes, Operations Manager Commercial Sector; the BetterBricks Market Managers – John Jennings, Janice Peterson, and Jack Davis; and Elaine Miller, BetterBricks Marketing Manager.

Collin Elliot, of Itron, Inc., conducted the analysis of the 2008 Kilowatt Crackdown savings. Steven Scott of MetaResources validated the 2010 savings for H&H. We report impacts validated in 2009 (in work led by Research Into Action, Inc. prior to the current contract) by Mike Kennedy and a team of analysts at ECONorthwest, Inc. As part of that same 2009 effort, Tami Rassmussen of ECONorthwest led staff in a review of the BetterBricks ACE model assumptions, which we include in this report.

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# EXECUTIVE SUMMARY

This document constitutes the final market progress evaluation report (MPER) of the Northwest Energy Efficiency Alliance's (NEEA) 2005-2009 BetterBricks Initiative. In December 2009, as part of NEEA's continuous improvement commitment, NEEA launched a redesign of its commercial sector initiative. NEEA plans to launch the redesigned initiative in 2011. This MPER evaluates the BetterBricks Initiative prior to the redesign. The MPER research sought to: 1) assess the adoption of BetterBricks best practices, per market progress indicators; 2) describe the 2010 baseline condition of these markets in terms of business practices; and 3) validate, to the extent possible, energy savings achieved by BetterBricks participants.

For this MPER, we conducted market surveys in each of the four markets targeted by BetterBricks initiatives: architects for the Design and Construction (D&C) effort; real estate managers for the Office Real Estate (ORE) effort; hospital facility directors for the Hospital and Healthcare (H&H) effort; and mechanical contractors for the Building Operations (BOPS) effort. The respondents to each market survey include: firms with extensive direct involvement with BetterBricks (we term them *participants*); firms with exposure to BetterBricks through its training, website, and other outreach (we term them *Light Touch;* they comprise both firms directly involved – but to a much lesser degree than participants – and directly influenced by BetterBricks); and firms that reported no direct involvement with BetterBricks and little or no direct influence (*nonparticipants*).

BetterBricks promulgates five primary principles subsuming a number of best practices. We captured these concepts in five metrics of market progress and an overall, summary metric. Based on these metrics, we estimate:

- Overall adoption among *participants* in the Design & Construction (D&C), Office Real Estate (ORE), and Building Operations (BOPs) markets is 85% or more; overall adoption among Hospitals & Healthcare (H&H) *participants* is 50%
- Overall adoption among *nonparticipants* in the four markets ranges from 0% to 45%
- Adoption of the BetterBricks best practice metrics among the *total market* ranges from 40% to 70%

We conclude that 2005-2009 BetterBricks met its 2010 objectives for adoption of best practices and market change in the specific markets as follows:

- **D&C:** submarkets that adjusted business practices to ensure high performance buildings
- **ORE:** targeted ORE floor space that adopted energy management plans; professionals capable of managing energy-related business practices change; and professionals

downloading the High Performance Portfolio Framework and associated tools, and beginning implementation

- **H&H**: regional hospital beds whose decision-makers: 1) are committed to and practicing SEMP – strategic energy management plan – elements; 2) request/ require trade allies to support SEMP practices, including enhanced O&M; and 3) consider BetterBricks an excellent source of information and practical tools on energy-related business and technical practices

- **BOPS:** building operations market whose service providers adopt business approaches that promote building operating performance

BetterBricks appears to have partially met the following 2010 objective:

- **D&C:** significant percentage of new project designs incorporate partial and fully integrated design (ID) strategies that result in savings greater than 25% over baseline. While we found ID features used by 55% of the market, we do not know the savings.

BetterBricks has also met its 2010 objectives common to all four markets (Table ES.1).

**Table ES.1: BetterBricks Met 2010 Objectives Common to All Four Markets**

| Objective | D&C | ORE | H&H | BOPS |
|---|---|---|---|---|
| **Adoption of best practices through BetterBricks involvement and influence** | ✓ | ✓ | ✓ | ✓ |
| **High market awareness (greater than 50%) of *betterbricks.com*** | ✓ | ✓ | ✓ | ✓ |
| **Market awareness of the benefits of high performance buildings** | ✓ | ✓ | ✓ | ✓ |
| **Collaboration with professional associations** | ✓ | ✓ | ✓ | ✓ |

To date (2008-2010), we and other researchers have validated 3.84 aMW of electricity savings and 714,657 therms of natural gas savings at BetterBricks' participant facilities. This number may change, as there is an effort underway to validate additional 2010 savings for D&C and BOPS. Given our project findings, we believe it likely that BetterBricks has generated energy savings far in excess of those that research has validated, yet a lack of program tracking data continues to prevent a full accounting of program savings.

While BetterBricks accomplished the bulk of its behavior change goals, there was still very little data to tie these changes to energy savings. While we believe that there are energy savings which resulted from this change, the data do not exist to validate this. Prior to the redesign effort, market progress indicators (MPIs) were not sufficiently defined to enable energy savings calculations. It is key to the success of the re-designed commercial initiative to build in the measurement and data collection necessary to tie desired behavior change to energy savings.

# 1 INTRODUCTION

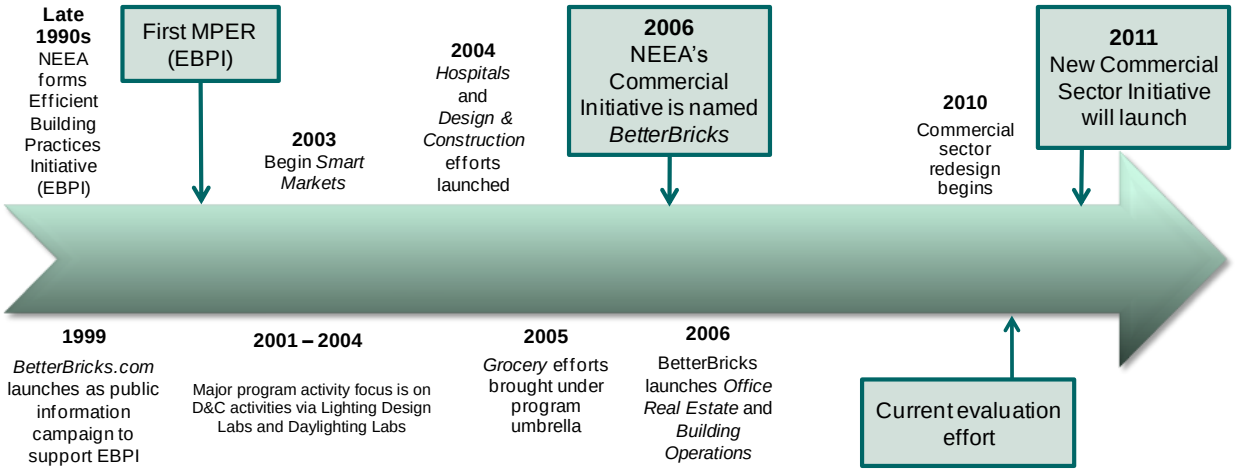
This document constitutes the final market progress evaluation report (MPER) of the 2005-2009 BetterBricks Initiative, the most recent approach of the Northwest Energy Efficiency Alliance's (NEEA) commercial sector initiative. In December 2009, as part of NEEA's continuous improvement commitment, NEEA launched a redesign of the commercial sector initiative to focus on efforts that accelerate market transformation, while filling the energy efficiency pipeline with opportunities to achieve significant regional savings. The redesigned initiative attempts to better tie behavior change to energy savings. NEEA plans to launch the redesigned initiative in 2011. This MPER evaluates the BetterBricks Initiative prior to the redesign.

A team led by Research Into Action, Inc., in association with PWP, Inc. and Washington State University Extension Energy Program, conducted the evaluation. NEEA is a non-profit corporation with stakeholders that include: the Bonneville Power Administration, electric utilities, public benefits administrators, state governments, public interest groups, and energy efficiency industry representatives. These entities work together to make affordable, energy-efficient products and services available in the marketplace.

BetterBricks is NEEA's commercial sector energy efficiency initiative. According to the *BetterBricks Reference Guide*, its mission is to "help drive the demand for, and supply of, energy efficient products and services in commercial markets." The strategy for achieving this is two-pronged: 1) Work directly with commercial building owners and managers to change energy-related business practices; and 2) work with trade allies in both new construction and existing building management to help develop their service offerings and enhance their capabilities to deliver energy-efficient high performance buildings. By influencing both the demand and supply sides of the energy efficiency market, BetterBricks hopes to create natural market demand for energy-related best practices while bolstering the market's capability to supply the services that organizations need to achieve those best practices.

NEEA has implemented some form of commercial sector energy efficiency initiative since the late 1990s, adapting and changing the approach in response to changing market conditions and evaluation feedback on what did and did not work well (see Figure 1.1). BetterBricks was born out of this evolution, and NEEA's commercial sector initiative continues to evolve today.

**Figure 1.1: Evolution of Commercial Sector Initiative and BetterBricks**




## INITIATIVE DESCRIPTION

In 2005-2009 BetterBricks parlance, the organizations with a *demand* for energy-related services fall into two *Target Market* initiatives, **Hospitals & Healthcare** and **Office Real Estate**. The firms that *supply* energy-related services are part of two *Cross-Cutting Market* initiatives – **Design & Construction** and **Building Operations**:

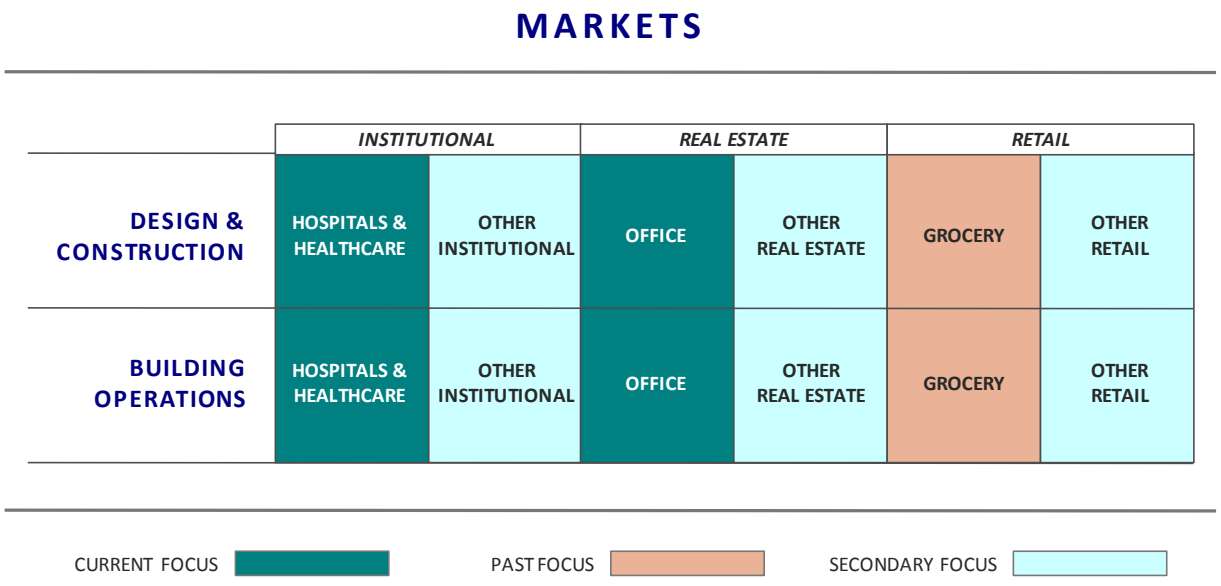
- **Hospitals & Healthcare (H&H)**[1] targets to hospitals and hospital systems that have their headquarters in the region served by NEEA.
- **Office Real Estate (ORE)** targets managed commercial real estate, excluding owner-occupied buildings.
- **Design & Construction (D&C)** focuses on those serving the commercial new construction market, principally architects and design engineers, especially in the office real estate and healthcare sectors.
- **Building Operations (BOPS)** targets those supplying building operations services in existing buildings, principally mechanical contractors.

Figure 1.2 illustrates the way in which the target and cross-cutting markets intersect. What makes BetterBricks unique is the *way* in which it addresses the two sides of the market: separately but with a coordinated, overlapping effort that is augmented by robust marketing and education and training efforts dedicated to supporting BetterBricks. These elements taken together yield a

[1] Formerly the High Performance Hospitals Program.

comprehensive commercial sector initiative aimed at changing behavior and transforming the building market to produce long-term sustained energy efficiency gains.

**Figure 1.2: Illustration of 2005-2009 BetterBricks Target and Cross-cutting Markets Approach**




BetterBricks managers believe that changes in particular behaviors within the target and cross-cutting markets will reduce facilities' energy-related capital and operating costs. Such changes also have the potential to create non-energy benefits, such as occupant comfort and productivity, and to bring design and construction projects into alignment with industry best practices.

## PROGRAM THEORY AND GOALS

BetterBricks works to achieve market transformation through a set of market interventions in each of the target and cross-cutting markets. The ultimate long-term goal of all program efforts is electricity savings. Short-term goals vary for each of the markets and include such outcomes as increased awareness of the benefits of energy efficiency, use of BetterBricks tools, and adoption of energy efficiency behaviors. Chapter 4 provides, as an introduction to the research findings, the 2010 market outcomes sought by BetterBricks. For comprehensive, long versions of each logic model, see *2008 BetterBricks Overall Market Progress Evaluation Report*.[2] For a complete list of intended short-term and long-term program goals, see graphic representations of logic models in Appendix C.

[2] Report #E09-208, July 17, 2009. Prepared for NEEA by Research Into Action, Inc., Tecmarket Works, PWP, Inc., Dethman & Associates, and Washington State University. *http://neea.org/research/reports/EO9-208_v3.pdf*.

BetterBricks' overall goal has been to transform targeted commercial markets such that energy efficiency best practices become standard business practice, and that providers of energy-efficient products and services are capable of meeting this increased demand.

BetterBricks' strategy for achieving targeted changes is to "work with a few to influence the many." BetterBricks works intensively with selected organizations in the target markets with the intent to illustrate the value of adopting recommended business practices specific to their individual needs. BetterBricks also works intensively with selected organizations in the cross-cutting markets to increase market capacity to meet demand for best practices by supplying related products and services.

BetterBricks provided a range of services to help participating organizations adopt the targeted behavior changes. The aim was to help move the selected organizations to the point where they could maintain the recommended practices – and associated energy savings – without continued initiative assistance. Those organizations achieving sustained business practice changes would serve as models and – the program theory posits – would stimulate targeted behavior changes in other similar organizations through natural market competition and imitation. Chapter 4 provides additional description of the BetterBricks approach, as does Appendix B.

## MPER ACTIVITIES AND PAST RECOMMENDATIONS

Table A.1 in Appendix A illustrates the evaluation tasks that have been performed for each BetterBricks MPER, starting in 2005 and culminating with the current MPER. Prior MPER recommendations and current status included the following:

- BetterBricks should elevate the importance of energy tracking; BetterBricks management should consider modifying the initial approach used with participants to focus on the benefits of knowing about their own energy expenditures and opportunities (target markets) or those of their clients (cross-cutting markets). In addition, BetterBricks should seek ways to address and minimize the burden of energy tracking by developing and facilitating the use of existing tools that are appropriate to the sector participants' capacity and capability. *Status: BetterBricks demonstrated progress by motivating firms to invest in energy tracking and analysis software.*

- BetterBricks needs to develop a robust system of tracking and additional savings analysis in order to tie the validated energy savings to specific business-practice changes and ultimately to estimate market savings. *Status: Tracking improvements showed some progress, but not sufficient to validate energy savings.*

- Program staff need to clearly define the criteria for determining which of the energy efficiency business practices being promoted by BetterBricks can be considered sufficient to qualify a firm as meeting the energy management and business plan objectives. Ensure that future plan objectives are measurable for the cross-cutting markets; there are currently insufficient data available to estimate market share. *Status: Development of the*

*BetterBricks Guide (November 15, 2009) demonstrated some progress, however more work is needed. The current research needed to define much of the criteria.*

- Program staff should revise the *adoption continuum* model of progress for each market to explicitly include an exit strategy, with criteria and tools for facilitating the process. Program staff should use the designation s*ustaining* only with those participants who meet the criteria established in the exit strategy. *Status: The BetterBricks Guide and the management and reporting tools developed by the market managers demonstrated progress.*

- BetterBricks' management should continue to work with the target market and cross-cutting market managers to identify areas where interactions between them would be most useful and to develop strategies to achieve them. *Status: Market managers showed progress by demonstrating teamwork in the projects considered during the current validation research.*

- Program staff should continue looking for ways to make the website as user-friendly as possible and to develop strategies and tactics that will drive target market actors to the website, helping to make it the first thing that members of the target population think of when they want information on energy management. For each of the target markets, specific research should be conducted to understand whether and how the BetterBricks website is being used. *Status: This evaluation shows high market awareness of betterbricks.com, indicating it is top of mind when looking for information on energy management, though the recommended research did not occur.*

- BetterBricks management should continue to increase the level of direct (face-to-face) communication with utilities to gain more complete awareness of utility needs and differences, and to clarify questions about the BetterBricks approach and how BetterBricks can support utilities to meet their goals. *Status: not investigated.*

## REPORT OBJECTIVES

This report provides the final MPER for the 2005-2009 BetterBricks Initiative. This report constitutes a combined MPER for the four market components active at the time of the evaluation. It represents the fifth MPER for Hospitals & Healthcare, the fourth for Design & Construction & Building Operations, and the third for Office Real Estate.

This report has three main purposes: To assess the degree to which actors in the four target markets have adopted BetterBricks best practices, per market progress indicators; to describe the 2010 baseline condition of these markets in terms of business practices; and to validate, to the extent possible, energy savings achieved by BetterBricks.

# 2 EVALUATION ACTIVITIES

Four key data collection activities informed the evaluation: interviews with market managers, review of BetterBricks documents, surveys of the four targeted markets, and interviews with professional associations. Figure 2.1 presents the schedule of these activities.

**Figure 2.1: Schedule of Data Collection Activities**

| | |
|---|---|
| 2009-2010 | • Document Review |
| Summer 2010 | • Market Manager Interviews |
| Fall 2010 | • Market Surveys |
| Fall 2010 | • Professional Association Interviews |

## MARKET MANAGER INTERVIEWS

In the summer of 2010, we launched our research for this MPER by conducting a series of three interviews with each BetterBricks market manager to obtain input for the market surveys, as follows:

- Interview 1: Explain the research approach and learn more about each program's targeted behavior change.
- Interview 2: Seek comments on proposed topics to include in the surveys.
- Interview 3: Obtain feedback on survey phrasing.

## DOCUMENT REVIEW

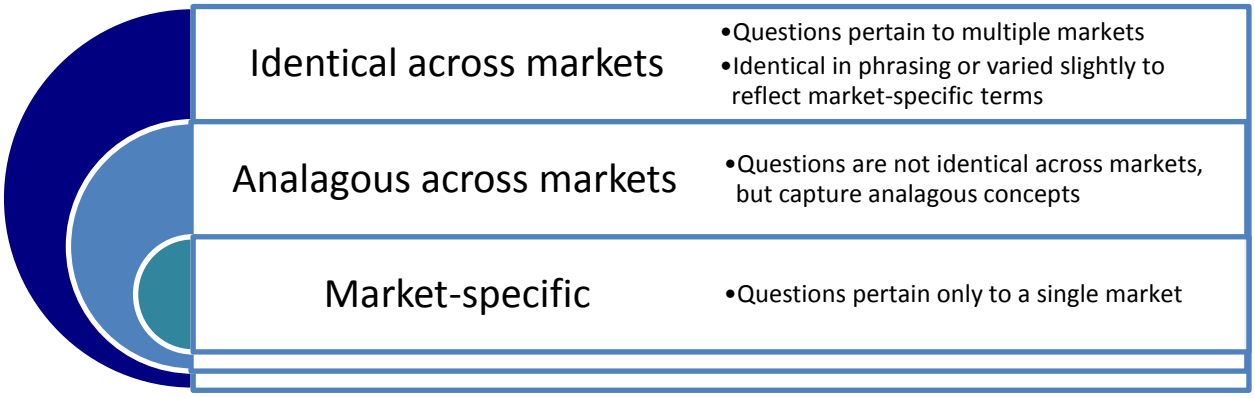
In the fall of 2009, the BetterBricks team wrote the *NEEA BetterBricks Reference Guide* to describe the specific changes BetterBricks has sought in the four markets. In late 2009, under a separate contract to the current MPER, we conducted interviews with BetterBricks market managers, business advisors, and technical advisors to better understand the concepts in the *Reference Guide.* We also have reviewed the previous MPER, *2008 BetterBricks Overall Market Progress Evaluation Report,* and have based our general descriptions of the four BetterBricks market activities on that source.

## MARKET SURVEYS

Although each of the evaluation activities contributed important information to the project, the market surveys lie at the heart of the analysis for this MPER. As implied by the program theory of diffusion of best practices from "the few to the many," BetterBricks expects that when leading companies advance their practices, they influence others within the markets to adopt best practices. BetterBricks therefore targets its direct-touch market activities to medium and large firms, with the assumption that larger firms are more influential and more likely imitated in the market. Given this, we conducted surveys with medium and large firms in the four markets of H&H, ORE, D&C, and BOPS. The population surveyed includes all firms in the target markets, spanning the gamut from those with extensive BetterBricks involvement to those unaware of it.

We designed the market surveys to be as similar across the four markets as possible. With that in mind, we created three main question types: Questions that *identically* pertain to all the markets, questions that *analogously* pertain to multiple markets, and questions that pertain only to *one specific* market. Figure 2.2 summarizes the three main types of survey questions:

**Figure 2.2: Market Survey Question Types**




Appendix E provides further explaination and the survey instruments.

## PROFESSIONAL ASSOCIATION INTERVIEWS

In addition to the market surveys, we conducted interviews with 12 professional organizations serving the targeted markets, with which BetterBricks partnered. These professional associations are a key aspect of the program's theory of change, in large part because they enable BetterBricks to reach an audience beyond their targeted firms, thus facilitating market diffusion of best practices. Examples of BetterBricks market partners include the local chapters of both the American Institute of Architects (AIA) and the Building Owners and Managers Association (BOMA). See Appendix A for details.

We designed the professional association interviews to explore such concepts as perceptions of BetterBricks, compatibility of BetterBricks' message with a member organization's message, influence of BetterBricks on the market, and future market trends. Appendix E provides the interview guides.

## DATA SOURCES

Table 2.1 provides our data sources and sample sizes for the MPER. We called non-responding contacts in the population ten times in an attempt to secure a survey. Appendix A provides more information on our methods, including survey sample goals and dispositions.

**Table 2.1: Data Sources for MPER**

| Data Collected | Source | Participant Sample Size | Nonparticipant Sample Size |
|---|---|---|---|
| **Program Information** | Market Manager Interviews | 4 | N/A |
| **Market Practices** | Market Surveys | 45 | 81 |
| **Design &Construction** | Architectural Firms | 9 | **35** |
| *Large (25 or more employees)* | | 9 | 16 |
| *Medium (10-25 employees)* | | 0 | 19 |
| **Office Real Estate** | Commercial Real Estate Firms | 6 | **25** |
| *Large (25 or more employees)* | | 4 | 11 |
| *Medium (10-25 employees)* | | 2 | 14 |
| **Hospitals & Healthcare** | Hospital Facility Directors | 22 | **14** |
| *Large (300 or more beds)* | | 15 | 7 |
| *Medium (WA/OR 150-299 beds; ID/MT 100-299 beds)* | | 7 | 10 |
| **Building Operations** | Mechanical Contractors | 8 | **7** |
| *Large (25 or more employees)* | | 7 | 6 |
| *Medium (10-25 employees)* | | 1 | 1 |
| **Perceptions of BetterBricks and Market Trends** | Professional Association Interviews | 12 | N/A |

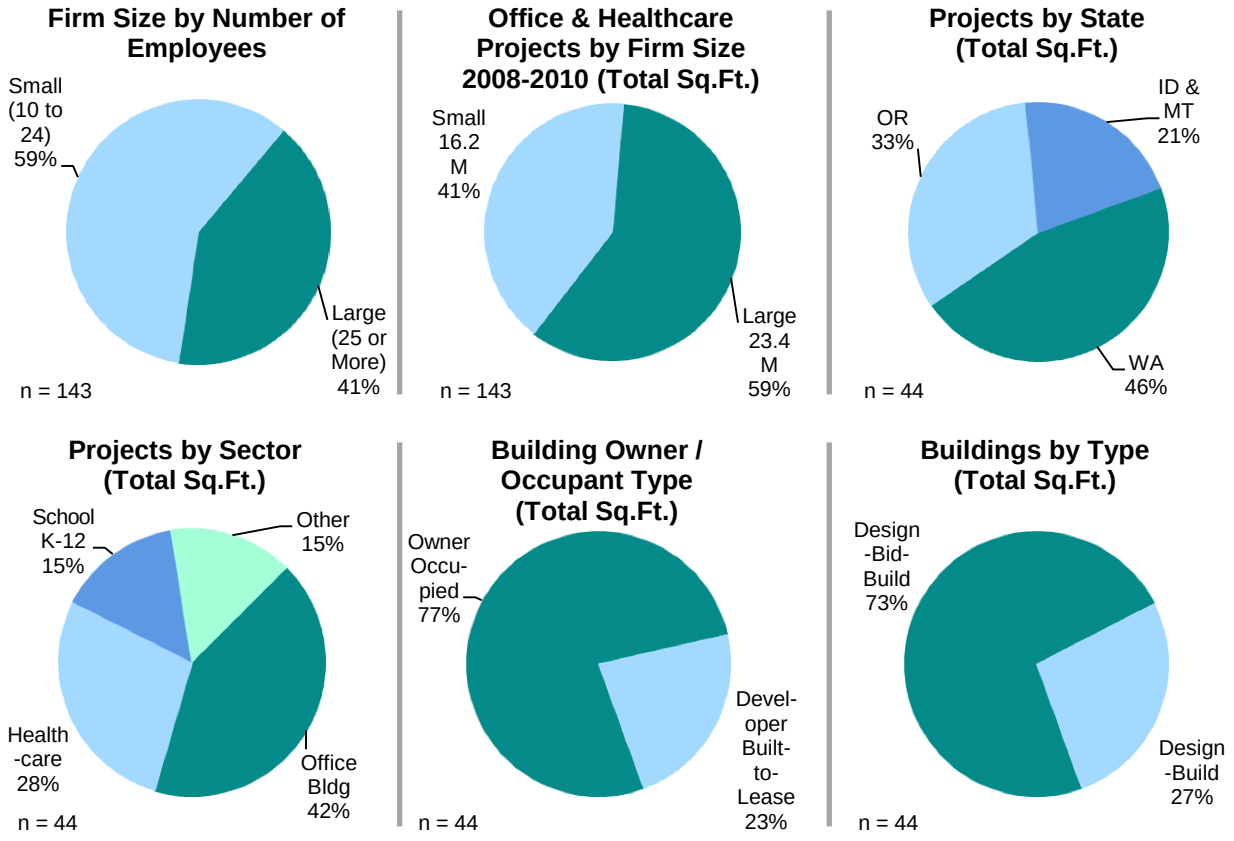
# 3 MARKET CHARACTERIZATION

This chapter characterizes the D&C, ORE, H&H, and BOPs markets targeted by BetterBricks. We derive our market descriptions from our survey data; Chapter 2 provides our survey sample sizes; Appendix A provides a detailed explanation of our methods for estimating market sizes.

## DESIGN AND CONSTRUCTION MARKET

Based on current Dun & Bradstreet (D&B) data, we estimate that 143 architectural firms in the Pacific Northwest have ten or more employees and design for the office and healthcare sectors. Their design projects in these sectors during the last three years total approximately 40 million square feet. We corroborated square footage estimates with data from the U.S. Census (see Appendix A for details). Figure 3.1 provides additional market characteristics.

**Figure 3.1: Estimated Architectural Firm Characterizations**

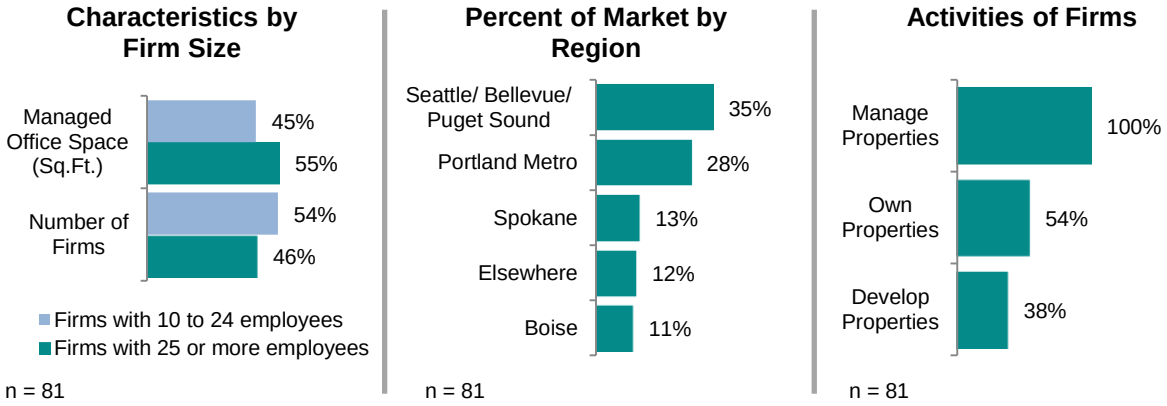


The D&C market contracted severely in late 2008 and 2009 with the economic recession and remained contracted through 2010. According to the US Census (*www.census.gov/const/www/c30index.html*), the value of private nonresidential construction put in place (seasonally adjusted annual rate) fell month-to-month from a peak of $412,197 million in October 2008 to a low of $252,323 million in July 2010 (a 39% reduction). The national market had contracted 28% as of the end of 2009. Disaggregated data are available through 2009 and show nonresidential construction in the western U.S. declined 28% through 2009; office construction in the West through 2009 declined 34%, and healthcare construction declined 7%. Since 1995, the American Institute of Architects produces the Architecture Billings Index. A value of 50 indicates no change in billings from the previous month, and values below 50 indicate a decrease. The December 2010 value for the West was 40.0 and its national value for the commercial/industrial sector was 42.7. According a December 27, 2010 special report of the *Architectural Record (http://archrecrod.construction.com/news/daily/ archives/210/12/ 101227recession_update.asp)*, "Joblessness persists in the field. Some AIA leaders put the unemployment rate at 20 percent or higher. And more gloom is spelled out by the Architecture Billings Index, compiled by the AIA. Since January 2008, the index has cleared 50 only twice, in September and November of 2010 (anything less than 50 suggests an industry in contraction)."

## OFFICE REAL ESTATE

We estimate, based on information from the ORE market manager, business journals, and contest participants, that 81 firms in the Pacific Northwest have ten or more employees and manage roughly 51 million square feet of commercial office space. Figure 3.2 provides additional descriptors.

**Figure 3.2: Estimated Office Real Estate Firm Characterizations**



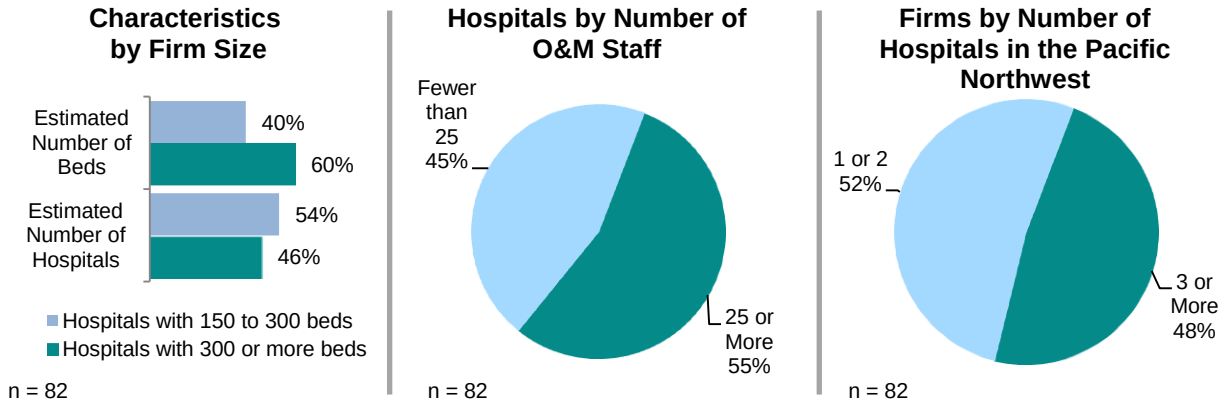

The recession has also affected the office real estate market, as suggested by the decline in the value of new construction put in place, reported above for the D&C market. The *Wall Street Journal*, in the July 6, 2010 article *Office Vacancy Rate Keeps Climbing*, reports a national office vacancy rate of 17.4%, described as the highest level since 1993

(*http://online.wsj.com/article/SB10001424052748703778504575347190869129432.html*). According to the ORE professional associations interviewed for this BPER, building values are down, vacancies up, rents down, and new construction has virtually ceased. It is hard to find capital and owners cannot raise rents to invest in energy efficiency. Building ownership is changing. People who have taken big losses will be less eager to do anything. Owners are in survival mode – looking for ways to survive in the short term. It is a challenge in this environment to look beyond the low hanging fruit and address energy use holistically to achieve deeper energy savings.

## HOSPITALS AND HEALTHCARE

Based on data provided by the H&H market manager, we estimate that 82 hospitals with 150 beds or more in Washington and Oregon and 100 beds or more in Idaho and Montana are operating in the Pacific Northwest. These hospitals operate approximately 22 thousand beds. Figure 3.3 provides additional descriptors, as do the previous BetterBricks MPERs.

**Figure 3.3: Estimated Hospital Firm Characterizations**




The H&H market is the least affected by the recession, although BetterBricks hospital professionals interviewed indicated hospitals have curtailed most new construction and capital investment in facilities. The 2009 value of new construction put in place for acute care facilities (hospitals) did not differ appreciably from that of 2008, according to the disaggregated U.S. Census data source reported previously for the D&C market. These projects were initiated before the recession; 2010 figures by sector are not yet available.

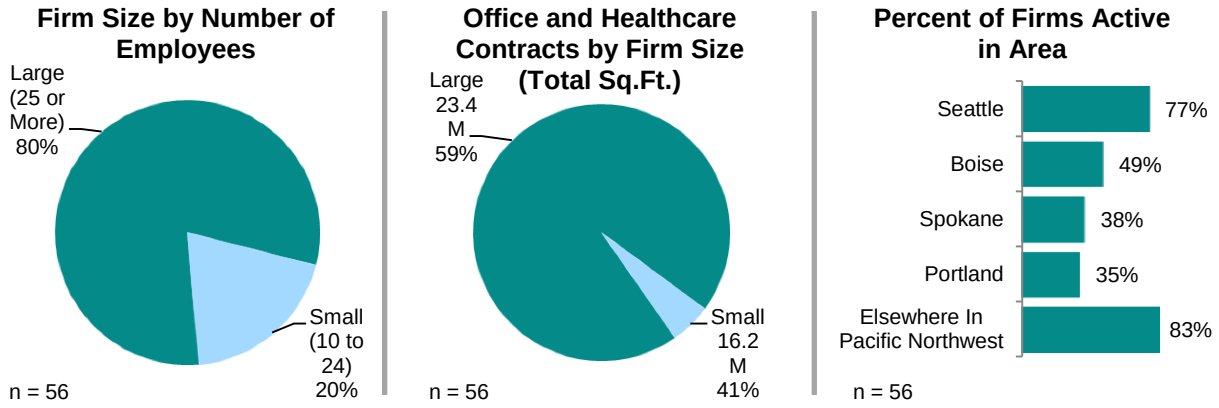
Hospitals face new regulations and reform due to the *Health Care and Education Reconciliation Act of 2010*. Studies conducted independent of the current research offer mixed reviews on the state of energy efficiency in the healthcare sector. The report *2010 Energy Efficiency Indicator: Healthcare Sector* concludes that "investment in building energy efficiency remains strong in the

North American healthcare industry" and calls the sector "a leader among other sectors" in energy efficiency.[3] In contrast, a survey conducted by the Corporate Realty, Design & Management Institute and reported on by Matthew Wheeland of Greener World Media on December 2, 1010, concluded that healthcare professionals undervalue investments in energy efficiency despite a broad recognition of the importance and benefits of sustainability projects.

## BUILDING OPERATIONS

Based on current D&B data, we estimate that 56 mechanical contractor firms in the Pacific Northwest have ten or more employees. These firms provide services to approximately 50 million square feet of commercial office and healthcare space. Virtually all firms offer the services of equipment servicing, equipment installation, and equipment system design. Figure 3.4 provides additional descriptors.

**Figure 3.4: Estimated Mechanical Contractor Firm Characterizations**




The BOPS market supplies the ORE market and other markets in contraction due to the recession. BOPS revenues are down as floor space sits empty and clients seek to curtail expenditures. As cited in the ORE section above, the *Wall Street Journal* reported an estimated office vacancy rate of over 17% in mid-2010.

[3] Derek Supple. *2010 Energy Efficiency Indicator – Healthcare Sector,* Issue Brief, October 2010. Institute for Building Efficiency, an initiative of Johnson Controls. Johnson Controls partnered with the International Facility Management Association (IFMA) and the American Society for Healthcare Engineering (ASHE) to commission a survey of more than 1,400 decision-makers across North America responsible for managing commercial buildings and their energy use. *http://www.instituteBE.com/Energy-Efficiency-Indicator/energy-efficiency-in-healthcare.aspx*.

# 4 MARKET PROGRESS FINDINGS

This chapter presents our findings from our survey research and interviews with professional associations. The chapter also draws on information from BetterBricks documents and market managers and the *2008 BetterBricks Overall Market Progress Evaluation Report.*[4]

BetterBricks has a market transformation theory: help a few leaders/early adopters be successful and then publicize that success to motivate the near majority to begin to copy the practices, while supporting the entire market by making tools available on the website *betterbricks.com* and by offering free and reduced-cost training. BetterBricks resources provided to the targeted firms comprise both technical advice and business assistance, provided by program contractors referred to as Technical Advisors and Business Advisors or Market Specialists. This focus on a limited number of targeted firms, called *Firm Focus* in some markets, aims to help these firms advance their practices so they become market leaders in energy efficiency and their progress influences others within the market to adopt best practices.

These market dynamics, combined with key elements of the diffusion strategy, help spread best practices. Diffusion-oriented efforts supported by BetterBricks comprise: education and training; marketing and advertising, including the promotion of case studies and other success stories; product development, which includes creation of tools that embody the lessons learned through BetterBricks-supported projects; and the *betterbricks.com* website, which both supports marketing and outreach, and serves as the repository of BetterBricks-developed tools and links to other resources. Marketing includes the annual *BetterBricks Awards* to recognize regional and market-segment achievements, press releases to announce the winners, and case studies, profile articles, and brochures.

To leverage these diffusion efforts, BetterBricks has established long-term relationships with a number of professional organizations that serve the targeted markets to support them in delivering training, seminars, conferences, and lectures from distinguished speakers, and annual awards recognizing energy-efficient design and facility operations.

The survey results we present refer to the targeted or Firm Focus firms as *participants*, although this is not a term used by the BetterBricks staff; these firms had extensive direct involvement with BetterBricks. We use the term *Light Touch* to describe firms that report that BetterBricks has enhanced their energy efficiency practices. These *Light Touch* firms include both firms with direct involvement – although considerably less involvement than *participant* firms – and firms with direct influence from BetterBricks. We use the term *nonparticipant* to describe the

[4] Report #E09-208, July 17, 2009. Prepared by Research Into Action, Inc., Tecmarket Works, PWP, Inc., Dethman & Associates, and Washington State University. *http://neea.org/research/reports/EO9-208_v3.pdf*.

remaining firms in the regional markets that do not report BetterBricks influence or involvement; these firms may or may not be aware of BetterBricks.

BetterBricks intends to directly affect a significant amount of square footage in the healthcare and office real estate markets through its intervention among both demand-side and supply-side firms. BetterBricks staff selected the Firm Focus firms in the Design and Construction and Building Operations components of BetterBricks, in part, on their share of the healthcare and office real estate markets.

Appendix B provides a more detailed description of program activities.

## DESIGN AND CONSTRUCTION (D&C)

The text box presents the outcomes NEEA anticipated by 2010 for D&C.

- Market partners, including utilities, trade associations and select firms help support and promote integrated design
- Sixty percent of Northwest A&E firm decision-makers are aware of the business opportunity and client benefits of high performance buildings
- A&E firms representing a significant percentage of the design and construction market adjust their business practices to deliver high performance buildings
- A significant percentage of the floor area of new project designs are incorporating partial and fully integrated energy design strategies that rely on passive or low-energy solutions for lighting, ventilation, comfort and critical process loads resulting in savings greater than 25% over baseline.

### Professional Association Interviews

To explore D&C progress toward its first 2010 goal, we spoke with representatives of partnering professional associations: the Seattle and Portland chapters of American Institute of Architects, the Idaho chapter of American Society of Heating, Refrigeration and Air-conditioning Engineers (ASHRAE), and the Cascadia chapter of the U.S. Green Building Council.

Across the professional associations interviewed, it is clear that BetterBricks support reaches a wide and somewhat diverse audience comprising not only design professionals, but also representatives of owners, students, and government officials. The number of participants in BetterBricks-sponsored events ranged from 70 to 80 a year for a regional chapter of ASHRAE, to several thousand for Cascadia.

Events supported included an annual conference, lectures, seminars, and the development of a complete course intended to help design professionals attain the benchmarks associated with the *2030 Challenge*. In addition, BetterBricks worked with these professional associations to help: fund a position to support training activities; a study to determine the feasibility of higher-level

training; and several ad hoc activities pertinent to BetterBricks goals that could not proceed without additional funding.

Representatives of the professional associations believe their members and event participants regard BetterBricks as a credible source of information. Contacts spoke highly of NEEA staff and contractors that they worked with, noting that they provided not just funding, but extensive knowledge and insight that helped make their efforts more effective. One respondent emphasized that: "NEEA has a wealth of knowledge they are willing to share."

All the professional associations interviewed spoke highly of the overall level of support provided and noted that BetterBricks is a critical part of their success. Respondents describe BetterBricks as an unseen or behind-the-scenes force helping the associations to advance its own agenda, as well as that of BetterBricks. The association contacts themselves adequately articulated BetterBricks' basic goals and priorities, as well as the key messages.

All of the contacts looked forward to continuing to work with BetterBricks in the future. One contact expressed concern that NEEA's commercial initiative redesign has shifted focus away from new construction.

In sum, BetterBricks' interaction with professional associations appears to be effective in promoting the goals of transforming design and construction practice to achieve more energy-efficient high performance buildings. The selected associations play a significant role in informing their members and view BetterBricks as a valuable resource in helping them to fulfill that mission (Table 4.1).

**Table 4.1: D&C Professional Association Support (n=4)**

| Question | Yes | No |
|---|---|---|
| **Desire to work with BetterBricks in the future** | 100% | 0% |
| **Does BetterBricks help promote a shared agenda?** | 100% | 0% |
| **Is BetterBricks a credible source of Information?** | 100% | 0% |

➡ **As evidenced by interviewed professional associations desiring to work with BetterBricks in the future, viewing it as helping to promote the shared goal of high performance buildings and providing a credible source of information, and other overwhelmingly positive comments, we infer D&C attained its 2010 goal that "market partners help support and promote integrated design."**

## Market Survey of Architects

Table 4.2 characterizes the BetterBricks targeted architectural market (ten or more employees) serving office real estate and hospitals, based on findings from our survey sample (weighted).

**Table 4.2: BetterBricks Targeted Architectural Market**

| Submarkets of BetterBricks | Firm Size | Estimated Population Characteristics | | | |
|---|---|---|---|---|---|
| | | Number of Firms | Percent of Firms | Total Sq Ft of Designs | Percent of Sq Ft |
| **BB Participants** | **Large** | **9** | **6%** | **8,724,000** | **22%** |
| **BB Light Touch** | Large | 37 | 26% | 10,862,000 | 27% |
| | Medium | 37 | 26% | 7,115,000 | 18% |
| | **Total** | **74** | **52%** | **17,977,000** | **45%** |
| **BB Nonparticipant** | Large | 13 | 9% | 3,816,000 | 10% |
| | Medium | 47 | 33% | 9,055,000 | 23% |
| | **Total** | **60** | **42%** | **12,872,000** | **33%** |
| **Total** | | **143** | **100%** | **39,5723,000** | **100%** |

➡ **It appears that D&C has met is 2010 goal that "60% of Northwest architectural firm decision-makers are aware of the business opportunity and client benefits of high performance buildings."** Decision-makers involved with about two-thirds (22% participants + 45% Light Touch) of the regional square footage of newly constructed office and healthcare facilities report BetterBricks has enhanced areas of their practice involving energy efficiency, which we construe as indicating they appreciate the benefits.

The data presents the percentage of the total market and submarket square footage that has adopted the BetterBricks best practice, as described by our market progress indicators (MPIs). We developed the MPIs directly from the D&C best practices, with the exception of certification (that is, buildings receiving LEED [Leadership in Energy and Environmental Design] certifications or other designations), which we include as an indicator of D&C best practices, rather than itself constituting a D&C best practice. We gauge adoption of best practices from the questions we posed in the D&C market survey.

The following comments provide some methodological background appropriate to the interpretation of the data, as well as to the analogous tables in the subsequent sections for the other three markets.

We consider that a contact's responses satisfy the BetterBricks criteria if they meet about two-thirds of the conditions defining the MPI statistics. (Appendix A identifies how we defined and quantified the MPI statistics. Reviewing the frequency distribution of all MPIs across all four markets, we defined *about two-thirds* as greater than or equal to 0.63.) We round the percentages shown in the table to the nearest 5% to facilitate comparisons across the differing-sized samples.

**Table 4.3: Estimated BetterBricks D&C Market Progress Indicators**

| MPI | Proportion of Market Evidencing MPI | | | | |
|---|---|---|---|---|---|
| | Total Market (n=43) | Participants (n=8) | Light Touch (n=19) | | Nonparticipants (n=16) |
| | | Large | Large | Medium | Large & Medium |
| **Design Practices** | 35% | 75% | 50% | 30% | 0% |
| **…Benchmarking** | 10% | 25% | 15% | 15% | 0% |
| **…Tracking and Reporting** | 15% | 25% | 0% | 45% | 0% |
| **…Energy Performance Targets** | 35% | 50% | 65% | 30% | 10% |
| **…Certification** | 15% | 50% | 20% | 0% | 0% |
| **…ID Awareness** | 60% | 100% | 85% | 45% | 20% |
| **…ID Team** | 70% | 60% | 80% | 55% | 75% |
| **…Energy Modeling** | 55% | 85% | 65% | 55% | 25% |
| **…ID Process** | 50% | 75% | 65% | 55% | 15% |
| **…ID Features** | 55% | 75% | 85% | 70% | 10% |
| **Strategic Leadership** | 60% | 100% | 80% | 45% | 25% |
| **…Executive Commitment** | 50% | 100% | 70% | 45% | 10% |
| **…Vision** | 65% | 100% | 95% | 70% | 15% |
| **…Intention** | 45% | 100% | 50% | 30% | 15% |
| **Mobilize the Organization** | 55% | 85% | 70% | 70% | 10% |
| **…Communicating Expectations** | 45% | 85% | 55% | 45% | 15% |
| **…Training** | 65% | 85% | 80% | 85% | 25% |
| **Contracts with Clients** | 45% | 60% | 55% | 30% | 30% |
| **Overall Adoption** | 45% | 100% | 65% | 30% | 0% |

We weighted the respondents to represent their market share (percent of floor space or, in the case of hospitals in Table 4.10, beds) according to the joint characteristics of participant status (participant, Light Touch, and nonparticipant) and size (large, medium). Every respondent within a group has the same weight, both for simplicity and because the self-reported data on the organization's market share lack precision.

We designated firms as Light Touch according to their self-report that BetterBricks enhanced their energy efficiency practices. According to the BetterBricks theory, we anticipate that adoption of BetterBricks best practices will increase with degree of involvement with BetterBricks (from nonparticipant to Light Touch, to participant) and with size of organization (from medium to large firms). The data, Table 4.7, Table 4.11, and Table 4.14 differ in their presentation of MPI statistics by size of firm, as small samples for some groups precluded showing medium and large firms separately.

Because we achieved nonparticipant sample sizes smaller than our goals, which were derived based on 90/10 confidence precision (see Appendix A), we do not conduct statistical tests of significance for the differences we report between groups. The reader should interpret the findings as suggestive, not precise.

The data suggest a number of tentative implications, as follows:

➡ **Participants and Light Touch firms have adopted D&C BetterBricks practices in greater proportions than nonparticipants. This is the first among the series of BetterBricks MPERs to demonstrate this finding**.

- However, given the absence of baseline research for D&C on these MPIs, we cannot rule out the possibility that these positive findings reflect some self-selection bias. It is possible that D&C targeted the firms already engaged to some extent in the best practices it promotes. It is also possible that Light Touch firms similarly had embraced more energy efficiency practices than had nonparticipants prior to exposure to D&C.
- On the other hand, all the participants and Light Touch firms themselves credit D&C activities with enhancing their energy efficiency practices.

➡ **D&C appears to have met its 2010 goal that "Architecture firms representing a significant percentage [defined as 20% to 40%, depending on the submarket] of the design and construction market adjust their business practices to deliver high performance buildings**. We found that firms designing about 45% of the square footage evidence BetterBricks best business practices.

➡ **D&C appears from these behavior indicators to be on the way to meeting its 2010 goal that "A significant percentage of the floor area [defined as 10-40%, depending on the submarket] of new project designs are incorporating partial and full integrated energy design strategies that rely on passive or low-energy solutions for lighting, ventilation, comfort and critical process loads resulting in savings greater than 25% over baseline."** We found ID features (the strategies listed in the goal) used by 55% of the market. However, we do not know the savings compared to baseline.

➡ **We lack a measure of the extent to which D&C has met its 2010 goals for engineering firms (its target market is "A&E" firms).** D&C targeted architectural firms and architectural firms comprise our D&C market survey population. We also lack a measure of D&C's goal for working with utilities as market partners.

About three-quarters of the architectural market has heard of the website *betterbricks.com* and one-third have heard of the *BetterBricks Awards* (see Table 4.4).

**Table 4.4: Familiarity with BetterBricks Among Architectural Market**

| Program Element | Participants (n=8) | Light Touch (n=19) | Nonparticipants (n=16) |
|---|---|---|---|
| **Heard of NEEA** | 100% | 95% | 60% |
| **Heard of *betterbricks.com*** | 100% | 100% | 75% |
| **Visited *betterbricks.com*'s D&C section** | 90% | 95% | 70% |
| **Used content from *betterbricks.com*** | 90% | 95% | 15% |
| **Heard of BetterBricks Awards** | 100% | 75% | 35% |
| **Attended BetterBricks Awards** | 90% | 35% | 10% |
| **Saw BetterBricks media** | 100% | 90% | 30% |
| **BetterBricks directly influenced your energy efficiency practices** | 100% | 80% | 0% |
| **BetterBricks enhanced your energy efficiency practices** | 100% | 100% | 0% |

➡ **Participants and Light Touch firms are familiar with BetterBricks program elements in greater proportions than nonparticipants. The architectural market appears to have high awareness of BetterBricks (at least 75% of non-participants, and 100% of participants and Light Touch firms have heard of betterbricks.com or some other element of BetterBricks).**

## OFFICE REAL ESTATE (ORE)

The text box presents the outcomes NEEA anticipated by 2010 for ORE.

- Market partners, including utilities, trade associations, and select firms begin support and promotion of high performance portfolios
- Real estate professionals receive and download the High Performance Portfolio Framework and associated tools, and begin implementation
- Fifty percent of targeted real estate decision-makers are aware of the specific benefits available from new and existing high performance buildings
- Real estate companies representing 20% of targeted real estate floor space adopt energy management plans that change energy-related business practices, including:
  - Two or more nationally-based companies with significant Northwest assets
  - One or more regional companies in each major Northwest commercial market
- Twenty percent of relevant real estate professionals are capable of managing change in energy-related business practices for design and construction and facility operations

## Professional Association Interviews

To explore ORE progress toward its first 2010 goal, the evaluation team interviewed contacts at the Seattle and Portland chapters of the Building Owners and Managers Association (BOMA), the Urban Land Institute, and Seattle's 2030 District – professional associations that worked with ORE.

ORE partners with the organizations to deliver education, seminars, events, and contests. Resources and ideas are leveraged and shared. The organizations market to their members and ORE underwrites the events and activities. They share ideas on how to strategically move the market forward and identify opportunities they can take advantage of. BetterBricks participates as a member and investor in some of the organizations.

The professional associations estimated that in the last two years approximately 1,000 people[5] participated in the *BetterBricks Awards*, BOMA Energy Efficiency Program (BEEP) and the Best of BEEP, the *Kilowatt Crackdown*, *Office Showdown*, training on benchmarking, and seminars on green leasing, sustainability, and green financing. Contacts said their members were very aware of ORE's involvement in these events.

The professional associations said ORE aids them in meeting their goals by helping to provide services to their members. Sustainability can also be part of the organizations' goals, as reflected in BOMA's seven-point challenge. Members benefit from having access to expertise through ORE that otherwise would not be available. The associations believe that the overall knowledge of their members has improved and that the real estate workforce is better trained about energy efficiency. Associations believe members have a deeper understanding that achieving energy efficiency is more than just taking advantage of the low hanging fruit. Energy management business practice change is becoming more of a first concern, as reflected in an increase in building benchmarking and in real energy reductions.

When asked about how their members perceive ORE, the professional associations said it has a lot of credibility and has a great reputation (Table 4.5). They see ORE as a solid partner that has done good things in the market, been strategic, and has established a lot of trust. Contacts view ORE as having no conflict of interest or motives, in contrast to other firms or organizations in the market. One association said ORE is the first place they would go to learn anything about energy efficiency.

[5] These are not unique individuals. A person may be counted more than once if they participated in multiple events.

**Table 4.5: BetterBricks Professional Association Support (n=4)**

| Question | Yes | No |
|---|---|---|
| **Desire to work with BetterBricks in the future** | 100% | 0% |
| **Does BetterBricks help promote shared agenda?** | 100% | 0% |
| **Is BetterBricks a credible source of Information?** | 100% | 0% |

➡ **As evidenced by the number of co-sponsored events and member participation, and by interviewed professional associations desiring to work with BetterBricks in the future, viewing it as helping to promote the shared goal of high performance buildings and providing a credible source of information, and other overwhelmingly positive comments, we infer ORE attained its 2010 goal that "market partners begin support and promotion of high performance portfolios."**

## Market Survey of Office Real Estate Firms

Table 4.6 characterizes the BetterBricks-targeted office real estate market based on findings from our survey sample (weighted). Refer to the paragraphs introducing The data for additional methodological detail useful in interpreting the tables in this section.

**Table 4.6: BetterBricks Targeted Office Real Estate Market**

| Submarkets of BetterBricks | Firm Size | Estimated Population Characteristics | | | |
|---|---|---|---|---|---|
| | | Number of Firms | Percent of Firms | Total Sq Ft | Percent of Sq Ft |
| **BetterBricks Participants** | Large | 4 | 5% | 4,000,000 | 8% |
| | Medium | 2 | 2% | 1,500,000 | 3% |
| | **Total** | **6** | **7%** | **5,500,000** | **11%** |
| **BetterBricks Light Touch** | Large | 15 | 19% | 11,000,000 | 21% |
| | Medium | 18 | 22% | 13,200,000 | 26% |
| | **Total** | **33** | **41%** | **24,200,000** | **47%** |
| **BetterBricks Nonparticipant** | Large | 18 | 22% | 9,300,000 | 18% |
| | Medium | 24 | 30% | 12,400,000 | 24% |
| | **Total** | **42** | **52%** | **21,700,000** | **42%** |
| **Total** | | **81** | **100%** | **51,400,000** | **100%** |

➡ **It appears that ORE has met is 2010 goal that "50% of targeted real estate decision-makers are aware of the specific benefits available from new and existing high performance buildings."** Decision-makers involved with about 60% (11% participants + 47% Light Touch) of the regional square footage of office real estate report BetterBricks

has enhanced areas of their practice involving energy efficiency, which we construe as indicating they appreciate the benefits.

Table 4.7 presents the percentage of the total market and submarket square footage that has adopted the BetterBricks best practice, as described by our market progress indicators (MPIs).

**Table 4.7: Estimated BetterBricks ORE Market Progress Indicators**

| MPI | Proportion of Market Evidencing MPI | | | |
|---|---|---|---|---|
| | Total Market (n=31) | Participants (n=6) | Light Touch (n=11) | Nonparticipants (n=14) |
| | | Large & Medium | Large & Medium | Large & Medium |
| **Building Operations** | 55% | 85% | 65% | 35% |
| **…Benchmarking** | 45% | 75% | 55% | 30% |
| **…Tracking and Reporting** | 50% | 85% | 55% | 30% |
| **…Energy Performance Targets** | 60% | 85% | 75% | 35% |
| **…Energy Efficiency Plan** | 55% | 100% | 65% | 25% |
| **…Energy Efficiency Study** | 75% | 100% | 90% | 45% |
| **…Energy Efficiency Tune-Up** | 75% | 100% | 90% | 45% |
| **Strategic Leadership** | 70% | 85% | 80% | 55% |
| **…Executive Commitment** | 80% | 100% | 90% | 65% |
| **…Vision** | 65% | 65% | 80% | 50% |
| **…Intention** | 85% | 100% | 100% | 70% |
| **Mobilize the Organization** | 55% | 85% | 65% | 30% |
| **…Communicating Expectations** | 55% | 85% | 55% | 50% |
| **…Training** | 65% | 85% | 80% | 45% |
| **Contracts with Clients and Suppliers** | 60% | 85% | 45% | 70% |
| **Overall Adoption** | 70% | 85% | 90% | 45% |

The data in Table 4.6 and Table 4.7 suggest a number of implications, as follows:

➡ **Participants and Light Touch firms have adopted ORE BetterBricks practices in greater proportions than nonparticipants. This is the first among the series of BetterBricks MPERs to demonstrate this finding.**

- As with the D&C findings, we cannot rule out the possibility that these positive findings reflect some self-selection bias; yet all the participants and Light Touch firms themselves credit ORE activities with enhancing their energy efficiency practices.

➡ **ORE appears to have met its 2010 goal that "Real estate companies representing 20% of targeted real estate floor space adopt energy management plans that change energy-related business practices."** We found that about 40% more participating and Light Touch square footage has such plans than nonparticipating square footage.

- The total market adoption of such plans as suggested by our data is 55%. However, we recognize the limits of self-reported data; respondents may provide answers that we code as meeting best practices that a site-visit or ethnographic study would code as not meeting best practices. We recognize that all the data – participants/Light Touch included – may reflect self-report bias.

➡ **ORE appears to have met its goal that "Twenty percent of relevant real estate professionals are capable of managing change in energy-related business practices for facility operations."** We found that more than half of the market has been affected by targeted or Light Touch activities (Table 4.6), and that these firms report 20% greater adoption of BetterBricks facility operational practices than do nonparticipants.

➡ **We lack a measure of the extent to which ORE has met its 2010 goals for design and construction.** With the downturn in the economy, few if any office real estate firms engaged in new design and construction in the last three years and thus we did not pursue the issue in our survey. Utilities were not sureveyed so we also lack a measure of ORE's goal for working with utilities as market partners.

About half of the office real estate market has heard of the website *betterbricks.com* and one-third have heard of the BetterBricks Awards (see Table 4.8).

**Table 4.8: Familiarity with BetterBricks Among Office Real Estate Market**

| Program Element | Participants (n=6) | Light Touch (n=11) | Nonparticipants (n=14) |
|---|---|---|---|
| **Heard of NEEA** | 100% | 75% | 35% |
| **Heard of *betterbricks.com*** | 100% | 100% | 50% |
| **Visited *betterbricks.com*'s ORE section** | 85% | 55% | 30% |
| **Used Content from *betterbricks.com*** | 85% | 55% | 15% |
| **Heard of *BetterBricks Awards*** | 65% | 100% | 35% |
| **Attended *BetterBricks Awards*** | 65% | 45% | 10% |
| **Saw High Performance Portfolio Framework** | 65% | 20% | 0% |
| **Saw BetterBricks media** | 85% | 80% | 5% |

Continued

| Program Element | Participants (n=6) | Light Touch (n=11) | Nonparticipants (n=14) |
|---|---|---|---|
| **BetterBricks directly influenced your energy efficiency practices** | 100% | 80% | 5% |
| **BetterBricks enhanced your energy efficiency practices** | 100% | 100% | 0% |
| **Participated in BEEP classes** | 50% | 55% | 15% |
| **Participated in Seattle *Kilowatt Crackdown*** | 65% | 25% | 30% |
| **Participated in Portland *Office Showdown*** | 15% | 35% | 0% |

➡ **The office real estate market overall appears to have moderate awareness of BetterBricks as less than 50% of non-participants are aware of most BetterBricks program elements. Awareness increases the more direct the BetterBricks involvement with participants showing a high level of awareness.**

## HOSPITAL AND HEALTHCARE (H&H)

The text box presents the outcomes NEEA anticipated by 2010 for BetterBricks Hospital & Healthcare (H&H). SEMP signifies "strategic energy management plan."

- BetterBricks can document market awareness of SEMP benefits among hospital decision-makers representing 75% of beds
- Hospitals representing 25% or more of regional beds will be committed to and practicing SEMP elements:
  - Financial decision-making clear and uses total-cost-of-ownership
  - Integrated design in new facilities and major renovations
  - Enhanced facility O&M practices
  - Consistent purchase of energy-efficient equipment
  - Cost-effective capital upgrades
  - Tracking and accountability
- Hospital decision makers (DMs) representing 25% of beds request and/or require (e.g., through RFPs and contracts) trade allies to support SEMP practices as follows:
  - Financial Decision-Making: DMs request/ require that engineers and equipment vendors provide well-documented energy & O&M cost data for financial analysis of energy investments
  - Integrated Design: DMs request/require that A&E teams are experienced in or willing to learn ID
  - Purchasing and Upgrades: See financial decision-making above
- Hospital decision-makers and their associations consider BetterBricks an excellent source of information & practical tools on energy-related business & technical practices
- Enhanced O&M: DMs request/ require that service providers are experienced in, or willing to learn, enhanced O&M

## Professional Associations Interviewed

Partnerships with professional organizations serving hospitals provide a key marketing venue. Partnering organizations include the state societies for healthcare engineering (serving facility directors) and the state hospital associations (serving executives). In particular, BetterBricks presentations have occurred at each state chapter of healthcare engineers in Washington, Oregon, Idaho, and Montana.

We interviewed representatives of the Washington, Idaho, and Montana chapters of the State Societies of Healthcare Engineers. We did not interview a representative from the Oregon State Society of Healthcare Engineers in order to maintain a regional balance of interviews (see Appendix A). Overall, these contacts correctly understood the role of BetterBricks as an entity to help their members to benchmark their facilities and to create and implement energy management plans.

The contacts reported involvement during the past two years in from two to eight events in which BetterBricks participated. Attendance at these events ranged from 30 to 50, with some individuals attending multiple events. The professional associations' members have a positive view of BetterBricks, see it as a credible source of information, and believe its message is the right one for this market (Table 4.9).

**Table 4.9: H&H Professional Association Support**

| Question | Yes (n=3) | No |
|---|---|---|
| **Desire to work with BetterBricks in the future** | 100% | 0% |
| **Is BetterBricks a credible source of Information?** | 100% | 0% |
| **Do you think this is the right message for this market?** | 100% | 0% |
| **Do you think the Initiative is getting this message to the market?** | 100% | 0% |

➡ **As evidenced by interviewed professional associations desiring to work with BetterBricks in the future, viewing it as providing the right message for the market and a credible source of information, we infer H&H attained its 2010 goal that partnering associations view BetterBricks as an "excellent source of information and practical tools on energy-related business and technical practices."**

## Market Survey of Hospital Facility Directors

Table 4.10 characterizes the BetterBricks target hospital market of medium and large hospitals based on findings from our survey sample (weighted).[6] Refer to the paragraphs introducing The data for additional methodological detail useful in interpreting the tables in this section.

**Table 4.10: BetterBricks Targeted Hospital Market**

| Submarkets of BetterBricks | Firm Size | Estimated Population Characteristics | | | |
|---|---|---|---|---|---|
| | | Number of Firms | Percent of Firms | Total Beds | Percent of Beds |
| **BetterBricks Participants (n=22)** | Large | 15 | 18% | 5,200 | 24% |
| | Medium | 7 | 9% | 1,400 | 6% |
| | **Total** | **22** | **27%** | **6,600** | **30%** |
| **BetterBricks Light Touch (n=5)** | Large | 22 | 27% | 7,800 | 36% |
| | Medium | 3 | 4% | 700 | 3% |
| | **Total** | **25** | **31%** | **8,500** | **39%** |
| **BetterBricks Nonparticipant (n=8)** | Large | 1 | 1% | 200 | 1% |
| | Medium | 34 | 41% | 6,700 | 30% |
| | **Total** | **35** | **42%** | **6,900** | **31%** |
| **Total (n=35)** | | **82** | **100%** | **22,000** | **100%** |

➡ **It appears that H&H has roughly met its 2010 goal that "BetterBricks can document market awareness of SEMP benefits among hospital decision-makers representing 75% of beds."** Decision-makers involved with about 70% (30% participants + 39% Light Touch) of the regional hospital beds report BetterBricks has enhanced areas of their practice involving energy efficiency, which we construe as indicating they appreciate the benefits.

Table 4.11 presents the percentage of the total market and submarket square footage that has adopted the BetterBricks best practice, as described by our market progress indicators (MPIs). All of the large organizations among the sampled nonparticipants indicated BetterBricks had influenced their efficiency practices, making them what we term Light Touch organizations. The Light Touch organizations shown in the table also include one medium-size hospital. No large organizations remained in the nonparticipant sample.

[6] For Washington and Oregon, hospitals with more than 150 beds. For Idaho and Montana, hospitals more than 100 beds.

**Table 4.11: BetterBricks Hospital & Healthcare Market Progress Indicators**

| MPI | Proportion of Market Evidencing MPI | | | |
|---|---|---|---|---|
| | Total Market (n=35) | Participants (n=22) | Light Touch (n=5) | Nonparticipants (n=8) |
| | | Large & Medium | Large | Medium |
| **Building Operations** | 70% | 95% | 75% | 33% |
| **…Benchmarking** | 45% | 80% | 50% | 10% |
| **…Tracking and Reporting** | 60% | 95% | 50% | 45% |
| **…Energy Performance Targets** | 70% | 85% | 90% | 35% |
| **…EE Plan** | 75% | 70% | 90% | 55% |
| **…EE Study** | 65% | 80% | 75% | 45% |
| **…EE Tune-Up** | 85% | 100% | 100% | 45% |
| **Life Cycle Cost Analysis Financial Analysis** | 70% | 80% | 85% | 45% |
| **Capital Improvements** | 80% | 85% | 85% | 65% |
| **Design Practices*** | 60% | 65% | 85% | 20% |
| **…ID Awareness** | 60% | 70% | 75% | 35% |
| **…ID Modeling** | 50% | 80% | 60% | 10% |
| **…ID Activities** | 75% | 70% | 90% | 55% |
| **…ID Features** | 75% | 95% | 85% | 35% |
| **Strategic Leadership** | 50% | 35% | 75% | 35% |
| **…Executive Commitment** | 70% | 60% | 100% | 35% |
| **…Vision** | 50% | 35% | 75% | 35% |
| **Mobilize the Organization** | 15% | 15% | 25% | 0% |
| **…Communicating Expectations** | 15% | 25% | 25% | 0% |
| **…Training** | 20% | 15% | 35% | 10% |
| **Contracts with Suppliers** | 40% | 35% | 60% | 20% |
| **Overall Adoption** | 40% | 50% | 50% | 20% |

* We asked all contacts if they were aware of "the architectural design process called integrated design;" we asked only contacts whose organizations had engaged in new construction or major renovation in the last three years the remaining ID questions.

These findings suggest a number of implications that can be tentatively drawn, as follows:

➡ **Participants and Light Touch firms have adopted H&H BetterBricks practices in greater proportions than nonparticipants. This is the first among the series of BetterBricks MPERs to demonstrate this finding.**

- As with the D&C and ORE findings, we cannot rule out the possibility that these positive findings reflect some self-selection bias; yet all the participants and Light

Touch firms themselves credit H&H activities with enhancing their energy efficiency practices.

➡ **H&H appears to have met its 2010 goal that "Hospitals representing 25% or more of regional beds will be committed to and practicing SEMP elements."** We found adoption of the SEMP elements among participant and Light Touch hospitals exceeded that among nonparticipants by more than 25% for every element except capital upgrades, where the difference was 20%.

- The total market adoption of the SEMP elements is around 40%. As discussed for ORE, the difference in reported behaviors between participants/Light Touch and nonparticipants provides a more conservative estimate of market adoption.

➡ **H&H appears to have met its 2010 goals that "Hospital decision-makers representing 25% of beds request and/or require (e.g., through RFPs and contracts) trade allies support SEMP practices," and that "decision-makers require that service providers are experienced in, or willing to learn, enhanced O&M."** We find the overall adoption of contracts with energy efficiency provisions at 40% of beds.

About three-quarters of the hospital market has heard of the website *betterbricks.com* and one-half have heard of the *BetterBricks Awards* (see Table 4.12).

**Table 4.12: Familiarity with BetterBricks Among Hospital Market**

| Program Element | Participants | Light Touch | Nonparticipants |
|---|---|---|---|
| **Heard of NEEA** | 100% | 85% | 65% |
| **Heard of *betterbricks.com*** | 100% | 100% | 80% |
| **Visited *betterbricks.com's* H&H section** | 100% | 100% | 55% |
| **Used Content from *betterbricks.com*** | 70% | 60% | 22% |
| **Heard of *BetterBricks Awards*** | 95% | 75% | 55% |
| **Attended *BetterBricks Awards*** | 65% | 10% | 10% |
| **Saw BetterBricks media** | 55% | 65% | 65% |
| **BetterBricks directly influenced your energy efficiency practices** | 70% | 50% | 10% |
| **BetterBricks enhanced your energy efficiency practices** | 80% | 65%* | 0% |

* For the other three markets, we defined Light Touch as those firms in the nonparticipant sample who reported their practices had been enhanced by BetterBricks. For H&H, we augmented this definition by including hospitals reported by market specialists to have had some limited but direct involvement with BetterBricks.

➡ **The hospital market appears to have high awareness of BetterBricks as even nonparticipants have more than 50% awareness of most program elements**. However, our low response rate for the H&H survey may have resulted in an

oversampling of firms familiar with NEEA. We also lack a measure of H&H's goal for working with utilities as market partners.

➡ **H&H appears to have met its 2010 goals that "Hospital decision-makers consider BetterBricks an excellent source of information and practical tools on energy-related business and technical practices," as decision-makers for 70% of beds reported using content from betterbricks.com and those for 80% of beds report BetterBricks enhanced their energy efficiency practices.**

## BUILDING OPERATIONS (BOPS)

The text box presents the outcomes NEEA anticipated by 2010 for BetterBricks Building Operations (BOPS).

- Northwest service provider decision-makers representing 50% of market share are aware of the business opportunity and customer benefits from improving building operating performance
- Service providers representing a significant percentage of the building operations market adopt business approaches that promote building operating performance
  - 25% of healthcare market share
  - 10% of targeted real estate market share

### Professional Association Interviews

BOPS seeks partnership opportunities for its education and training and outreach activities. These opportunities include the BOMA Energy Efficiency Program (BEEP) series and events with Local 290, the Plumbers and Steamfitters Union, and other trade unions to address issues of common interest.

We interviewed a representative of the Washington chapter of the International Facility Management Association, a BOPS partnering association with more than 300 members who work with buildings of diverse types and uses, and who reflect a range of training and experience levels. This professional association has co-sponsored five trainings with BetterBricks, and with utility and other corporate sponsors during the past two years, with attendance ranging from 20 to 40. The associations' members are aware of BetterBricks' participation in those events, and see BetterBricks as a credible, easily accessible asset in giving guidance in best practices and benchmarking.

The contact considers the BetterBricks' messaging appropriate for this market, and believes BetterBricks is influencing the market by transforming best practices into standard practices. This contact views such transformation as consistent with trends in this market to: 1) communicate to organizations the value facility managers bring to them; and 2) increase the competencies expected of facility managers, including the addition of sustainability in 2011.

➡ **Given that the professional association has cosponsored five trainings with BetterBricks and believes that BetterBricks is a credible source of energy efficiency information and is transforming best practices into standard practice, we conclude BOPS is successfully engaging professional associations. BOPS did not set a 2010 goal relating to market partners**.

## Market Survey of Mechanical Contractor Firms

Table 4.13 characterizes the BetterBricks targeted mechanical contractor market (firms with ten or more employees) serving office real estate and hospitals, based on findings from our survey sample (weighted). Refer to the paragraphs introducing The data for additional methodological detail useful in interpreting the tables in this section.

**Table 4.13: BetterBricks Targeted Mechanical Contractor Market**

| Submarkets of BetterBricks | Firm Size | Estimated Population Characteristics | | | |
|---|---|---|---|---|---|
| | | Number of Firms | Percent of Firms | Total Sq Ft | Percent of Sq Ft |
| **BetterBricks Participants** | Large | 7 | 13% | 10,900,000 | 22% |
| | Medium | 3 | 5% | 400,000 | 1% |
| | **Total** | **10** | **18%** | **11,300,000** | **23%** |
| **BetterBricks Light Touch** | Large | 6 | 11% | 5,900,000 | 12% |
| | Medium | 0 | 0% | 0 | 0% |
| | **Total** | **6** | **11%** | **5,900,000** | **12%** |
| **BetterBricks Nonparticipant** | Large | 32 | 57% | 31,000,000 | 61% |
| | Medium | 8 | 14% | 2,200,000 | 4% |
| | **Total** | **40** | **71%** | **33,200,000** | **65%** |
| **Total** | | **56** | 100% | **50,400,000** | 100% |

Table 4.14 presents the percentage of the total market and submarket square footage that has adopted the BetterBricks best practice, as described by our market progress indicators (MPIs).

The nonparticipant sample included only one contact reporting BetterBricks influenced its energy efficiency practices, that is, a Light Touch firm. We do not include the responses of this single firm in the table.

**Table 4.14: Estimated BetterBricks BOPS Market Progress Indicators**

| MPI | Proportion of Market Evidencing MPI | | |
|---|---|---|---|
| | Total Market (n=15) | Participants (n=8) | Nonparticipants (n=7) |
| | | Large & Medium | Large & Medium |
| **Building Operations** | 30% | 75% | 15% |
| **…Benchmarking** | 20% | 85% | 0% |
| **…Tracking and Reporting** | 60% | 85% | 50% |
| **…Energy Performance Targets** | 15% | 50% | 0% |
| **…EE Plan** | 25% | 50% | 15% |
| **…EE Study** | 25% | 60% | 15% |
| **…EE Tune-Up** | 75% | 100% | 65% |
| **Capital Improvements** | 85% | 100% | 80% |
| **Strategic Leadership** | 60% | 90% | 50% |
| **…Executive Commitment** | 25% | 60% | 15% |
| **…Vision** | 85% | 90% | 80% |
| **Mobilize the Organization** | 40% | 75% | 30% |
| **…Communicating Expectations** | 35% | 85% | 15% |
| **…Training** | 40% | 60% | 30% |
| **Contracts with Clients** | 60% | 85% | 50% |
| **Overall Adoption** | 45% | 85% | 30% |

These findings suggest a number of implications that can be tentatively drawn, as follows:

➡ **Participants and Light Touch firms have adopted BOPS BetterBricks practices in greater proportions than nonparticipants. This is the first among the series of BetterBricks MPERs to demonstrate this finding.**

- As with the other market findings, we cannot rule out the possibility that these positive findings reflect some self-selection bias; yet all the participants and Light Touch firms themselves credit BOPS activities with enhancing their energy efficiency practices.

➡ **BOPS appears to have met its 2010 goals: 1) "Northwest service provider decision-makers representing 50% of market share are aware of the business opportunity and customer benefits from improving building operating performance"; and 2) "Service providers representing a significant percentage (10% to 25% by submarket) of the building operations market adopt business approaches that promote building operating performance."** We found the adoption among participants of BetterBricks overall best practices exceeds the adoption among nonparticipants by over 50%.

- The total market adoption of the BetterBricks elements is around 45%. As noted for the other markets, the difference in reported behaviors between participants and nonparticipants provides a more conservative estimate of market adoption.

➡ **We lack a measure of BOPS' goal for working with utilities as market partners.**

About half of the mechanical contractor market has heard of *betterbricks.com* (see Table 4.15).

**Table 4.15: Familiarity with BetterBricks Among Mechanical Contractor Market**

| Program Element | Participants (n=8) | Nonparticipants (n=7) |
|---|---|---|
| **Heard of NEEA** | 100% | 50% |
| **Heard of *betterbricks.com*** | 100% | 50% |
| **Visited *betterbricks.com*'s BOPS section** | 100% | 30% |
| **Used Content from *betterbricks.com*** | 85% | 15% |
| **Heard of *BetterBricks Awards*** | 85% | 0% |
| **Attended *BetterBricks Awards*** | 60% | 0% |
| **Saw Fat Building Brochure** | 100% | 0% |
| **Saw BetterBricks media** | 85% | 85% |
| **BetterBricks directly influenced your energy efficiency practices** | 100% | 0% |
| **BetterBricks enhanced your energy efficiency practices** | 75% | 0% |
| **Participated in Seattle *Kilowatt Crackdown*** | 50% | 0% |
| **Participated in Portland *Office Showdown*** | 40% | 0% |

➡ **The mechanical contractor market appears to have moderate awareness of BetterBricks, based on a relatively high awareness of program elements by participants (60% or more for most elements) and a mixed awareness among nonparticipants (0% to 85%).** However, our low response rate for the BOPS survey may have resulted in an oversampling of firms familiar with NEEA.

## BETTERBRICKS ADOPTION BY URBAN AND RURAL AREAS

NEEA currently uses the 2003 Rural-Urban Continuum Codes (RUCC) published by the U.S. Department of Agriculture, Economic Research Service, to define urban and rural areas. The RUCC uses a nine-point scale to categorize counties on a urban/rural continuum. NEEA designates codes 1-5 (county population of more than 20,000 in, or adjacent to, an urban area) as urban counties and codes 6-9 as rural counties. Using this classification, approximately 89% of households in the Northwest live in urban counties.

All participating, light touch, and nonparticipating (which we limited to firms of 10 or more employees) firms identified in this MPER research are located in urban areas. The research was unable to determine the extent to which the D&C, ORE, and BOPs firms conduct activity in rural areas, or the extent to which the hospital organizations have facilities in rural areas. However, because of the RUCC county designations, a great deal of the BetterBricks activity will likely occur outside rural counties.

BetterBricks also conducted education and training (E&T) activities throughout the region. Where attendee information was gathered, the mailing address zip code was used to determine whether the attendee was in a rural or urban county. Using a USDA table cross referencing zip codes and counties, we were able to provide a breakdown of attendee location by county. Approximately 4% of the attendees were from rural counties with an additional 14% from unknown locations. See Table 14.16

It appears that the attendees from rural counties are at least close to the proportion of total employees (our proxy for commercial floorspace[7]) in rural counties.

**Table 4.16: E&T Attendees by State and Urban/Rural County (n=601)**

| State | Rural | Urban | U/K | Total |
|---|---|---|---|---|
| ID | 0.0% | 8.5% | 0.0% | **8.5%** |
| MT | 0.0% | 0.0% | 0.2% | **0.2%** |
| WA | 2.0% | 52.2% | 0.0% | **54.2%** |
| OR | 1.7% | 21.8% | 0.0% | **23.5%** |
| U/K | 0.0% | 0.0% | 13.6% | **13.6%** |
| **Total attendee distribution** | **3.7%** | **82.5%** | **13.8%** | **100.0%** |
| *Four-state urban/rural employee[7] distribution* | *4.8%* | *95.2%* | **0.0%** | **100.0%** |

[7] The commercial floor area per county is not currently available. As a proxy, we used employee by county from Sector 00: CB0800A1: 2008 County Business Patterns: Geography Area Series: County Business Patterns: 2008, US Economic Census under the assumption that commercial square footage will be roughly proportionate to the distribution of employees per county.

# 5 ENERGY SAVINGS VALIDATION AND ACE MODEL REVIEW

NEEA's standard practice is to estimate energy savings by measuring the market adoption of products or practices with defined levels of energy savings per unit. For BetterBricks, however, validation of energy savings is limited to individual projects because the program's prescribed practices were not sufficiently defined and tracking data was largely unavailable. Without such definition or tracking data, it was not possible to estimate energy savings for overall market change. As a result, NEEA's Alliance Cost Effectiveness (ACE) models show only the aggregated energy savings of individually validated projects and are not a calculation of whole market savings.

## ENERGY SAVINGS VALIDATION

Table 5.1 provides a tabular summary of the electricity and natural gas savings validated by the various research activities to date.

**Table 5.1. Validated Electricity and Natural Gas Savings**

| Activity | Validated Savings Estimates | | |
|---|---|---|---|
| | Savings Prior to 2010 | | 2010 Savings to date |
| | Research Conducted 2008 | Research Conducted 2009 | |
| **Design and Construction** | 1.59 aMW<br>529,882 therms | 0.06 aMW<br>35,373 therms | Projects pending |
| **Office Real Estate** | — | 1.49 aMW<br>4,056 therms | Projects pending |
| **Building Operations: Healthcare Facilities** | 0.34 aMW<br>47,130 therms | 0.09 aMW<br>96,300 therms | 0.06 aMW<br>0 therms<br>Projects Pending |
| **Building Operations: Other Facilities** | — | 0.10 aMW<br>1,916 therms | Projects pending |
| **Rooftop HVAC** | — | 0.02 aMW<br>0 therms | N/A |
| **Grocery Stores** | — | 0.09 aMW<br>0 therms | N/A |
| **Validated BetterBricks Total** | **1.93 aMW<br>577,012 therms** | **1.85 aMW<br>137,645 therms** | **0.06 aMW<br>0 therms** |

The findings in this section cover research conducted by the team of Research Into Action, Inc., Mike D. Kennedy, Inc., Itron, Inc., ECONorthwest, and MetaResources during 2009 – 2010, and research conducted by The Cadmus Group – built on previous research conducted by Heschong Mahone Group, Inc. – in 2008-2009 to evaluate energy savings for BetterBricks. NEEA will

conduct research to validate additional 2010 savings in 2011. The research attempts to validate program-reported savings estimates, rather than conduct the rigorous measurement and verification activities employed, for example, with pay-for-performance contracts.

NEEA can provide on request documents describing the research and findings summarized in Table 5.1. None of the work summarized addresses the attribution of savings to BetterBricks or other influences, nor does it validate savings from random samples. Thus, it would be inappropriate for NEEA to assume causality, extrapolate validated savings to other sites, or make assumptions about the persistence of validated savings.

We were able to validate savings from relatively few BetterBricks projects, which inevitably resulted in a small quantity of validated energy savings. We attribute the small number of validated projects to the facts that BetterBricks implementation did not lay a foundation for evaluation and, perhaps as a consequence, the program data-tracking system (Commercial Tracking System – CTS) has incomplete data. Based on our market survey findings, professional association interviews, understanding of BetterBricks activities, and understanding through other commercial sector research we have conducted, we suspect that BetterBricks' impacts to date far exceed the savings the impact evaluators have validated.

## ACE MODEL REVIEW

NEEA estimates the cost-effectiveness of its initiatives through its Alliance Cost Effectiveness (ACE) models. The ACE models include all of the assumptions necessary to forecast aMW savings through an initiative's market transformation period or the time estimated to transform a market. 2005-2009 BetterBricks has two ACE models: Hospitals (H&H) and Offices (ORE).

The H&H ACE Model has two cross-cutting focuses – *Building Operations and Design & Construction* – within two vertical markets: *Hospitals and Other Healthcare Facilities*. Design and Construction', encompasses savings measures corresponding to the BetterBricks design and construction activities of new buildings; Building Operations, comprises BetterBricks' savings measures corresponding to existing building stock. Like the H&H ACE model, The ORE ACE Model has two cross-cutting focuses – *Building Operations and Design & Construction* – but within four vertical markets: *large and medium/small office real estate that are either owner occupied or non-owner occupied*.

In 2009, Research Into Action and ECONorthwest reviewed the BetterBricks ACE models' key assumptions. We suggested revisions to assumptions relating to market size and growth, energy utilization index, adoption, codes and standards, and plug loads, and recommended some additional research. We lacked sufficient data to comment on the key assumptions of BetterBricks energy savings, ramp up period, persistence, and consumer costs. Both models were subsequently revised to reflect these recommendations. Appendix D provides the ACE model reviews.

# 6 SUMMARY AND RECOMMENDATIONS

## SUMMARY OF FINDINGS

BetterBricks seeks to collaborate with professional organizations serving its target markets as a means of market diffusion. Interviewed professional associations confirm that BetterBricks has had an active presence in their organizations, has sponsored or co-sponsored numerous trainings and educational events, and provides their membership with valuable information.

Figure 6.1 illustrates the degree of familiarity of *betterbricks.com* and other BetterBricks program elements among nonparticipants (those with neither BetterBricks direct involvement or direct influence; neither participant nor Light Touch) in the four target markets. Half or more of the surveyed nonparticipants in each market have heard of *bettterbricks.com* and about one-in-six nonparticipants have used content from the website. More than one-third of nonparticipant contacts in D&C, ORE, and H&H have heard of the *BetterBricks Awards*.

**Figure 6.1: Familiarity with BetterBricks Among Nonparticipants**

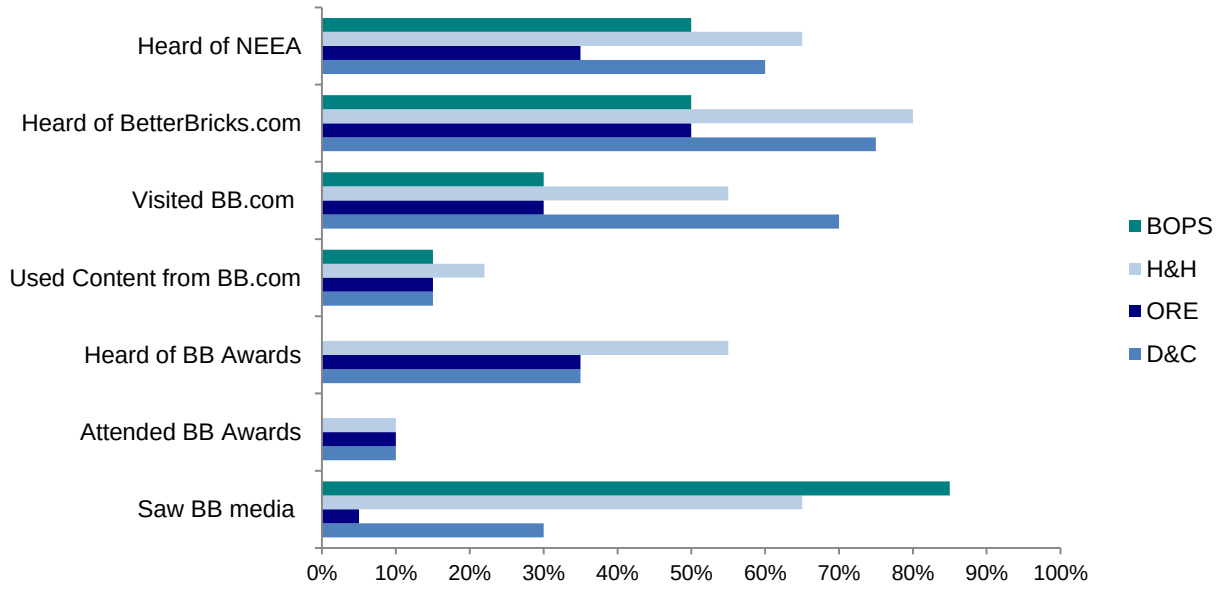
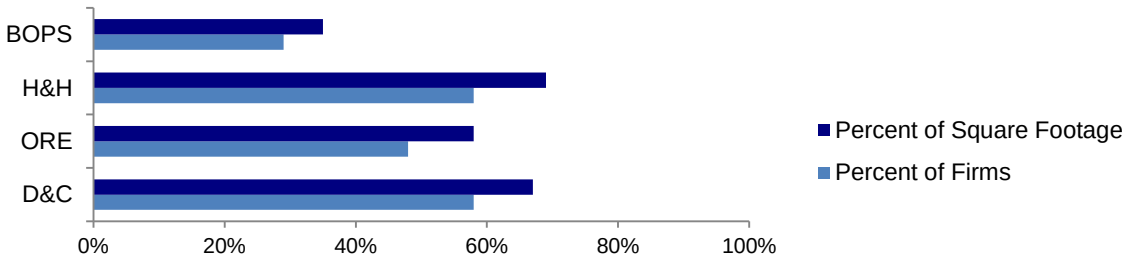



Figure 6.2 illustrates the estimated market adoption of BetterBricks influence, by proportion of firms in the target market and proportion of target market square footage (or, for hospitals, beds). We estimate this adoption as the market share comprised by participant and Light Touch firms. Estimated adoptions range for three markets from about half to about two-thirds; we estimate the adoption of the BOPS market at about one-third.

**Figure 6.2: Estimated BetterBricks Market Influence**




Note: Percent of square footage goals were met for all four target markets.

BetterBricks promulgates five primary principles subsuming a number of best practices. We captured these concepts in five metrics and an overall, summary metric. Figure 6.3 illustrates the estimated adoption (in terms of square footage and, for hospitals, beds) of these best practice metrics among participants. We estimate overall adoption among participants in three markets at 85% or more; we estimate the overall adoption among H&H participants at 50%. Details given in Chapter 4 show high adoptions within H&H of the BetterBricks best practices most directly related to energy savings – building operations, design and construction, use of Life Cycle Cost Analysis (LCCA), and capital improvements – yet low adoptions related to strategic leadership, mobilization, and contracts with suppliers.

**Figure 6.3: Estimated Adoption of BetterBricks Best Practices Among Participants**

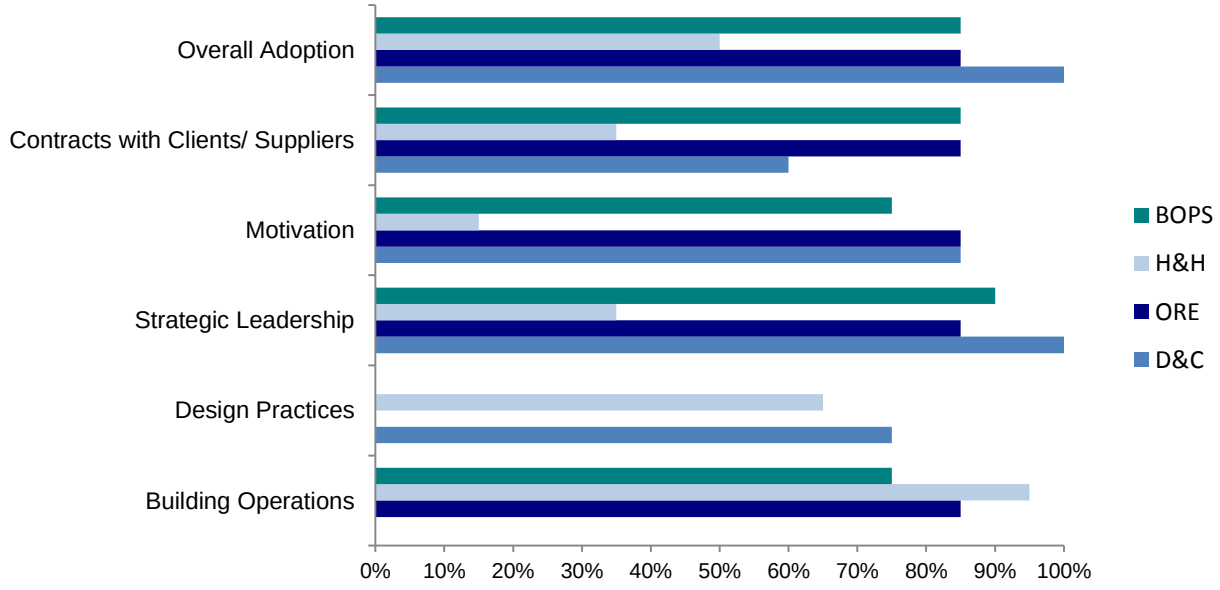



Figure 6.4 illustrates the estimated adoption of the BetterBricks best practice metrics among nonparticipants, which exclude Light Touch firms. We estimate overall adoption among nonparticipants in the four markets ranging from 0% to 45%.

**Figure 6.4: Estimated Adoption of BetterBricks Best Practices Among Nonparticipants**

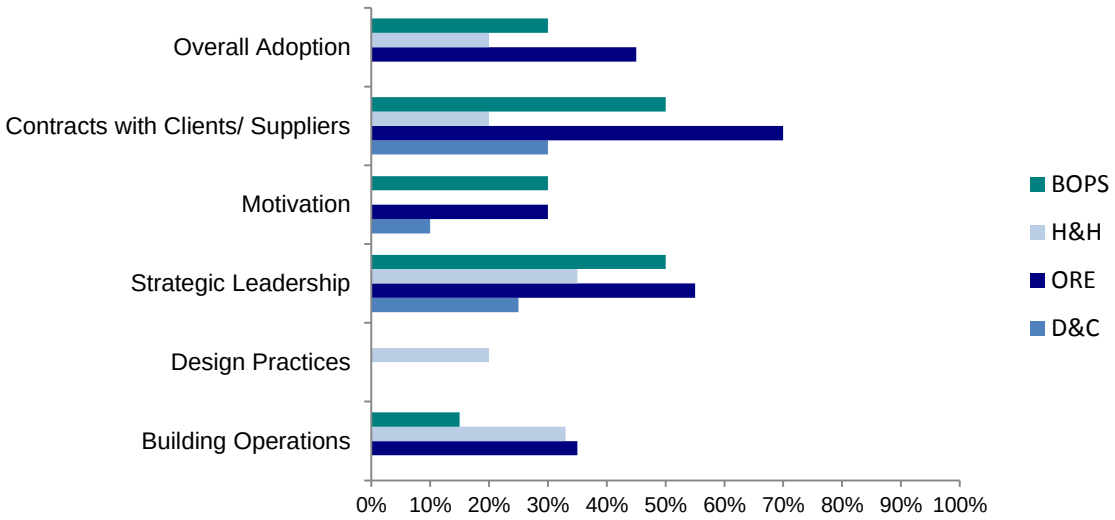
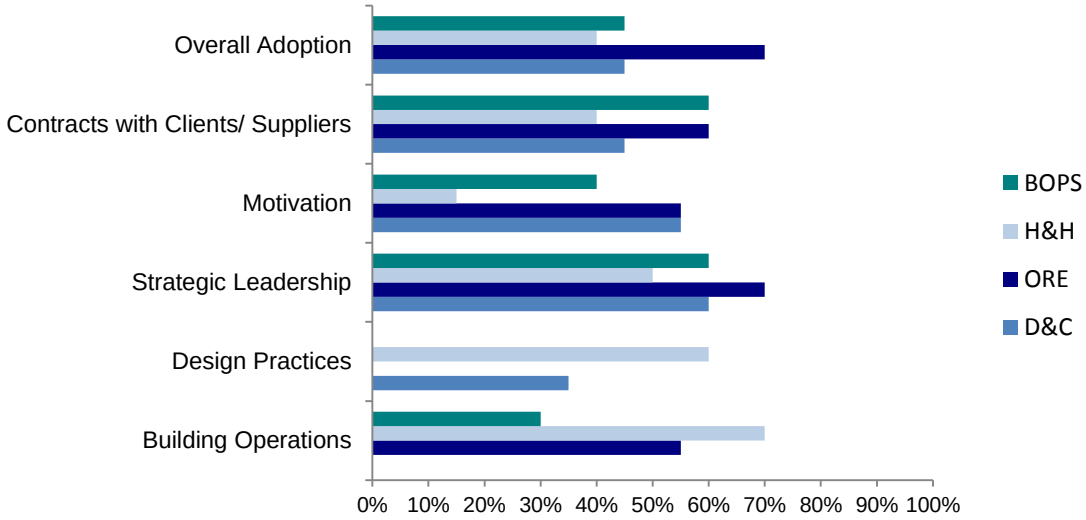



Figure 6.5 builds on Figures 6.3 and 6.4 and illustrates the estimated adoption of the BetterBricks best practice metrics among the total market (participants, Light Touch, and nonparticipants). ORE shows the highest overall adoption at 70%; the other three markets show an overall adoption of about 40 to 45%.

**Figure 6.5: Estimated Adoption of BetterBricks Best Practices Among the Total Market**




The custom nature of BetterBricks work makes savings validation problematic. Additionally, there is a lack of tracking data. The combined result is that there are no savings to extrapolate onto the broader market. Additionally, this study was able to validate only a small quantity of

energy savings for BetterBricks participants; NEEA will undertake additional validation analysis of 2010 program savings in 2011.

## CAVEATS AND DISCUSSION OF FINDINGS

The nonparticipant samples may over-represent those firms familiar with NEEA. To the extent that this occurs, the estimated market awareness of BetterBricks (Figure 6.1) and market adoption of BetterBricks influence (Figure 6.2) are biased upward. Further, the nonparticipant samples are smaller than our goal sample sizes, which corresponded to 90/10 confidence/ precision. Thus, we have less confidence in the nonparticipant estimates than we would like.

We derived the estimated adoption of BetterBricks best practices metrics from about 100 detailed questions. Some of the questions sought categorical responses on the proportion of contact's activity that met the condition posed in the question, and we gave more points toward the metric the higher the proportion. Other questions asked whether an activity had ever occurred. Thus, high scores on the metric indicate the contact's firm has engaged in the best practice. High scores do not preclude the possibility that the firm could conduct the best practice more thoroughly, on a larger proportion of its activities. Thus, the reader should not interpret high metric adoptions as indicative that no further progress can be made in the market. Firms could embrace the best practice more thoroughly, and subsequent studies might want to "raise the bar" for measuring market transformation through more stringent metric definition.

The research relies on self-reported behaviors. Any of the contacts might have overstated their firm's uptake of the behaviors, particularly if they perceive the behaviors represent "socially desirable" actions. It also seems reasonable to surmise that nonparticipants, in particular, may have overstated their firms' uptake of the behaviors. This supposition makes sense because of both practical and theoretical considerations. On the practical side, the nonparticipant responses suggest a higher baseline adoption of the best practices than one might expect based on familiarity with the degree to which commercial facilities have attained energy efficiency. On the theoretical side, nonparticipants are less likely than participants to have recently discussed many of the concepts posed in the questions. While we crafted the questions from simple language, nonetheless, nonparticipants may have a less stringent interpretation of the practices than participants, who have been steeped in BetterBricks thinking.

Because of these caveats, we believe it would be a mistake to interpret the various percentages as precise quantifications of BetterBricks' best practices adoptions. Rather, they are rough indicators. Nonetheless, we believe the data support a comparison between participants and nonparticipants. Participants report engaging in the BetterBricks best practices to a much greater extent than do nonparticipants, with the metrics typically differing by 30 percentage points or more.

Because previous baseline studies did not address these specific metrics, we cannot rule out the possibility that participants were already conducting these best practices at greater rates than nonparticipants prior to their BetterBricks involvement. While this may be true, participant adoptions exceed nonparticipant adoptions by over 50 percentage points for more than one-third

of the metrics. The participants would have to have had substantial uptake of the best practices prior to their BetterBricks involvement to evidence no program effect in comparison with the nonparticipants. Again, familiarity with the commercial sector suggests this was not the case. Finally, all of the participants stated that BetterBricks enhanced their energy efficiency practices.

## SUMMARY CONCLUSIONS FOR BETTERBRICKS

We conclude that 2005-2009 BetterBricks met its 2010 objectives common to all four markets as shown in Table 6.1.

**Table 6.1: BetterBricks Met 2010 Objectives Common to All Four Markets**

| Objective | D&C | ORE | H&H | BOPS |
|---|---|---|---|---|
| **Adoption of best practices through BetterBricks involvement and influence** | ✓ | ✓ | ✓ | ✓ |
| **High market awareness (greater than 50%) of betterbricks.com** | ✓ | ✓ | ✓ | ✓ |
| **Market awareness of the benefits of high performance buildings** | ✓ | ✓ | ✓ | ✓ |
| **Collaboration with professional associations** | ✓ | ✓ | ✓ | ✓ |

We also conclude that 2005-2009 BetterBricks met its 2010 objectives for adoption of best practices and market change in the specific markets as follows:

- **D&C:** submarkets that adjusted business practices to ensure high performance buildings
- **ORE:** targeted ORE floor space that adopted energy management plans; professionals capable of managing energy-related business practices change; and professionals downloading the High Performance Portfolio Framework and associated tools, and beginning implementation
- **H&H**: regional hospital beds whose decision-makers: 1) are committed to and practicing SEMP elements; 2) request/ require trade allies to support SEMP practices, including enhanced O&M; and 3) consider BetterBricks an excellent source of information and practical tools on energy-related business and technical practices
- **BOPS:** building operations market whose service providers adopt business approaches that promote building operating performance

BetterBricks appears to have partially met the following 2010 objective:

- **D&C:** significant percentage of new project designs incorporate partial and fully integrated design strategies that result in savings greater than 25% over baseline. While we found ID features used by 55% of the market, we do not know the savings compared to baseline.

Due to unavailability of data or insufficient definition, we lack measures of the extent that BetterBricks met the following 2010 objectives:

- **D&C:** all objectives for engineers working outside of architectural firms
- **ORE:** objectives for design and construction activity (little new ORE construction occurred in 2008-2010)
- **All Markets:** objectives for working with utilities as market partners

To date (2008-2010), we and other researchers have validated 3.84 aMW of electricity savings and 714,657 therms of natural gas savings at BetterBricks participant facilities. Given the BetterBricks activities, the feedback we obtained from partnering professional associations, and the findings from market surveys, we believe it likely that BetterBricks has generated energy savings far in excess of those that research has validated. The research relied on incomplete data on program participants and their activities, and incomplete detail for the targeted changes sought from the market sufficient to identify actions taken and determine approaches for estimating change in energy usage.

We also conclude that most of the BetterBricks managers had not defined their markets nor identified market participants in a manner that would enable them to know their progress toward market share goals. Only the H&H market manager had created a list of organizations in the target market and market share (number of beds). Other market managers claimed participants constituted a certain market share, but did not provide evaluators with information in support of these claims. For instance, the D&C goals are defined in terms of A&E (architectural and engineering) firms and their market share, yet all program participants were architectural firms. Had the initiative explicitly addressed and defined its target market at the outset, it could have followed an adaptive management approach and either revised its goals or revised its Firm Focus activities as it became apparent the two were not consistent.

Finally, we note that BetterBricks staff did not provide sufficiently discreet and defined definitions of the changes they sought to stimulate in the market until late in the initiative (fall 2009). They specified goals using language that lacked direct, observable correlates. The goals use terms such as “high performance buildings,” “enhanced O&M,” and “fully integrated design.” While these terms may be appropriate for goals, the program team did not define those into discrete, observable, and measureable components so that all can agree on progress toward goals. With each round of BetterBricks MPERs, the evaluators sought to deconstruct the goal concepts into multiple, specific actions that trained observers could recognize or market actors – upon hearing the actions – would interpret with relative consistency. Yet each successive evaluation found program staff countering that the measured actions did not accurately reflect the behavior changes they were promulgating. Again, an adaptive management approach would make these concepts specific at the outset and subsequently revise, as necessary, either the goals or the program activities.

It should be noted that while BetterBricks accomplished the bulk of its behavior change goals, there was still very little to tie these changes to energy savings. While we believe that there are energy savings which resulted from this change, the data do not exist to validate this. Prior to the redesign effort, MPI's were not sufficiently defined to enable energy savings calculations. It is key to the success of the re-designed commercial initiative to build in the measurement and data collection necessary to tie desired behavior change to energy savings.

## RECOMMENDATIONS

We offer NEEA's commercial sector staff the following recommendations as it embarks on a redesigned commercial sector initiative.

1. **Define the target markets in such a way that the number of firms in the market and the market shares of the firms or groupings of firms can be determined**. Early in an initiative, determine the number of firms and measures of market share.
2. **Identify the discrete, observable, and measurable changes the program seeks to promulgate – those actions that informed observers could agree have or have not been taken and that program staff agree constitute evidence of a desired behavior change**. The program staff or evaluators assisting them can then assemble these discrete elements into a handful of metrics whose measurements summarize program progress toward goals.
3. **For complex efficiency behaviors, such as fully integrated design, define the combination of elements that constitute the behavior**. Ensure the use of consistent definitions of the complex behaviors in all impact validations, in validating ACE model assumptions, and in program management.
4. **Develop behavior change measures that are more clearly tied to energy savings.**
5. **Conduct baseline research on the defined target markets to obtain information on the current adoption of desired behaviors, as evidenced by the metric scores.**
6. **Incorporate into the commercial sector initiative's work with market actors, the tracking and reporting necessary to determine energy use pre- and post-intervention and to understand the measure or change**. Ensure market actors' willingness to share this information with program staff. Although tracking activities can appear to staff and participants to divert attention from implementation, tracking provides both the implementing organization and the program staff with the information necessary to assess the value of the actions taken.
7. **Record data pertinent to savings validation research in the program database. This includes such information as baseline data, design and construction models, project characteristics, and project initiation and completion dates**. For projects implemented in phases over time, add suffixes to project IDs to enable tracking the characteristics and progress of individual interventions.

# APPENDICES

# A METHODOLOGICAL DETAIL

## PRIOR BETTERBRICKS MPER RESEARCH

Table A.1 shows the evaluation tasks conducted for each BetterBricks MPER. NEEA discontinued the BetterBricks Grocery component in 2008.

**Table A.1: Evaluation Tasks for BetterBricks' Target Markets**

| Component | Market | MPER | | | | |
|---|---|---|---|---|---|---|
| | | 2005 | 2006 | 2007 | 2008 | 2010 |
| Conduct Baseline/Market Survey | D&C | | ● | ● | | |
| | ORE | | | ● | | ● |
| | Hospitals | ● | | ● | | ● |
| | BOPS | | ● | ● | | |
| | Grocery | ● | | ● | | |
| Market Characterization | D&C | | ● | ● | ● | ● |
| | ORE | | | ● | ● | ● |
| | Hospitals | | ● | ● | ● | ● |
| | BOPS | | ● | ● | ● | ● |
| | Grocery | | ● | ● | ● | |
| Assess Logic Model | D&C | | ● | ● | ● | ● |
| | ORE | | | ● | ● | ● |
| | Hospitals | ● | ● | ● | ● | ● |
| | BOPS | | ● | ● | ● | ● |
| | Grocery | ● | ● | ● | ● | |
| Assess Market Progress | D&C | | | ● | ● | ● |
| | ORE | | | | ● | ● |
| | Hospitals | ● | ● | ● | ● | ● |
| | BOPS | | | ● | ● | ● |
| | Grocery | ● | ● | ● | ● | |

Continued

| Component | Market | MPER | | | | |
|---|---|---|---|---|---|---|
| | | 2005 | 2006 | 2007 | 2008 | 2010 |
| Assess Progress Toward Goals | D&C | | ● | ● | ● | ● |
| | ORE | | | | ● | ● |
| | Hospitals | ● | ● | ● | ● | ● |
| | BOPS | ● | ● | ● | ● | ● |
| | Grocery | ● | ● | ● | ● | ● |
| Estimate/Validate Savings Impact | D&C | | | | | ● |
| | ORE | | | | | ● |
| | Hospitals | | | | ● | ● |
| | BOPS | | | | | ● |
| | Grocery | | | | ● | ● |
| ACE Model Review | D&C | NA | NA | NA | NA | NA |
| | ORE | | | | ● | ● |
| | Hospitals | | | | ● | ● |
| | BOPS | NA | NA | NA | NA | NA |
| | Grocery | | | | ● | ● |

## SURVEY AND INTERVIEW POPULATIONS

### Participants

*NEEA BetterBricks Reference Guide* identifies BetterBricks participants (that is, targeted firms; see page 2). The market managers updated this list and provided contact information for the participants.

### Hospital Population

The manager of the Hospital Initiative in 2007 developed a detailed list of all hospital acute care facilities in the Pacific Northwest. This list includes number of beds and indicates hospitals belonging to a system, such as Providence Health and Services. We defined *large* hospitals as those with 300 beds or more and *medium* hospitals in Washington and Oregon as those with 150 to 299 beds. In order that our sample distribution by state might resemble the distribution of the total population of hospitals by state, we defined *medium* hospitals in Idaho and Montana as those with 100 to 299 beds. When applying these criteria to the detailed list, we estimate that there are 82 hospitals with 150 or more beds in Oregon and Washington, and 100 beds or more in Idaho or Montana. These hospitals operate approximately 22 thousand beds across the Pacific Northwest.

## Office Real Estate Population

We developed an Office Real Estate market list from several sources. First, the ORE market manager had developed a partial list of the largest and most influential commercial real estate firms in the Northwest. Second, we added the largest firms we found listed in the *Business Journals* for Portland, Puget Sound, Spokane, and Idaho for 2010. Finally, we added real estate management firms that had buildings participating in BetterBricks' *Kilowatt Crackdown* (in Seattle) and *Office Energy Showdown* (in Portland). We defined *large* firms as those with 25 or more employees and *medium* firms as those with 10 to 24 employees, according to respondents' self-report. From these multiple sources and criteria, we estimate that there are 81 office real estate firms who have 10 or more employees and who manage approximately 51-million square feet of commercial office space.

## Design & Construction and Building Operations Populations

The managers of the other initiatives did not have comparable lists of their target markets. For D&C and BOPs, we used Dunn & Bradstreet (D&B) to indentify market actors. We identified the target market for D&C from a D&B listing of architects (NAICS code 541310 *Architectural Services)* in NEEA's region. This was the only NAICS code that was obviously architects and included known targeted firms. We pulled a stratified sample of *large* (25 or more employees, per the D&B data) and *medium* firms (10 to 24 employees). Based on this sample and given that there is no evidence to suggest that there is a significant number of architectural firms not listed under this NAICS code, we estimate that there are 143 architectural firms in the Northwest with ten or more employees.

We similarly identified the target market for BOPS from D&B's listing of mechanical contractors in the region (NAICS code 238220 *Contractors, Mechanical)* and pulled an analogous stratified sample. This NAICS code was suggested by NEEA's market specialist and contained firm focus firms. We also had to filter out some firms that were primarily residential firms or whose primary business was not commercial HVAC. Again, based on this sample and given that there is no evidence to suggest that there is a significant number of mechanical contractor firms not listed under this NAICS code, we estimate that there are 56 mechanical contractor firms in the Northwest with ten or more employees. In analyzing the survey data, we learned there was little correlation between the number of employees reported by D&B and those reported by the survey respondent. Consequently, we stratified the samples for the analytical findings we report in Chapter 4 according to self-reported organization size, which was well correlated with other measures of size the contact reported (such as square footage of market activities).

## Professional Associations Population

The market managers identified a list of 12 professional organizations with contacts at 25 chapters (Table A.2).

**Table A.2: Professional Associations Identified by BetterBricks Staff**

| Organization | Chapters | | | | |
|---|---|---|---|---|---|
| | WA | OR | ID | MT | Region |
| 2030 District | ● | | | | |
| American Institute of Architects (AIA) | ● | ● | ● | ● | |
| American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) | ● | ● | ● | | ● |
| Building Owners and Managers Association (BOMA) | ● | ● | ● | | ● |
| International Facility Management Association (IFMA) | ● | | | | |
| Montana Joint Engineers | | | | ● | |
| National Sustainable Building Advisor Program | ● | | | | |
| Northwest Energy Education Institute | | ● | | | |
| Northwest Trade Ally Network | | | | | ● |
| State Society of Healthcare Engineers (SSHE) | ● | | ● | ● | |
| U.S. Green Building Council (USGBC) | ● | | ● | ● | |
| Urban Land Institute (ULI) | ● | | | | |
| TOTAL | 9 | 4 | 5 | 4 | 3 |

## SURVEY AND INTERVIEW SAMPLES AND DISPOSITIONS

### Survey Samples and Dispositions

Table A.3 gives our goal and completed sample sizes for the nonparticipant surveys in each market and Table A.4 provides comparable information for the participant surveys. We were unable to attain our goals for the *large* strata in all but the Design & Construction markets. However, we also found little correlation between the size of firm (in number of employees) given by Dunn & Bradstreet and the size of firm as reported by respondents, perhaps owing to the downsizing of firms that has occurred in the recession that started in fall 2008. We consequently do not report results by the strata in which we had grouped the firms in advance of surveying them. Also note that the table includes *Light Touch* with the nonparticipants, as we identified Light Touch firms based on their responses to the survey, with the exception of three *Light Touch* hospitals that we knew in advance and include in our goals for participants.

**Table A.3: Nonparticipant Survey Goals, Completes, Dispositions**

| | D&C | ORE | H&H | BOPS |
|---|---|---|---|---|
| **Initial Population List (Qualifying Population Unknown)** | 218 | 84 | 56 | 71 |
| **Goal** | 51 | 38 | 31 | 35 |
| **Complete** | **35** | **25** | **13** | **7** |
| **Response Rate** | **20%** | **33%** | **24%** | **13%** |
| **Numbers Dialed** | 218 | 84 | 56 | 71 |
| **Firm Disqualified (not in target market) / Out of Business** | 30 | 4 | 1 | 9 |
| **Bad Number** | 11 | 4 | 0 | 5 |
| **Callbacks (placed 10 calls; not completed)** | 123 | 34 | 31 | 32 |
| **No answer** | 4 | 0 | 1 | 1 |
| **Refusals** | 15 | 17 | 10 | 17 |

**Table A.4: Participant Survey Goals, Completes, Dispositions**

| | D&C | ORE | H&H | BOPS |
|---|---|---|---|---|
| **Population (Known)** | 9 | 6 | 22 | 8 |
| **Goal** | 9 | 6 | 22 | 8 |
| **Complete** | **8** | **6** | **22** | **8** |
| **Response Rate** | **89%** | **100%** | **100%** | **100%** |
| **Refused or Not Available** | 1 | 0 | 0 | 2 |

We were disappointed with the nonparticipant response rates. We called each non-responding firm ten times over several weeks, at different times of day, and yet did not succeed in reaching our quotas. Unfortunately, we did not have individual contacts for the nonparticipants and tried to reach the correct person by describing the position and responsibilities of the desired contact. When the response rate to the hospital survey was low, we contacted the BetterBricks market manager and asked for assistance. The hospital market specialists provided us with contact names for about one-third of the sample. In the cases where the names they provided were new to us, we called these new contacts ten times, so the hospital organizations were called on average more than ten times.

We think it likely that contacts aware of NEEA more readily agreed to answer our questions than contacts unaware of NEEA. Thus, our nonparticipant sample is likely biased toward respondents aware of NEEA and influenced by NEEA. Consequently, our estimates of Light Touch market share likely overstates BetterBrick's reach into the market. On the other hand, because we mentioned the Northwest Energy Efficiency Alliance as the survey sponsor in our introductory remarks, it is possible our nonparticipant sample is biased toward firms more engaged in energy efficiency, irrespective of their awareness of NEEA. To the extent that is the case, the percentage

differences in the MPIs between nonparticipants and BetterBricks participants/ Light Touch understate BetterBricks' influence.

### Interview Sample

Per the statement of work, we interviewed 12 professional association contacts. We interviewed one contact at each of the chapters listed in Table A.5. Note that for H&H, we sought to interview either the Oregon or Washington chapter of SSHE, but not both, according to the decision to allocate the total sample of 12 contacts across the four states. We completed the interview with the Washington contact first and therefore did not pursue the Oregon contact.

**Table A.5: Professional Association Interview Sample**

| Market | Organization | Chapters |
|---|---|---|
| **D&C** | AIA | WA, OR |
| | ASHRAE | ID |
| | USGBC | WA |
| **Office Real Estate** | BOMA | WA, OR |
| | ULI | WA |
| | 2030 District | WA |
| **Hospitals and Healthcare** | SSHE | WA, ID, MT |
| **Building Operations** | IFMA | WA |

## SAMPLE WEIGHTING

We analyzed the survey responses to determine the proportion of respondents that were *medium* (10 to 24 employees) and *large* (25 or more employees), and we made the simplifying assumption that our survey respondents are representative of the population for this characteristic. We also made the simplifying assumption that our original population lists contain all the medium and large firms in the market; we adjusted this population downward based on the proportion of firms that failed the survey screening. From these statistics, we developed estimates of the numbers of medium and large firms in each population. We grouped the observations into *medium* and *large* based on the respondents' statements of firm size (in terms of number of employees), and we weighted the observations based on the total market square footage (self-reported by the respondents) comprised by the medium and by the large firms. Thus, the square footage of weighted medium firms totals our estimate of population square footage comprised by medium firms, and the same for large firms.

## ESTIMATING MARKET SIZE

We estimated the number of firms in each market in a three-step process. We started with lists provided by the H&H manager, drawn from Dunn & Bradstreet for D&C and BOPS, and developed from multiple sources for ORE. We augmented these lists as necessary to include participant firms and cleaned the lists to develop the best possible initial estimate of the number of firms in the population. In step 2, we conducted the market surveys and in doing so learned that some firms did not meet the target criteria or were no longer in business. From these we developed an estimate of the proportion of the initial list that does not belong in the market estimate. In step 3, we applied this estimated proportion of non-qualifying firms to our initial market size to develop a revised estimate of number of firms in the target market.

We estimated the square footage in each market (or, for H&H, number of beds) from the survey responses.

## CORROBORATION OF TOTAL NEW CONSTRUCTION SQUARE FOOTAGE

From the U.S. Census sources *Annual Value of Private Construction Put In Place 2002-2009*, and *Value of Private Construction Put In Place – Seasonally Adjusted Annual Rate* (for 2010), we obtained the total dollar value for offices and healthcare nationally. The share for the Pacific Northwest we assumed to equal the region's share of the national population. We used $150 per square foot construction costs for offices (per a general contractor for office construction) and $405 for hospitals, per Joel Loveland, University of Washington. We estimated a 2008-2010 market size of 43.8 million square feet.

## SURVEY DESIGN

BetterBricks promulgates five primary principles subsuming a number of best practices. In 2009, under a separate contract, we interviewed the BetterBricks market managers and business and technical advisors to learn more about the best practices and what these program staff considered to be evidence of targeted behavior change. Under this contract in 2010, we interviewed and held discussions with the market managers on three more occasions, to further increase our understanding of the targeted behavior changes, to seek comments on draft survey questions, and to obtain feedback on final, specific question phrasing. Through this process we developed market surveys for D&C, ORE, H&H, and BOPS that we used to identify the adoption of best practices among participants, Light Touch firms, and nonparticipants.

We strove to craft each question using plain English, terms we expected the audiences would have a common understanding of. We intentionally did not use terms of art common to BetterBricks and the energy efficiency community, such as enhanced O&M and high performance buildings.

## ANALYSIS ALGORITHMS FOR MARKET SURVEY DATA

We derived the estimated adoption of BetterBricks best practices metrics from about 100 detailed questions. Some of the questions sought categorical responses on the proportion of contact's activity that met the condition posed in the question, and we gave more points toward the metric the higher the proportion. Other questions asked whether an activity had ever occurred. Thus, high scores on the metric indicate the contact's firm has engaged in the best practice. High scores do not preclude the possibility that the firm could conduct the best practice more thoroughly, on a larger proportion of its activities. Thus, the reader should not interpret high metric adoptions as indicative that no further progress can be made in the market. Firms could embrace the best practice more thoroughly, and subsequent studies might want to "raise the bar" for measuring market transformation through more stringent metric definition.

The research relies on self-reported behaviors. Any of the contacts might have overstated their firm's uptake of the behaviors, particularly if they perceive the behaviors represent "socially desirable" actions. It also seems reasonable to surmise that nonparticipants, in particular, may have overstated their firms' uptake of the behaviors. This supposition makes sense because of both practical and theoretical considerations. On the practical side, the nonparticipant responses suggest a higher baseline adoption of the best practices than one might expect based on familiarity with the degree to which commercial facilities have attained energy efficiency. On the theoretical side, nonparticipants are less likely than participants to have recently discussed many of the concepts posed in the questions. While we crafted the questions from simple language, nonetheless, nonparticipants may have a less stringent interpretation of the practices than participants, who have been steeped in BetterBricks thinking.

We coded the response to each yes/no question using a binary 0,1 code (yes = 1, no/don't know/refused = 0). We coded the response to each categorical, ordinal variable with a scalar that ranged between 0 and 1; we coded responses that they were not at all engaged in the action as 0, responses that they were fully engaged in the action as 1, and responses in between these two extremes according to the number of response categories. For example, questions asking frequency that had the response categories of "seldom or never, less than half, about half, more than half, and virtually all the time" we coded as 0, 0.25, 0.5, 0.75, and 1, respectively.

Table A.6 shows the how we created the D&C market metrics used, based on the five primary BetterBricks principles and their corresponding best practices, per *BetterBricks Reference Guide.* Tables A.7, A.8, and A.9 provide the derivation of the market metrics for ORE, H&H, and BOPS.

**Table A.6: Design & Construction Market Metrics**

| Question Number | Question | Question Weight | Sub-Metric | Sub-Metric Weight | Final Metric & Weight |
|---|---|---|---|---|---|
| | **Metrics Related to Design Practices** | | | | |
| **57** | Calculated the energy use per square foot of completed buildings | 0.33 | Benchmarking | 0.11 | Design Practices 0.5 |
| **58** | Compared the energy use of completed buildings to the energy use as modeled during design | 0.33 | | | |
| **59** | Used energy use per square foot results to establish key performance indicators across projects? | 0.33 | | | |
| **60** | Completed a formal Post Occupancy evaluation or assessment | 0.4 | Tracking and Reporting | 0.11 | |
| **61** | Reported the results of a post-occupancy assessment or energy use calculation to the building owners | 0.4 | | | |
| **62** | Do you have any post-occupancy evaluations planned for any projects currently in design? | 0.2 | | | |
| **34** | Do any of your projects have written energy efficiency goals? | 0.1 | Energy Performance Targets | 0.11 | |
| **35** | About what percentage of your projects have specific energy efficiency goals or targets other than meeting code? | 0.2 | | | |
| **37** | About what percentage of your buildings over the past three years were designed to be ……at least 10% more efficient than code? | 0.3 | | | |
| **38** | ...at least 25% more efficient than code? | 0.4 | | | |
| **39** | Have any of the design projects you completed in the past three years obtained a certification rating such as LEED, Living Building, Green Globe, Earth Advantage? | 0.0 | Certification | 0.11 | |
| **40** | Which certifications? LEED, Living Building, Green Globe, Earth Advantage | 0.2 | | | |
| **41** | How many of your projects completed in the past three years received LEED certification? | 0.2 | | | |

Continued

| Question Number | Question | Question Weight | Sub-Metric | Sub-Metric Weight | Final Metric & Weight |
|---|---|---|---|---|---|
| | **Metrics Related to Design Practices, cont.** | | | | |
| **42** | How many of those were LEED Platinum?… | 0.30 | Certification, cont. | 0.11 | Design Practices 0.5 |
| **43** | ...LEED Gold? | 0.20 | | | |
| **45** | Please rate your agreement with the following statement: The current LEED criteria guarantee energy efficient buildings. | 0.10 | | | |
| **126** | How familiar are you with the architectural design process called Integrated Design? | 0.33 | ID Awareness | 0.11 | |
| **127** | Has your firm used integrated design for any of its new construction, addition or renovation design projects in the last three years? | 0.33 | | | |
| **128** | What proportion of your projects over the last three years has used integrated design elements? | 0.33 | | | |
| **136** | Thinking of these groups as possible members of the integrated team, about what proportion of projects used some sort of integrated team? | 0.17 | ID Team | 0.11 | |
| **137** | And considering just those projects that used some sort of integrated team, about how often did the integrated teams meet, on average, before the end of schematic design? | 0.17 | | | |
| **138** | And how often, on average, did they meet after the end of schematic design? | 0.17 | | | |
| **130** | How often were the following people included in the design team...The engineering consultant | 0.083 | | | |
| **131** | ...The general contractor | 0.083 | | | |
| **132** | ...Owner's representatives | 0.083 | | | |
| **133** | ...Representatives of the operations and maintenance staff | 0.083 | | | |
| **134** | ...The commissioning agent | 0.083 | | | |
| **135** | ...Representatives of the building users or occupants | 0.083 | | | |

Continued

| Question Number | Question | Question Weight | Sub-Metric | Sub-Metric Weight | Final Metric & Weight |
|---|---|---|---|---|---|
| | **Metrics Related to Design Practices, cont.** | | | | |
| **139** | Other than for code compliance, on how many of your last five projects did you use energy modeling to determine the design? | 0.50 | Energy Modeling | 0.11 | Design Practices 0.5 |
| **140** | For those projects where you used energy modeling, on average, how many times during the design process was the whole building energy use modeled? | 0.50 | | | |
| **144** | ...A design charette was held where the designer meets with the owner, building operator, and consulting engineers? | 0.33 | ID Process | 0.11 | |
| **153** | ...Commissioning began during the design process | 0.33 | | | |
| **154** | ...A plan was made for operator or occupant training | 0.33 | | | |
| **145** | ...Daylighting with controls was used reduce electric lighting | 0.14 | ID Features | 0.11 | |
| **146** | ...Building orientation was selected to minimize heating, cooling, or lighting loads | 0.14 | | | |
| **147** | ...Thermal mass of the building served to reduce heating and cooling loads | 0.14 | | | |
| **148** | ...A major system--such as the chiller, boiler, ventilation, or lighting system--was designed to use less significantly less energy than in comparable facilities or required by code. | 0.14 | | | |
| **150** | ...Occupancy sensors were used to control ventilation | 0.14 | | | |
| **151** | ...Energy efficient equipment was specified | 0.14 | | | |
| **152** | ...Occupancy sensors were used to control lighting | 0.14 | | | |

Continued

| Question Number | Question | Question Weight | Sub-Metric | Sub-Metric Weight | Final Metric & Weight |
|---|---|---|---|---|---|
| | **Metrics Related to Strategic Leadership** | | | | |
| **161** | Does the senior management of your firm believe a priority on energy efficient design will provide the firm with a strategic advantage? | 0.20 | Executive Commitment | 0.33 | Strategic Leadership 0.2 |
| **163** | Has your firm formally adopted, through policies and procedure statements, energy efficiency and sustainability goals for your design projects? | 0.20 | | | |
| **182** | Has your firm retained outside energy efficiency or sustainability specialists or groups? | 0.20 | | | |
| **183** | Do you have a mechanical engineer on staff that specifically supports energy efficient design? | 0.20 | | | |
| **184** | In selecting engineering consultants, has your firm included in its criteria demonstrated Integrated Design or energy efficiency capability? | 0.20 | | | |
| **166** | Does your firm consider energy efficiency to be part of its market identity? | 0.2 | Vision | 0.33 | |
| **167** | Do your firm's marketing materials describe integrated design specialties? | 0.2 | | | |
| **168** | Do your firm's marketing materials describe the advantages of energy efficient or high performance buildings? | 0.2 | | | |
| **169** | Do your firm's marketing materials highlight its capabilities or successes with energy efficiency or sustainability? | 0.2 | | | |
| **170** | Does your organization's website contain a section specifically featuring your sustainability or energy efficiency credentials, successes or related awards you have received? | 0.2 | | | |
| **176** | About what proportion of your clients come to you specifically looking for designs that are more energy efficient than code? | 0.5 | Intention | 0.33 | |
| **164** | Has your firm accepted the AIA 2030 Challenge targets? | 0.5 | | | |

Continued

| Question Number | Question | Question Weight | Sub-Metric | Sub-Metric Weight | Final Metric & Weight |
|---|---|---|---|---|---|
| | **Metrics Related to Mobilizing the Organization** | | | | |
| **196** | Does your firm consider demonstrated competence in energy efficiency as a factor in promotion decisions? | 0.5 | Communicating Expectations | 0.34 | Mobilizing the Organization 0.2 |
| **198** | Does your firm recognize its energy efficiency or sustainability achievements in staff meetings and credit key individuals and teams? | 0.5 | | | |
| **188** | Have you or other staff participated in any seminars or training related to any aspect of energy efficiency and building design? | 0.1 | Training | 0.66 | |
| **190** | What organizations sponsored the presentation or training? AIA, Cascadia Green Building Council, Other (specify) | 0.2 | | | |
| **191** | About what proportion of your design staff are LEED accredited? | 0.3 | | | |
| **193** | Does your firm allocate staff time to improving capability in energy efficiency? | 0.2 | | | |
| **194** | Is energy efficiency included in your professional development planning for any staff? | 0.2 | | | |
| | **Metrics Related to Contracts with Clients** | | | | |
| **157** | Do any of your design contracts with clients include specific energy efficiency requirements? | 1.0 | Contracts with Clients | 1.0 | Contracts with Clients 0.1 |

**Table A.7: Office Real Estate Market Metrics**

| Question Number | Question | Question Weight | Sub-Metric | Sub-Metric Weight | Final Metric & Weight |
|---|---|---|---|---|---|
| | **Metrics Related to Building Operations** | | | | |
| **64** | …Obtained an ENERGY STAR® score (ES=1) | 0.33 | Benchmarking | 0.167 | Building Operations 0.25 |
| **89** | [If ES=1] Have you trained any of your staff in using ENERGY STAR Portfolio Manager? | 0.33 | | | |
| **85** | [If ES=1] AND [If Goal=1] Have you used the ENERGY STAR results to help in establishing an energy use or savings target? [If needed, the results on ENERGY STAR score] | 0.33 | | | |
| **88** | [If ES=1] Have you reported ENERGY STAR results to building owners decision makers? | 0.33 | Tracking and Reporting | 0.167 | |
| **87** | Have you used ENERGY STAR results to attract a new client? | 0.33 | | | |
| **65** | …[If ES=1] Kept the ENERGY STAR score current by regularly updating the information | 0.33 | | | |
| **66** | …Set a goal or target for energy use or energy use reduction [Note: target can be for multiple buildings considered collectively and does not need to be for an individual building] [Goal=1] | 1.0 | Energy Performance Targets | 0.167 | |
| **108** | …Goal is written (If necessary, "not jut generally understood" | NA (Eliminated due to data issues) | | | |
| **109** | …Goal specifies numeric targets for energy savings or use | | | | |
| **110** | …Goal includes a completion date | | | | |
| **112** | …Goal includes a budget | | | | |
| **113** | …Goal is authorized by senior management | | | | |
| **114** | …Senior management receives updates on progress toward goal | | | | |

Continued

| Question Number | Question | Question Weight | Sub-Metric | Sub-Metric Weight | Final Metric & Weight |
|---|---|---|---|---|---|
| | **Metrics Related to Building Operations, cont.** | | | | |
| **98** | …Plan is written (If necessary, "not jut generally understood" | 0.167 | Energy Efficiency Plan | 0.167 | Building Operations 0.25 |
| **99** | …Plan includes numeric goals for energy savings or use | 0.167 | | | |
| **101** | …Plan includes a timeline | 0.167 | | | |
| **103** | …Plan includes a budget | 0.167 | | | |
| **104** | …Plan is authorized by senior management | 0.167 | | | |
| **105** | …Senior management receives updates on plan achievements | 0.167 | | | |
| **67** | …Conducted a study to identify ways to reduce building energy use [Study=1] AND, if response "less than half" or "about half", then [Study_Potential=1] [Study_Potential=0 for responses "none," "more than half", "and virtually all"] | 0.4 | Energy Efficiency Study | 0.167 | |
| **92** | [If Study_Potential=1] You mentioned you have conducted a study to identify ways to reduce building energy use, but have not done so for all of your buildings. Do you currently have plans to study most of the remaining buildings over the next two years? | 0.25 | | | |
| **93** | [If Study=0] Do you have plan within the next two years to conduct a study to identify opportunities to reduce building energy use? | 0.25 | | | |
| **94** | [If Study=1] Who conducted the study, was it: the utility, staff working for your firm, or contractors (or someone else (specify)) [multiple responses allowed; if multiple responses ask "So more than one building has been studied?" If a single study, probe to get single response to the question] | 0.2 | | | |
| **95** | [If Study=1] Did the study look for operations and maintenance changes that might lower energy costs? | 0.4 | | | |

Continued

| Question Number | Question | Question Weight | Sub-Metric | Sub-Metric Weight | Final Metric & Weight |
|---|---|---|---|---|---|
| | **Metrics Related to Building Operations, cont.** | | | | |
| **69** | …Taken steps to reduce building energy use [Actions=1] | 0.5 | Energy Efficiency Tune-Up | 0.167 | Building Operations 0.25 |
| **71** | [If Actions=1] Have you seen an improvement in the energy performance of any of your buildings? | 0.5 | | | |
| **117** | For any of your buildings, have you made any no or low cost changes in operations or maintenance to reduce energy costs in the last two years? | NA (Eliminated due to data issues) | | | |
| | **Metrics Related to Strategic Leadership** | | | | |
| **161** | Does the senior management of your organization believe a commitment to sustainability or energy efficient facilities will provide the organization with a strategic advantage? | 0.25 | Executive Commitment | 0.33 | Strategic Leadership 0.25 |
| **162** | Please rate the extent to which you agree with the following statement, where "1" signifies strongly disagree and "5" signifies strongly agree: Decreasing a building's typical energy use increases its asset value. | 0.25 | | | |
| **163** | Have energy efficiency and sustainability goals been formally adopted through a mission statement or policy and procedures statements? | 0.25 | | | |
| **179** | Has your firm established a specific individual, team or committee responsible for energy use reduction and/ or sustainability? | 0.25 | | | |
| **166** | Does your firm consider energy efficiency to be part of its brand identity? | 0.33 | Vision | 0.33 | |
| **169** | Do your firm's marketing materials highlight its capabilities or successes with energy efficiency or sustainability? | 0.33 | | | |
| **170** | Does your organization's website contain a section specifically featuring your sustainability or energy efficiency credentials, successes or related awards you have received? | 0.33 | | | |

Continued

| Question Number | Question | Question Weight | Sub-Metric | Sub-Metric Weight | Final Metric & Weight |
|---|---|---|---|---|---|
| | **Metrics Related to Strategic Leadership, cont.** | | | | |
| **172** | Does your firm communicate with any of the following groups about energy efficiency and sustainability for the property? …Tenants? | 0.25 | Intention | 0.33 | Strategic Leadership 0.25 |
| **173** | …Property management teams? | 0.25 | | | |
| **174** | …Owners? | 0.25 | | | |
| **175** | …Service providers? | 0.25 | | | |
| | **Metrics Related to Mobilizing the Organization** | | | | |
| **196** | Does your firm consider demonstrated competence in energy efficiency as a factor in promotion decisions? | 0.33 | Communicating Expectations | 0.34 | Mobilizing the Organization 0.25 |
| **197** | Is energy efficiency included in job descriptions of managerial staff positions? | 0.33 | | | |
| **198** | Does your firm recognize its energy efficiency or sustainability achievements in staff meetings and credit key individuals and teams? | 0.33 | | | |
| **186** | Have you trained any of your building engineers and operators in how to conduct studies to identify energy savings opportunities? [NA response category for don't employ staff appropriate for this] | 0.167 | Training | 0.66 | |
| **188** | Have you or other staff participated in any seminars or training related to any aspect of energy efficiency in office real estate? | 0.167 | | | |
| **190** | [If Y] What organizations sponsored the presentation or training? (open-ended with pre-codes, check all that apply, continue to probe with "Anything else?":) BOMA, ULI (Urban Land Institute), IFMA, AIA, Cascadia Green Building Council, CEM, Other (specify) | 0.167 | | | |
| **193** | Does your firm allocate staff time for improving capability in energy efficiency? | 0.167 | | | |
| **194** | Is energy efficiency included in your professional development planning for any staff? | 0.167 | | | |
| **195** | Would you say that over the last year staff have received more training in energy efficiency than in previous years? | 0.167 | | | |

Continued

| Question Number | Question | Question Weight | Sub-Metric | Sub-Metric Weight | Final Metric & Weight |
|---|---|---|---|---|---|
| | **Metrics Related to Contracts with Clients and Suppliers** | | | | |
| **187** | Have you identified contractors with demonstrated capability to conduct studies to identify energy savings opportunities? | 0.33 | Contracts with Clients and Suppliers | 1.0 | Contracts with Clients and Suppliers 0.25 |
| **157** | Do any of your contracts with equipment service providers include energy efficiency requirements? | 0.33 | | | |
| **158** | Has your firm adopted language specific to energy efficiency in your leasing and property management contracts? [EE_CONTRACT=1] | 0.33 | | | |

**Table A.8: Hospitals and Healthcare Market Metrics**

| Question Number | Question | Question Weight | Sub-Metric | Sub-Metric Weight | Final Metric & Weight |
|---|---|---|---|---|---|
| | **Metrics Related to Building Operations** | | | | |
| **57** | …Calculated the energy use per square foot (EUI=1) (if necessary: also known as energy intensity, energy utilization index, or EUI) | 0.125 | Benchmarking | 0.167 | Building Operations 0.18 |
| **64** | …Obtained an ENERGY STAR score (ES=1) | 0.125 | | | |
| **76** | [If ES=0 AND EUI=1] You indicated you've calculated the energy use per square foot. What tool did you use, if any? (open-ended. Pre-codes: ENERGY STAR Portfolio Manager, Energy Expert, Utility Manager Pro, Avista IQ, Microsoft Excel, Other (specify) | NA (Eliminated due to data issues) | | | |
| **80** | …Comparing across buildings you are responsible for? | 0.125 | | | |
| **81** | …Comparing across buildings in the region? | 0.125 | | | |
| **82** | …Comparing performance of the same building over time? | 0.125 | | | |
| **83** | …[If Goal=1] Comparing building performance to energy use goals? | 0.125 | | | |
| **89** | [If ES=1] Have you trained any of your staff in using ENERGY STAR Portfolio Manager? | 0.125 | | | |
| **85** | …[If Goal=1] Used results to help in establishing an energy use or savings target? | 0.125 | | | |
| **88** | …Reported results to building owners decision makers | 0.5 | Tracking and Reporting | 0.167 | |
| **63** | …[If EUI=1] Kept the estimate of energy use per square foot current by regularly updating the information | 0.25 | | | |
| **65** | …[If ES=1] Kept the ENERGY STAR score current by regularly updating the information | 0.25 | | | |

Continued

| Question Number | Question | Question Weight | Sub-Metric | Sub-Metric Weight | Final Metric & Weight |
|---|---|---|---|---|---|
| | **Metrics Related to Building Operations, cont.** | | | | |
| **66** | …Set a goal or target for energy use or energy use reduction [Note: target can be for multiple buildings considered collectively and does not need to be for an individual building] [Goal=1] | 1.0 | Energy Performance Targets | 0.167 | Building Operations 0.18 |
| **108** | …Goal is written (If necessary, "not jut generally understood" | NA (Eliminated due to data issues) | | | |
| **109** | …Goal specifies numeric targets for energy savings or use | | | | |
| **110** | …Goal includes a completion date | | | | |
| **111** | …Goal identifies the responsible parties | | | | |
| **112** | …Goal includes a budget | | | | |
| **113** | …Goal is authorized by senior management | | | | |
| **114** | …Senior management receives updates on progress toward goal | | | | |
| **98** | …Plan is written (If necessary, "not jut generally understood" | 0.125 | Energy Efficiency Plan | 0.167 | |
| **99** | …Plan includes numeric goals for energy savings or use | 0.125 | | | |
| **100** | …Plan includes specific action items | 0.125 | | | |
| **101** | …Plan includes a timeline | 0.125 | | | |
| **102** | …Plan identifies the responsible parties | 0.125 | | | |
| **103** | …Plan includes a budget | 0.125 | | | |
| **104** | …Plan is authorized by senior management | 0.125 | | | |
| **105** | …Senior management receives updates on plan achievements | 0.125 | | | |
| **67** | …Conducted a study to identify ways to reduce building energy use [Study=1] AND, if response "less than half" or "about half", then [Study_Potential=1] [Study_Potential=0 for responses "none," "more than half", "and virtually all"] | 0.4 | Energy Efficiency Study | 0.167 | |

Continued

| Question Number | Question | Question Weight | Sub-Metric | Sub-Metric Weight | Final Metric & Weight |
|---|---|---|---|---|---|
| | **Metrics Related to Building Operations, cont.** | | | | |
| **92** | [If Study_Potential=1] You mentioned you have conducted a study to identify ways to reduce building energy use, but have not done so for all of your buildings. Do you currently have plans to study most of the remaining buildings over the next two years? | 0.25 | Energy Efficiency Study, cont. | 0.167 | Building Operations 0.18 |
| **93** | [If Study=0] Do you have plan within the next two years to conduct a study to identify opportunities to reduce building energy use? | 0.25 | | | |
| **94** | [If Study=1] Who conducted the study, was it: the utility, staff working for your firm, or contractors (or someone else (specify)) [multiple responses allowed; if multiple responses ask "So more than one building has been studied?" If a single study, probe to get single response to the question] | 0.2 | | | |
| **95** | [If Study=1] Did the study look for operations and maintenance changes that might lower energy costs? | 0.4 | | | |
| **69** | …Taken steps to reduce building energy use [Actions=1] | 0.1425 | Energy Efficiency Tune Up | 0.167 | |
| **71** | [If Actions=1] Have you seen an improvement in the energy performance of any of your buildings? | 0.1425 | | | |
| **117** | For any of your buildings, have you made any no or low cost changes in operations or maintenance to reduce energy costs in the last three years? | 0.1425 | | | |
| **119** | …Improved the scheduling of equipment, such as lighting and HVAC? | 0.1425 | | | |
| **120** | …Corrected situations of simultaneous heating and cooling? | 0.1425 | | | |
| **121** | ...Adjusted the outside air usage or economizer functioning? | 0.1425 | | | |
| **122** | ...Recalibrated sensors in the last two years? | 0.1425 | | | |

Continued

| Question Number | Question | Question Weight | Sub-Metric | Sub-Metric Weight | Final Metric & Weight |
|---|---|---|---|---|---|
| | **Life Cycle Cost Analysis Financial Analysis** | | | | |
| **73** | Are you familiar with life-cycle cost analysis, also called total cost of ownership analysis? [LCCA=1] | 0.5 | Life Cycle Cost Analysis Financial Analysis | 1.0 | Life Cycle Cost Analysis Financial Analysis .005 |
| **74** | [IF LCCA=1] Which statement best describes your organization's investment decision-making with respect to life-cycle cost analysis. Would you say you: __Have not used nor plan to use life-cycle cost analysis, __Have plans to use life-cycle cost analysis for some investments, __Have made investments based on lowest life-cycle cost | 0.5 | | | |
| | **Capital Improvements** | | | | |
| **116** | For any of your buildings, have you replaced existing equipment with high-efficiency equipment in the last three years? | 1.0 | Capital Improvements | 1.0 | Capital Improvements .005 |
| | **Metrics Related to Design Practices** | | | | |
| **126** | [Ask All] How familiar are you with the architectural design process called Integrated Design? Would you say… __Not at all, __Somewhat, or __Very | 0.33 | ID Awareness | 0.25 | Design Practices 0.18 |
| **127** | [If ID=somewhat or very] Has your organization used integrated design for any of its new construction, addition or renovation design projects in the last three years? | 0.66 | | | |
| **139** | [IF NC_INV=1] Other than for code compliance, did you use energy modeling to determine the design? | 1.0 | ID Modeling | 0.25 | |
| **144** | [IF NC_INV=1] Was a design charette held where the architect meets with the owner, building operator, and consulting engineers? | 1.0 | ID Activities | 0.25 | |
| **148** | [IF NC_INV=1] Was any major system--such as the chiller, boiler, ventilation, or lighting system--designed to use less significantly less energy than in comparable facilities or required by code? | 1.0 | ID Features | 0.25 | |

Continued

| Question Number | Question | Question Weight | Sub-Metric | Sub-Metric Weight | Final Metric & Weight |
|---|---|---|---|---|---|
| | **Metrics Related to Strategic Leadership** | | | | |
| **161** | Does the senior management of your organization believe a commitment to sustainability or energy efficient facilities will provide the organization with a strategic advantage? | 0.33 | Executive Commitment | 0.5 | Strategic Leadership 0.18 |
| **163** | Have energy efficiency and sustainability goals been formally adopted through a mission statement or policy and procedures statements? | 0.33 | | | |
| **179** | Has your firm established a specific individual, team or committee responsible for energy use reduction and/ or sustainability? | 0.33 | | | |
| **166** | Does your organization consider sustainability or energy efficiency to be part of its market identity? | 1.0 | Vision | 0.5 | |
| | **Metrics Related to Mobilizing the Organization** | | | | |
| **196** | Does your organization consider demonstrated competence in energy efficiency as a factor in promotion decisions? | 0.33 | Communicating Expectations | 0.34 | Mobilizing the Organization 0.18 |
| **197** | Is energy efficiency included in job descriptions of operational staff positions? | 0.33 | | | |
| **198** | Does your organization recognize its energy efficiency or sustainability achievements in staff meetings and credit key individuals and teams? | 0.33 | | | |
| **186** | Have you trained any of your building engineers and operators in how to conduct studies to identify energy savings opportunities? [NA response category for don't employ staff appropriate for this] | 0.125 | Training | 0.66 | |
| **188** | Have you or any of the O&M staff participated in any seminars or training related to energy efficiency? | 0.125 | | | |
| **189** | [If Y training] About what proportion of the O&M staff have received training related to energy efficiency? Would you say Less than Half, More than Half, Virtually All | 0.125 | | | |

Continued

| Question Number | Question | Question Weight | Sub-Metric | Sub-Metric Weight | Final Metric & Weight |
|---|---|---|---|---|---|
| **Metrics Related to Mobilizing the Organization, cont.** | | | | | |
| **190** | [If Y] What organizations sponsored the presentation or training? (open-ended with pre-codes, check all that apply, continue to probe with "Anything else?":) BOC, CEM, IFMA, AIA, Cascadia Green Building Council, OSHE, WASHE, society of healthcare engineers, conferences, PGE, utility, Seattle IDL (Integrated Design Lab), Practice Greenhouse, University of Washington, community colleges, other (specify) | 0.125 | Training, cont. | 0.66 | Mobilizing the Organization 0.18 |
| **191** | [If Y training] Have you or any of your staff received certifications relating to energy efficiency? | 0.125 | | | |
| **193** | Does your organization allocate time for your operations staff to improve capability in energy efficiency? | 0.125 | | | |
| **194** | Is energy efficiency included in your professional development planning for any staff? | 0.125 | | | |
| **195** | Would you say that over the last two years operations staff have received more training in energy efficiency than in previous years? | 0.125 | | | |
| **Metrics Related to Contracts with Suppliers** | | | | | |
| **187** | Have you identified contractors with demonstrated capability to conduct studies to identify energy savings opportunities? | 0.25 | Contracts with Suppliers | 1.0 | Contracts with Suppliers 0.18 |
| **157** | Do any of your contracts with equipment service providers include energy efficiency requirements? | 0.25 | | | |
| **158** | Has your organization included energy efficiency requirements in any of its specs for equipment purchases? [EE_SPECS=1] | 0.25 | | | |
| **155** | [If ID=somewhat or very] Does your organization plan to request for future new construction projects that your A&E team be experienced in or willing to learn Integrated design? | 0.25 | | | |

**Table A.9: Building Operations Market Metrics**

| Question Number | Question | Question Weight | Sub-Metric | Sub-Metric Weight | Final Metric & Weight |
|---|---|---|---|---|---|
| | **Metrics Related to Building Operations** | | | | |
| **57** | …Calculated the energy use per square foot (EUI=1) (if necessary: also known as energy intensity, energy utilization index, or EUI) | 0.14 | Benchmarking | 0.167 | Building Operations 0.5 |
| **64** | …Obtained an ENERGY STAR score (ES=1) | 0.14 | | | |
| **80** | …Comparing across buildings you are responsible for? | 0.14 | | | |
| **81** | …Comparing across buildings in the region? | 0.14 | | | |
| **82** | …Comparing performance of the same building over time? | 0.14 | | | |
| **83** | …[If Goal=1] Comparing building performance to energy use goals? | 0.14 | | | |
| **85** | …[If Goal=1] Used results to help in establishing an energy use or savings target? | 0.14 | | | |
| **88** | …Reported results to building owners decision makers | 0.25 | Tracking and Reporting | 0.167 | |
| **87** | …Used results to attract a new client | 0.25 | | | |
| **63** | …[If EUI=1] Kept the estimate of energy use per square foot current by regularly updating the information | 0.25 | | | |
| **65** | …[If ES=1] Kept the ENERGY STAR score current by regularly updating the information | 0.25 | | | |
| **66** | …Set a goal or target for energy use or energy use reduction [Note: target can be for multiple buildings considered collectively and does not need to be for an individual building] [Goal=1] | 1.0 | Energy Performance Targets | 0.167 | |
| **68** | …Created a proposal for services to address energy savings opportunities [Plan=1] | 1.0 | Energy Efficiency Plan | 0.167 | |
| **67** | …Conducted a study focused on energy saving opportunities [Study=1] | 1.0 | Energy Efficiency Study | 0.167 | |

Continued

| Question Number | Question | Question Weight | Sub-Metric | Sub-Metric Weight | Final Metric & Weight |
|---|---|---|---|---|---|
| | **Metrics Related to Building Operations, cont.** | | | | |
| **69** | …Taken steps to reduce building energy use [Actions=1] | 0.1425 | Energy Efficiency Tune-up | 0.167 | Building Operations 0.5 |
| **71** | [If Actions=1] Have you seen an improvement in the energy performance of any of your customers? | 0.1425 | | | |
| **117** | For any of your customers, have you made any no or low cost changes in operations or maintenance to reduce energy costs in the last two years? | 0.1425 | | | |
| **119** | …Improved the scheduling of equipment, such as lighting and HVAC? | 0.1425 | | | |
| **120** | …Corrected situations of simultaneous heating and cooling? | 0.1425 | | | |
| **121** | ...Adjusted the outside air usage or economizer functioning? | 0.1425 | | | |
| **122** | ...Recalibrated sensors in the last two years? | 0.1425 | | | |
| | **Metrics Related to Capital Improvements** | | | | |
| **116** | For any of your customers, have you replaced existing equipment with high-efficiency equipment in the last two years? | 1.0 | Capital Improvements | 1.0 | Capital Improvements 0.05 |
| | **Metrics Related to Strategic Leadership** | | | | |
| **161** | Does the senior management of your firm believe that energy efficiency services are a viable product? | 0.5 | Executive Commitment | 0.5 | Strategic Leadership 0.15 |
| **179** | Does your firm have an energy efficiency or sustainability services group? | 0.5 | | | |
| **168** | Do your firm's marketing materials describe the advantages of energy efficient or high performance buildings? | 0.33 | Vision | 0.5 | |
| **169** | Do your firm's marketing materials highlight its capabilities or successes with energy efficiency or sustainability? | 0.33 | | | |
| **170** | Does your organization's website contain a section specifically featuring your sustainability or energy efficiency credentials, successes or related awards you have received? | 0.33 | | | |

Continued

| Question Number | Question | Question Weight | Sub-Metric | Sub-Metric Weight | Final Metric & Weight |
|---|---|---|---|---|---|
| | **Metrics Related to Mobilizing the Organization** | | | | |
| **196** | Does your organization consider demonstrated competence in energy efficiency as a factor in promotion decisions? | 0.33 | Communicating Expectations | 0.34 | Mobilizing the Organization 0.15 |
| **197** | Is energy efficiency included in job descriptions of operational staff positions? | 0.33 | | | |
| **198** | Does your organization recognize its energy efficiency or sustainability achievements in staff meetings and credit key individuals and teams? | 0.33 | | | |
| **186** | Have you trained any of your technicians or engineers in how to conduct studies to identify energy savings opportunities? [NA response category for don't employ staff appropriate for this] | 0.11 | Training | 0.66 | |
| **188** | Have you or any of the sales and operations staff participated in any seminars or training related to energy efficiency? | 0.11 | | | |
| **189** | [If Y training] About what proportion of the sales and operations staff have received training related to energy efficiency? Would you say Less than Half, More than Half, Virtually All | 0.11 | | | |
| **190** | [If Y] What organizations sponsored the presentation or training? (open-ended with pre-codes, check all that apply, continue to probe with "Anything else?":) BOC, CEM, IFMA, AIA, Cascadia Green Building Council, OSHE, WASHE, society of healthcare engineers, conferences, PGE, utility, Seattle IDL (Integrated Design Lab), Practice Greenhouse, University of Washington, community colleges, other (specify) | 0.11 | | | |
| **191** | [If Y training] Have you or any of the staff received certifications relating to energy efficiency? | 0.11 | | | |
| **192** | [If Y] What certifications? Pre-codes: BOC, CEM, Other (specify) | 0.11 | | | |

Continued

| Question Number | Question | Question Weight | Sub-Metric | Sub-Metric Weight | Final Metric & Weight |
|---|---|---|---|---|---|
| | **Metrics Related to Mobilizing the Organization, cont.** | | | | |
| **193** | Does you firm allocate time for your sales and operations staff for training in energy efficiency? | 0.11 | Training, cont. | 0.66 | Mobilizing the Organization 0.15 |
| **194** | Is energy efficiency included in your professional development planning for any staff? | 0.11 | | | |
| **195** | Would you say that over the last year staff have received more training in energy efficiency than in previous years? | 0.11 | | | |
| | **Metrics Related to Contracts with Clients** | | | | |
| **158** | Has your firm adopted any contract language specific to energy efficiency? [EE_CONTRACT=1] | 0.167 | Contracts with Clients | 1.0 | Contracts with Clients 0.15 |
| **46** | Do you have written service protocols for energy efficiency service offerings to include in contracts? | 0.167 | | | |
| **48** | ...tracking building energy costs? | 0.167 | | | |
| **49** | ...calculating the energy use per square foot or ENERGY STAR score? | 0.167 | | | |
| **50** | …conducting a study focused on energy savings opportunities? | 0.167 | | | |
| **54** | [IF EE_PKG=1] Do you have sales targets for these products? | 0.167 | | | |

# B ADDITIONAL RESEARCH FINDINGS

This appendix provides additional research findings. The following sections describe program activities, present additional findings from the professional association interviews, and provide program recommendations offered by BetterBricks participants.

## PROGRAM ACTIVITIES

### D&C Market Activities

D&C seeks to achieve significant and persistent energy efficiency in new commercial buildings – especially offices and healthcare – through influencing design practice among architectural firms. This effort involves business planning assistance, in-depth project-based education (also known as technical assistance), research and development on design strategies and tools, and professional staff development with a few targeted early adopter firms. The effort advocates using a core set of best practices as a means of delivering high performance buildings that meet the *2030 Challenge* targets for energy and carbon reduction.

The best practices include:

- Use of integrated design (ID) – defined as the synthesis across climate, use, loads, and systems resulting in buildings that are far more energy-efficient than current best practices – and a team approach to address energy use
- Setting project energy performance targets significantly better than code
- Use of enabling design tools and approaches to achieve synergies between climate, use, loads, and systems
- Commissioning the building, systems, and equipment
- Help structure a hand-off to operators, educate occupants, and monitor start-up
- Enable and support post-occupancy evaluations

A regional network of Integrated Design Labs (IDLs or labs) operated by Schools of Architecture at five universities in the four states provide the technical assistance. The labs help designers learn how to deliver building projects that perform at the highest levels of energy efficiency and interior quality, with little or no additional capital cost through integrated design team problem-solving.

For business assistance, D&C deploys a national consulting firm specializing in architecture and engineering business and strategic planning as a Business Advisor to work with senior members

of each Firm Focus firm to make ID and energy efficiency an integral part of their business strategy.

The D&C professional organizations enjoy wide recognition and credibility among design professionals. Examples include the local and regional chapters of the American Institute of Architects; Cascadia – a regional organization that both serves as the local chapter of the United States Green Building Council (USGBC) and pursues other endeavors; state chapters of the American Society for Heating, Refrigeration and Air Conditioning (ASHRAE), the New Buildings Institute, and several others.

## ORE Market Activities

ORE, launched in March 2006, "advocates for changes to energy-related business practices" among real estate firms that own and manage office buildings in the Pacific Northwest. The target market consists of managed commercial real estate and does not include owner-occupied buildings. ORE began working with three real estate firms in June 2008.

An important early accomplishment of ORE, reported in the first Market Progress Evaluation Report,[8] was establishing a strategic alliance with the Building Owners and Managers Association (BOMA). Through shared sponsorship of BOMA education and training and other events, ORE established recognition and credibility and raised awareness in its target audience. ORE has continued to build on its relationship with BOMA while also developing relationships with other organizations, such as the Urban Land Institute (ULI) and the Cascadia Chapter of the U.S. Green Building Council.

In 2007, BOMA and ORE partnered to deliver the *BOMA Energy Efficiency Program* (BEEP) in Seattle, Portland, and Boise. Over 600 people attended these BEEP events. BOMA offered BEEP in Spokane in 2008. BOMA continues to offer the *Best of BEEP* – a condensed version of the six-session BEEP series, with attention on smaller markets like Tacoma, the Tri-Cities, and Eugene.

ORE served as the primary catalyst, as well as a sponsor, of the BOMA Portland *Energy Office Showdown* and the BOMA Seattle/King County *Kilowatt Crackdown*. These friendly competitions use ENERGY STAR® Portfolio Manager to benchmark participating office buildings. They also provide free assistance to obtain ENERGY STAR® certification, scoping to identify energy efficiency opportunities, and workshops and assistance on energy benchmarking. Through the competitions, building managers benchmarked sizeable portions of the office real estate in Portland and Seattle/King County, spreading benchmarking capability in the office real estate market. In the third annual Portland *Energy Office Showdown* in 2009, 32 properties representing over 11 million square feet participated. In the first *Kilowatt Crackdown*, 53

[8] *Office Real Estate Initiative Market Progress Evaluation Report #1*, Northwest Energy Efficiency Alliance, January 25, 2008.

buildings – representing over 18 million square feet (approximately 20% of the Puget Sound office inventory) – completed the contest and over 100 buildings are signed up for the 2nd *Kilowatt Crackdown*. BOMA chapters in other parts of the country have copied these events.

In 2007, ORE worked with its contractors to develop the *High Performance Portfolio Framework* (HPPF), a "how-to guide for real estate professionals . . . to create – and maintain – energy excellence" in their office portfolios. The HPPF outlines the process to achieve a high performance office building portfolio by following five steps: *Assess, Commit, Plan, Implement, and Capitalize.* A series of 27 supporting briefs and templates complement the HPPF. These tools and resources, available on the BetterBricks website, support education, outreach, and direct work with real estate firms.

In recent years, ORE has been focusing on leveraging the transactional nature of the real estate business. Some of the topics addressed include:

- **Green Leases:** ORE has offered education events in partnership with BOMA and *Lunch and Learn* sessions at real estate firms attended by more than 250 real estate professionals. ORE has assisted several real estate firms to modify their leases to support enhanced energy management. NEEA has used its recent experience finding new office space to develop case study articles on their selection process and green lease agreement.

- **Property Management Agreements**: ORE has worked with some real estate firms to incorporate energy management requirements into property management agreements.

- **Tenant Improvements**: ORE recently released the *Sustainable Tenant Improvement Manual*, developed in partnership with a leading real estate asset management company. Research is underway to understand better the tenant improvement process. This research will support the future development of tools and resources.

- **Building Valuation and Financing**: ORE is a founding member of the Green Building Finance Consortium. The Executive Director of the Consortium, Scott Muldavin, recently published *Value Based Cost Savings, How to Underwrite Sustainable Properties* with support from ORE. This is part of ORE's efforts to link the role energy efficiency plays in the value of commercial buildings. In partnership with Cushman Wakefield, ORE recently released the *Green Building Opportunity Index*. The Index highlights the ingredients necessary for a healthy green building market. ORE has also offered seminars on green financing.

ORE also tries to be opportunistic by taking advantage of and supporting market activities that are consistent with its goals. An example is the 2030 District in Seattle. The district includes six major downtown property managers and owners, and, with involvement from utilities, the city, and other organizations, is developing energy and greenhouse reduction goals and strategies to meet those goals. ORE plays a supportive role by being a catalyst for new ideas, helping to make connections between people and organizations, and potentially assisting with carrying out the strategies to meet the 2030 District goals.

ORE is currently working with eight real estate firms in the Seattle-area, Portland, and Boise. Six of these firms are receiving a comprehensive level of service, while two others are receiving more limited and focused services (this evaluation categorizes these firms as *Light Touch*). ORE staff design services tailored to the needs and interests of each firm. This is not a one-size-fits-all approach. Work to assist one of the original real estate firms is currently on hold, partly because of "transitions" at the firm, but two other firms have made enough progress that they will be ending their relationship with ORE soon.

The ORE manager developed a report card to gauge the progress of a real estate firm in achieving a high performance portfolio. There are four stages: *engaged*, *committed*, *advancing*, and *sustaining*. ORE staff has completed report cards for six of the real estate firms (through the 2nd quarter 2010). According to staff, one of the firms has reached sustaining status, while most of the others are advancing (Table B.1).

**Table B.1: Real Estate Firm Report Card Beginning and Current Stage Progression**

| Firm | Starting Date | Starting Stage | Current Stage |
|---|---|---|---|
| **Firm 1** | 6-08 | Engaged | Sustaining |
| **Firm 2** | 6-08 | Committed | Advancing |
| **Firm 3** | 10-08 | Engaged | Committed |
| **Firm 4** | 6-09 | Committed | Advancing |
| **Firm 5** | 6-09 | Engaged | Advancing |
| **Firm 6** | 1-10 | Committed/ Advancing | Advancing/ Sustaining |

## H&H Market Activities

H&H targets hospital and hospital systems that have their headquarters in the four-state region served by NEEA. H&H seeks to transform the regional healthcare market so healthcare organizations design and operate their hospitals and associated facilities according to best energy efficiency practices. H&H starts this transformation at an individual hospital or hospital system by encouraging these organizations to adopt Strategic Energy Management Plans (SEMPs). SEMPs provide the blueprints for the organizations to create lasting changes in business practices and lead to reduced energy consumption in all buildings.

Market Specialists work with targeted hospitals to develop and implement SEMPs. The main categories of business practice changes contained in a SEMP are: 1) design and construction, operations and maintenance; 2) financial practices and purchasing; 3) capital upgrades; and 4) monitoring and tracking. Typical early steps include the identification of efficiency opportunities for facility operations and upgrades, estimation of the resources required and of the return on investment, and creation of an action plan to address the opportunities over several years. Once a

hospital has developed a SEMP and an executive has signed it, the Market Specialists assist in plan implementation.

H&H has developed and assembled tools and materials to support the Market Specialists and the hospitals engaged in developing and implementing SEMPs. The BetterBricks website provides links to these tools and resources, which are organized under: *Assessment*; *Planning; Financial; Purchasing; Operations & Maintenance; Design & Construction; Staff and Public Awareness; Tracking & Recognition.* In addition, the website provides links to relevant regional and national case studies, and links to additional references and hospital resources. Two notable hospital guides produced by BetterBricks are the *Guide to the Design & Construction of High Performance Hospitals,* and the *Guide to Optimizing Hospital Facility Investments*.

Training and education workshop titles included, among others: *Financial Decision-Making Tools for Hospitals*, *High Performance Hospitals and Medical Research Facilities, Lighting for Healthcare Facilities,* and *Understanding the Value of Commissioning*. BetterBricks co-sponsored a national conference held in Colorado entitled *Successful Strategies for Achieving Green Hospitals* and promoted hospital-sector-specific conferences and education conducted by the American Society of Heating, Refrigeration and Air-conditioning Engineers (ASHRAE) and by the Washington and Oregon chapters of the American Institute of Architects (AIA).

H&H promotes the use of *total-cost-of-ownership* or, equivalently, lifecycle cost analysis (LCCA) by hospitals considering capital investments, including new equipment, equipment replacements, and new construction. Such an analysis gives value to the long-term savings of energy efficiency and makes it possible to use a single financial criterion to assess diverse investment decisions.

## BOPS Market Activities

BOPS focuses on improving regional building performance by facilitating market adoption of improved operations and maintenance (O&M) strategies by market actors on both the demand and supply sides of the market.

On the supply side, BOPS helps to build local teams to provide O&M services. BOPS provides technical training and business development support to select mechanical and controls service providers. This effort, known as *Firm Focus*, builds skills to deliver new building tune-up and retro-commissioning services, and helps firms enhance their basic service agreements to include energy-efficiency benchmarking, monitoring, and on-going service. Technical Advisors provide how-to training, and Business Advisors teach firms how to market, sell, and write effective proposals for their energy efficiency services.

On the demand side, BOPS stimulates demand for building operations and maintenance services in the Pacific Northwest, primarily by identifying energy savings opportunities among targeted ORE and H&H organizations. BOPS has also assisted end-users by developing O&M RFPs.

NEEA's market research showed a need to define and differentiate building-performance services in order to enhance market value for those services. To that end, NEEA articulated customer screening (customer qualification) and scoping (project identification) services that in turn can lead to further energy efficiency services. These additional services include:

- Enhanced O&M practices
- Energy tune-up
- Commissioning / retro-commissioning
- Equipment replacement

Through Firm Focus, NEEA collaborates with building service providers in the Northwest, providing business-planning and technical assistance, to help those service providers offer building performance services in a way that will provide greater value to their customers, increase their revenues and profits, and give them a competitive advantage in the marketplace. BOPS works with eight Firm Focus contractors in Washington, Oregon, and Idaho. Some are large, full-service mechanical and controls contractors whose customers include large high-rises with complex systems; some are smaller firms that tend to service smaller buildings with unitary equipment.

BOPS has also assembled a set of tools to enhance O&M diagnostic, assessment, benchmarking, and monitoring services. BetterBricks introduces, provides training about, and supports the purchase of these tools. The *betterbricks.com* website offers the tools developed by BetterBricks and links to proprietary tools, as well as technical information and additional resources, including video training.

The BOPS tool box includes building and system best practices and performance indicators for tracking utility bills, for benchmarking, and for trend logging. The tool box also includes the Field Diagnostic Services Inc. (FDSI) *HVAC Service Assistant* tool, a hand-held diagnostic tool for rooftop AC units. Another tool, *Air Advice*, provides system efficiency information as part of an air quality assessment. Technical Advisors work with targeted office real estate firms and hospitals using a BOPS-developed assessment tool that includes in-depth interviews with building managers. The initial building performance services, screening and scoping reports, walkthroughs, and resulting proposals, are also important tools, particularly for Hospital projects. For ongoing monitoring, BOPS encourages facility managers to acquire tools to support a dashboard of system performance, such as *Energy Expert*, a proprietary tool developed by NorthWrite.

As of 2008, BOPS and its partnering professional associations had over 70 trained technicians who can use the FDSI tool, and who have pursued approximately 24 retro-commissioning and building tune-up projects with Technical Advisors. Technical Advisors have also supported about 30 projects in the Hospitals and Office Real Estate markets. Due to BetterBricks' support for the purchase of a FDSI tool and training local trainers, the BOPS market manager estimates

that hundreds of union members in the Portland area have been exposed to energy-efficiency field-diagnostic equipment.

The following list identifies BetterBricks-sponsored events appropriate to the BOPS target market.

- Annual IFMA Seattle Education Symposium, Lynnwood
- Idaho ASHRAE Conference
- Northwest Facilities Expo, Portland
- MSHE/ASHRAE 2009 Spring Conference, May, Butte, MT
- 2009 Joint Engineering Conference, at OSU Corvallis
- National Conference on Building Commissioning, Seattle
- Powerful Business Conference, Bellevue, WA
- International Building Operators Association Annual Conference and Trade Show, Idaho Falls
- Monitoring Load Shape for Energy Savings, PGE
- Chilled Water Systems, PGE
- Oregon Society for Healthcare Engineering Fall 2009 Conference, Salishan
- CSI Mt. Rainier Chapter Continuing Education Conference, Lynnwood
- Best of BOMA's Energy Efficiency Program (BEEP), Washington
- FDSI HVAC Service Assistant Tool training
- Benchmarking trainings
- AEE Westcoast Energy Management Conference

The BetterBricks business advisor conducted workshops with:

- Oppenheimer Boise
- Wright-Runstad Bellevue
- McKinstry Energy Services Group Seattle
- MckInstry Service Maintenance Group Seattle
- MacDonald-Miller Sales Portland
- Merit Mechanical Sales – Redmond

The BetterBricks business advisor also conducted the following webinars and trainings:

- Idaho Office of Energy Renewables – Schools Tune-up Program

- 10-12 Engineering Companies September 15th & 17th 2009 total of 45+ engineers
- 26 Mechanical Service Contracting companies April 13th & 15th 2010 total of 107 people. Also included detailed training on Service Assistant tool from FDSI.

- BOC Webinars
  - Common Opportunities
  - Finding Outside Air and Equipment Scheduling Opportunities

## ADDITIONAL FINDINGS FROM PROFESSIONAL ASSOCIATION INTERVIEWS

### D&C Professional Associations

While all the professional association contacts said their organizations take pains to emphasize BetterBricks sponsorship through, for example, use of the BetterBricks logo and verbal acknowledgement in presentations and written materials, they believe most participants do not fully understand the role played by BetterBricks.

Even individuals at the professional organizations may not be fully aware of the extent of BetterBricks assistance. One respondent cited a course that was developed and delivered with BetterBricks support; the organizers received such an enthusiastic response to the course that they plan a roll-out for other parts of the region and even the rest of the country. But it was only when planning the roll-out in other regions that the organization realized how much "hidden" support BetterBricks had provided – for example, in curriculum development and helping to pay for presenters.

Respondents describe BetterBricks as an unseen or behind-the-scenes force helping the professional association to advance its own agenda, as well as that of BetterBricks. In part because of this low-key approach, one respondent said that the organization is not always sure whether it is meeting BetterBricks' expectations.

The professional association contacts themselves adequately articulated BetterBricks' basic goals and priorities, as well as the key messages. Again, however, respondents did not think many of their members were fully aware of BetterBricks' mission. Several contacts said they do not believe their membership has a clear understanding of BetterBricks' fundamental goals . One respondent noted, "market transformation is a difficult concept to explain to design professionals." One suggested that NEEA develop a brief one-to-two minute video message summarizing the goals and role of BetterBricks in supporting its partnering associations, which the partners could present at the start of a training session or seminar.

Changes offered by professional association contacts for NEEA to consider include:

➡ Improve communication about the full range of monetary and other support provided both directly and indirectly by Better Bricks to further individual education and training.

- More clearly set out NEEA's expectations from the partnering associations regarding, for example, training content or numbers of workshop participants.
- Provide professional associations with the tools to succinctly explain to their members the role of BetterBricks and why it is supporting a specific initiative (that is, how the goals of BetterBricks align with those of the partner organization).

## ORE Professional Associations

Some of the contacts we interviewed for this evaluation we also interviewed for prior MPERs, so we can track the development of these professional association relationships. The input from associations about ORE has been quite positive and their enthusiasm has increased in the series of interviews we have conducted. ORE's relationships with long-time partnering associations like BOMA have matured and a level of comfort and trust has developed.

While the professional associations believe ORE has effectively reached large building owners and managers of class A office buildings in the urban markets, they believe there are significant opportunities to reach other groups. This includes owners and managers with smaller portfolios of class B and C office buildings in the suburbs and in smaller markets. This less sophisticated group of owners is harder to reach, is less motivated, has resource constraints, and is less likely to belong to or participate in BOMA chapters.

## H&H Professional Associations

The contacts described challenges to transforming the healthcare market with energy efficiency efforts. For example, their members' primary concerns are patient care and satisfaction, followed by regulatory compliance, which easily trumps energy efficiency. The contacts also mentioned reduced capital budgets and the low cost of electricity as additional barriers to energy-efficiency for this market. Contacts attributed to these barriers what they view as the slow and modest adoption of BetterBricks.

At the same time, the frequent and ongoing changes in legislation and technology give the healthcare market a dynamism that creates opportunities for intervention. Examples include facility upgrades required by American Disabilities Act compliance, asbestos mitigation, and earthquake structural compliance. One contact noted it is often easier to build new facilities than to bring existing facilities into compliance, suggesting a focus on new construction would be fruitful.

The professional associations' members have a positive view of BetterBricks, see it as a credible source of information, and believe its message is the right one for this market. However, contacts believe their members are becoming sated with energy efficiency messages that are of limited value to them because of their employers' healthcare and regulatory-compliance priorities. Contacts' suggestions for addressing this challenge included linking energy efficiency messages to other primary concerns such as staff and patient well-being, and the "environment of care."

The contacts conveyed a sense of vagueness about their understanding of BetterBricks' role in the region, especially due to the commercial sector initiative redesign occurring this year (2010).

### BOPS Professional Associations

(We have no additional detail for BOPS professional association findings.)

## PARTICIPANT SUGGESTIONS FOR NEEA'S COMMERCIAL SECTOR ACTIVITIES

Table B.2 provides the open-ended responses of BetterBricks participants asked "What, if anything, would you like NEEA to consider as it evolves how it works with [D&C: the design community; ORE: the office real estate community; H&H: the hospital and healthcare community; BOPS: the mechanical contractor community] to increase energy efficiency?"

**Table B.2: Participant Suggestions for Future NEEA Activities**

| Participant Suggestion |
|---|
| **D&C Survey** |
| Big thing my firm is doing now is developing metrics to capture project performance. BetterBricks funded the preliminary effort and it needs to do more things like that. |
| What's missing are the examples. We're lacking data about what's happening around the country; need upfront payback analyses for clients. |
| Educate and communicate ways for us all to do better in our practices w/ regard to energy efficiency. The integrated design labs are excellent as ways for us to access information and assistance (through daylighting studies, energy modeling, seminars and presentations) so they are important "gateways" to maintain. Just keep informing us of what is available. |
| Communicate successes. Publishing case studies and actual examples of projects that achieve outstanding results is great incentive for all of us in the design community to keep improving and incorporating energy efficiency into our buildings. Knowing that someone else has actually achieved some great results in their project is very important to keep us all striving to do better. |
| More case studies on lessons learned. |
| Continue and do more of the following: 1) education to design professionals, 2) partnerships with design professionals, 3) grassroots like the labs (IDLs), 4) utility partnerships. |
| More funding for the research labs (IDLs); working with them has been very beneficial allowing the firm to make informed decisions. |
| More education on modeling. |
| Support for firms to do more/better benchmarking. |
| Architects need more resources as there is more demand than can be met. |
| Many architectural clients do not want to pay for energy modeling and it would be good to have a source of funds for this purpose. |

Continued

| Participant Suggestion |
|---|
| **ORE Survey** |
| Key is getting the third party property management firms on board and trained. |
| Recently there has been much greater awareness in the real estate business of the importance of energy efficiency; BetterBricks/NEEA needs to capitalize on that. |
| More mandatory policies and codes for buildings for energy efficiency. |
| They are doing a lot of the right things and the pace is just right. |
| They are already doing a fantastic job, can't think of much more they can do. |
| **H&H Survey** |
| Provide more direct support for implementation of measurement and verification systems. |
| Further promotion of recommissioning of buildings, especially in this tough economy. |
| Only parts of hospitals are truly 24/7 operations and the portion that is not is the true opportunity to save energy. |
| Efforts to conserve energy need not be grandiose, don't discount small projects. |
| Continue to educate senior facilities management staff on both the value of and opportunities associated with energy management. |
| More BetterBricks communications with CEO level types regarding value of energy efficiency for their hospitals. |
| More operational on-site training at the hospitals. |
| Help, support, cooperation with utilities in regard to their incentive plans to devise a custom plan for hospital/health care market. |
| Continued support: from tech advisors; continued funding for system energy manager position; keep dialogue/communications ongoing. |
| Was working closely w/ BB doing big study, but ran out of funds would like to continue the study. |
| Provide more grants. |
| Need to be more practical in what they are delivering, need to be able to provide more solutions to their customers. [From a Light Touch respondent] |
| Would like them to become a funding source, like ETO and provide low interest loans up front. [From a Light Touch respondent] |
| Hard to sell to her organization's senior management the projections made by BetterBricks as to what the savings are versus the cost of employing an energy manger. [From a Light Touch respondent] |
| **BOPS Survey** |
| Incentivizing the monitoring is really big with building owners. |
| Raising awareness to recognize potential opportunities, that would be helpful. There should be more influence in the service industry: service offerings, and maintenance and operations. There is a lot of potential here since contractors or staff are not trained in what they should be looking for when they repair or replace equipment. |
| I would say continue the Better Bricks program as it is. It helps to have the funding sources or incentives to get buildings off the decision block or to nudge buildings' owners to make these decisions. Also, support from the [BOPS Technical Advisor and Market Specialist] should continue. We made some progress over the last year, and without them we would not be one tenth of the way we are right now. it sounds like BetterBricks funding is going away . We have a long way to go to implement and develop these services. |

Continued

| Participant Suggestion |
| --- |
| **BOPS Survey, Cont.** |
| It always surprised me that NEEA is comprised of utility companies and, yet NEEA does not cooperate well with utilities and vice-versa. I'll give you an example: we want interval data on electrical usage for one of our clients. We are doing tune-up with a client through NEEA, and we cannot get hands on interval data from [the utility]. You can use interval data in Energy Expert, a software for energy use forecasting, and [the utility] has interval data. NEEA is trying to get it for us and has been trying for six weeks. I feel, there is a lack of cooperation. They need to work on that and beyond that.<br>Over the last three years there have been turf wars. [The utility] has programs that parallel NEEA programs, and they compete. [The utility] and NEEA want to save energy or maximize energy savings so they can attribute them to their accomplishments. What comes out is the problem like interval data issue in the example I gave. They need to get their act together. |
| I think it is important for NEEA to continue to invest in Firm Focused contractors and continue to emphasize commercial office sector with Better Bricks Program and Kilowatt Crackdown. I think the healthcare market is a viable market. NEEA is an advocate for increased incentives and behavior change that focus on ownership teams in both commercial and healthcare sectors. Those initiatives have been valuable. It is still very early in the education process and the adoption rate is still low, and there should be continued investment . I would encourage NEEA to assist with that – continue to invest in [a Firm Focus firm] and the customers. |
| Do not cancel the program. We heard something to that effect. Two people that worked with us from NEEA were told that they will not have a job this upcoming January. I want to convey my disgust to who ever made that decision. We just got on board and hope program will continue. |
| NEEA does not understand what mechanical contractors are all about. They do not know even what type of a proposal we give to a customer. We are for profit. They do not understand the process of making a sale. They view us as an engineering firm. There is a disconnect; e.g. early on with NEEA Better Bricks program, we did a client interview that owns large office and production facility. Senior VP and controller and director were there. We had this initial interview about operations and maintenance practices. Consultant from NEEA was asking a long list of questions. She would ask questions and enter it into a laptop as if those were cut and dry responses. They were dealing with cut and dry engineering facts and not looking into sales or how one is to sell an energy package. It was frankly a bit embarrassing. We made some changes after that and we did the rest of the interviews ourselves. |
| Any sort of rebates or incentives for upgrades and repairs (e.g. economizer) is what I see as the most powerful tool to get people to invest in energy-efficient services. |
| We need more of enhancing incentives in the state of Oregon on the government level. For example, there is a provision in Oregon constitution that does not allow for agencies to use utility/energy savings to be redirected toward paying for other costs/loans. That would help motivate agencies to make these savings more readily. |

# C LOGIC MODELS

Figure C.1, Figure C.2, Figure C.3, and Figure C.4 present the Design & Construction (D&C), Office Real Estate (ORE), Hospitals and Healthcare (H&H), and Building Operations (BOPS) logic models, respectively.

**Figure C.1: Simplified Logic Model for BetterBricks Design & Construction (D&C) Cross-Cutting Market**

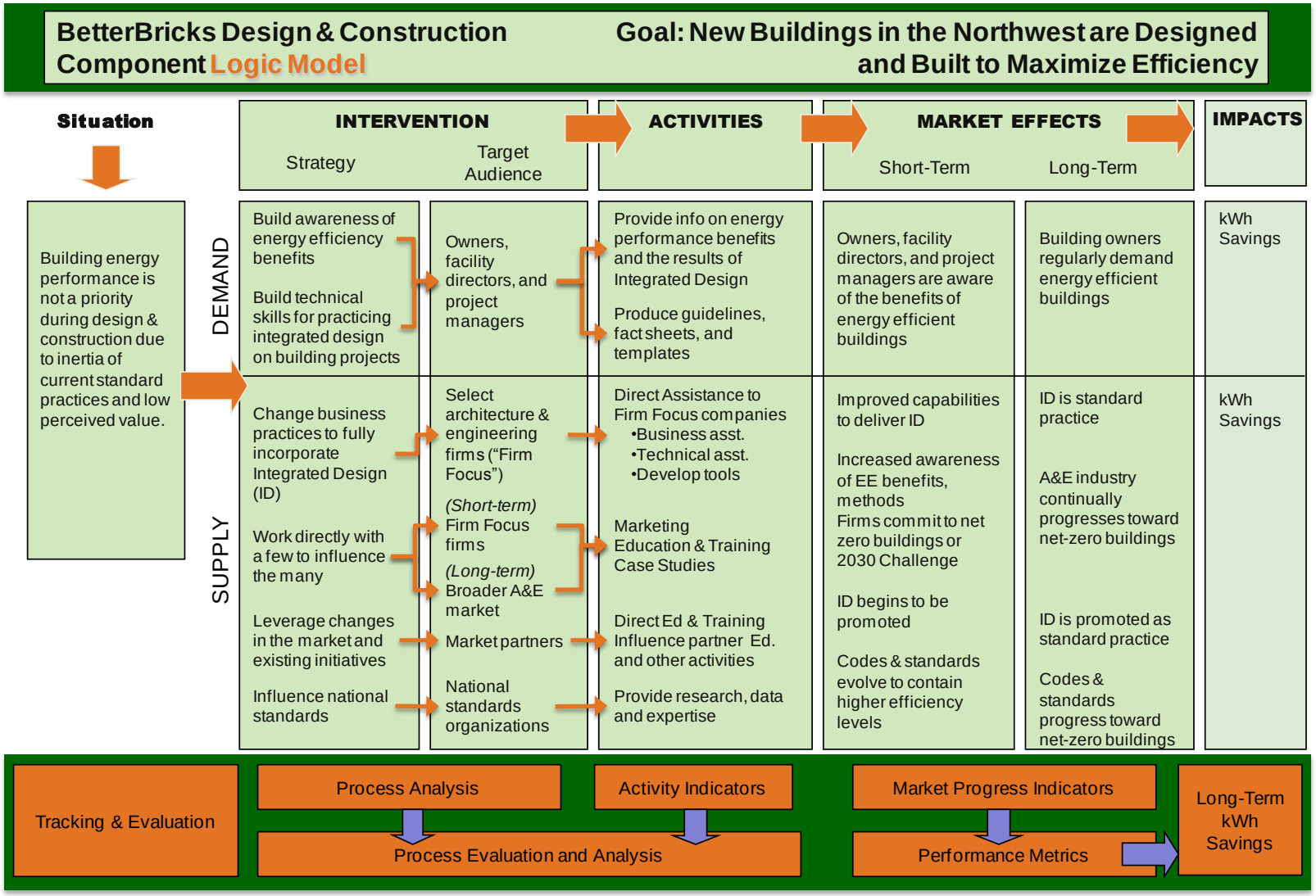


**Figure C.2: Simplified Logic Model for BetterBricks Office Real Estate (ORE) Target Market**

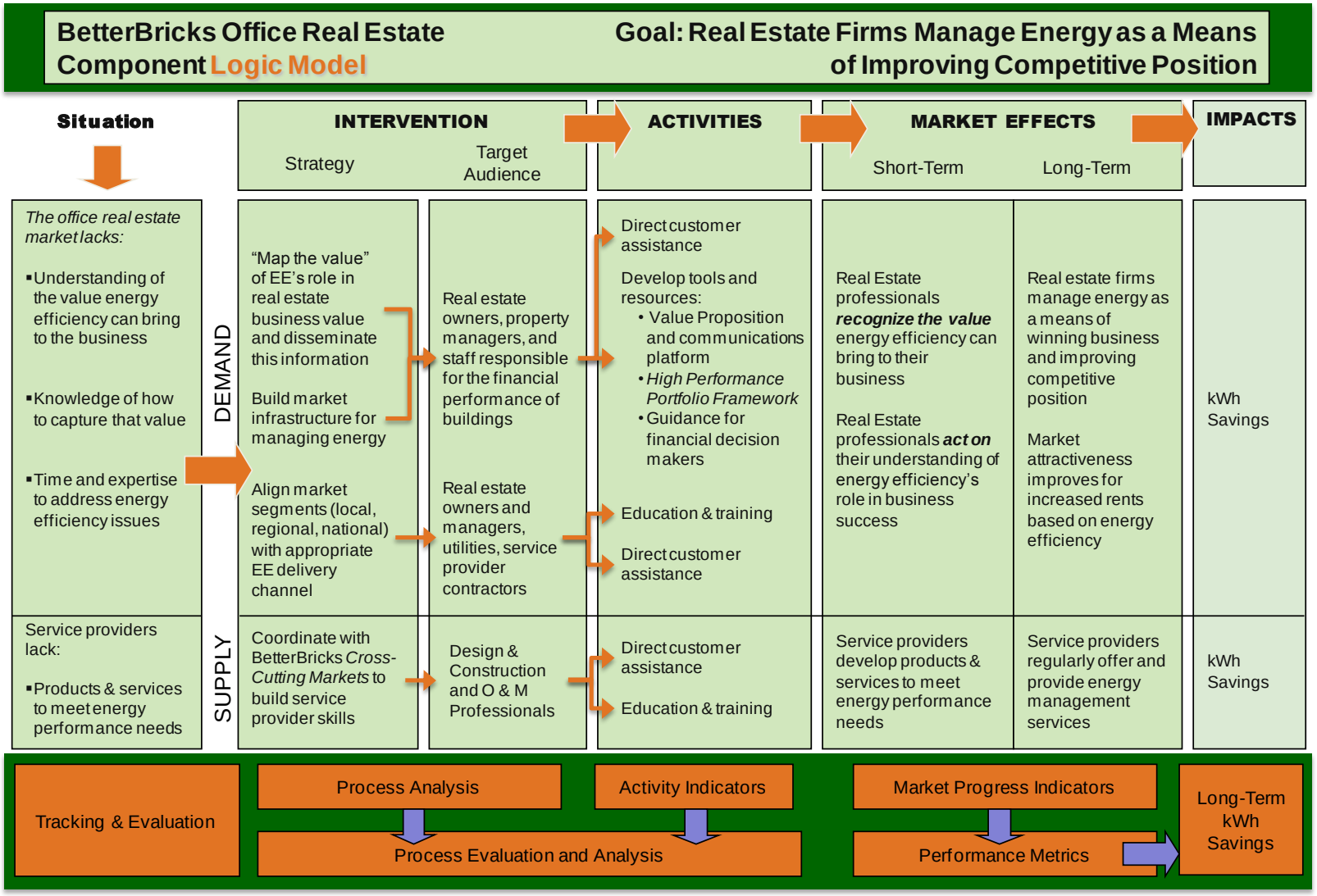


**Figure C.3: Simplified Logic Model for BetterBricks Hospitals & Healthcare (H&H) Target Market**

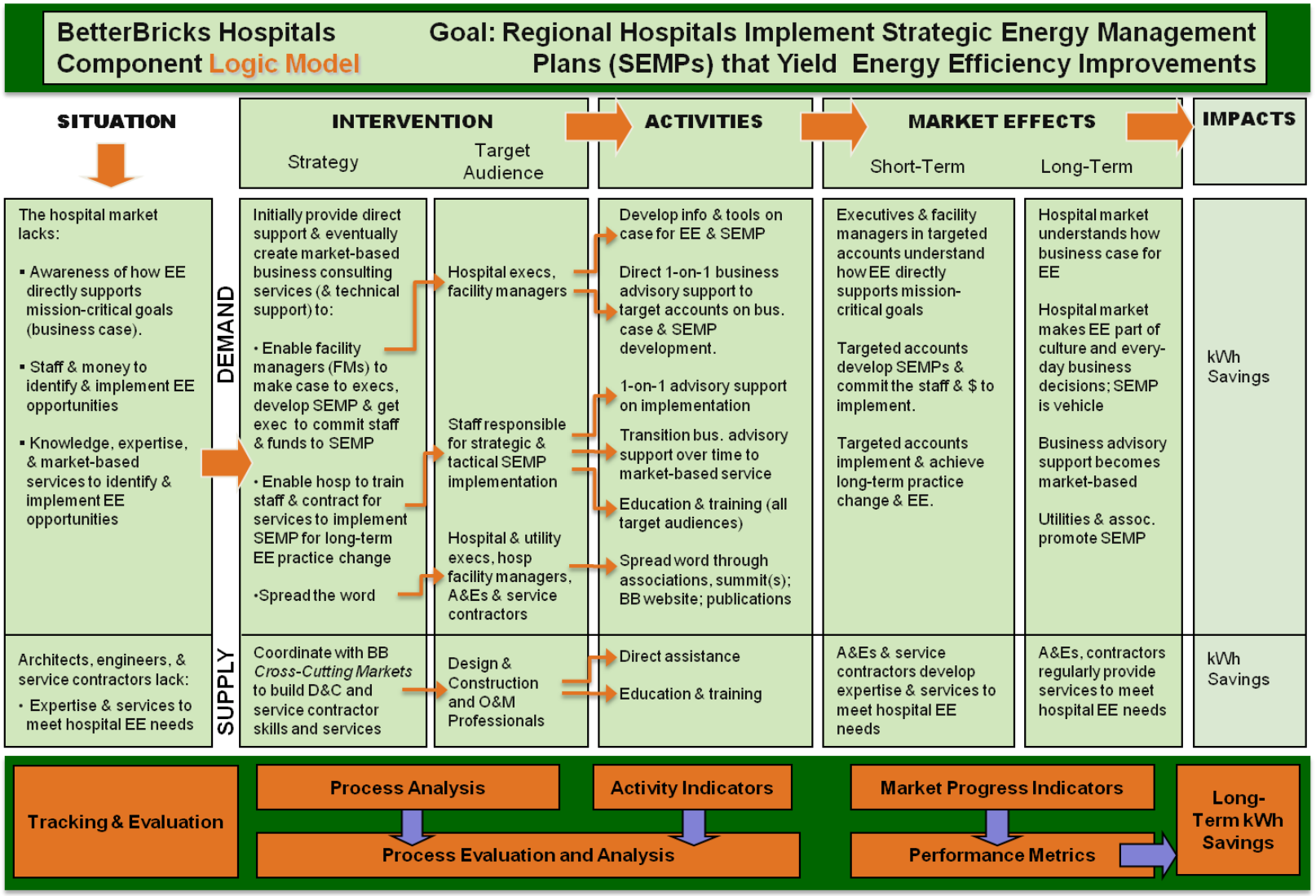
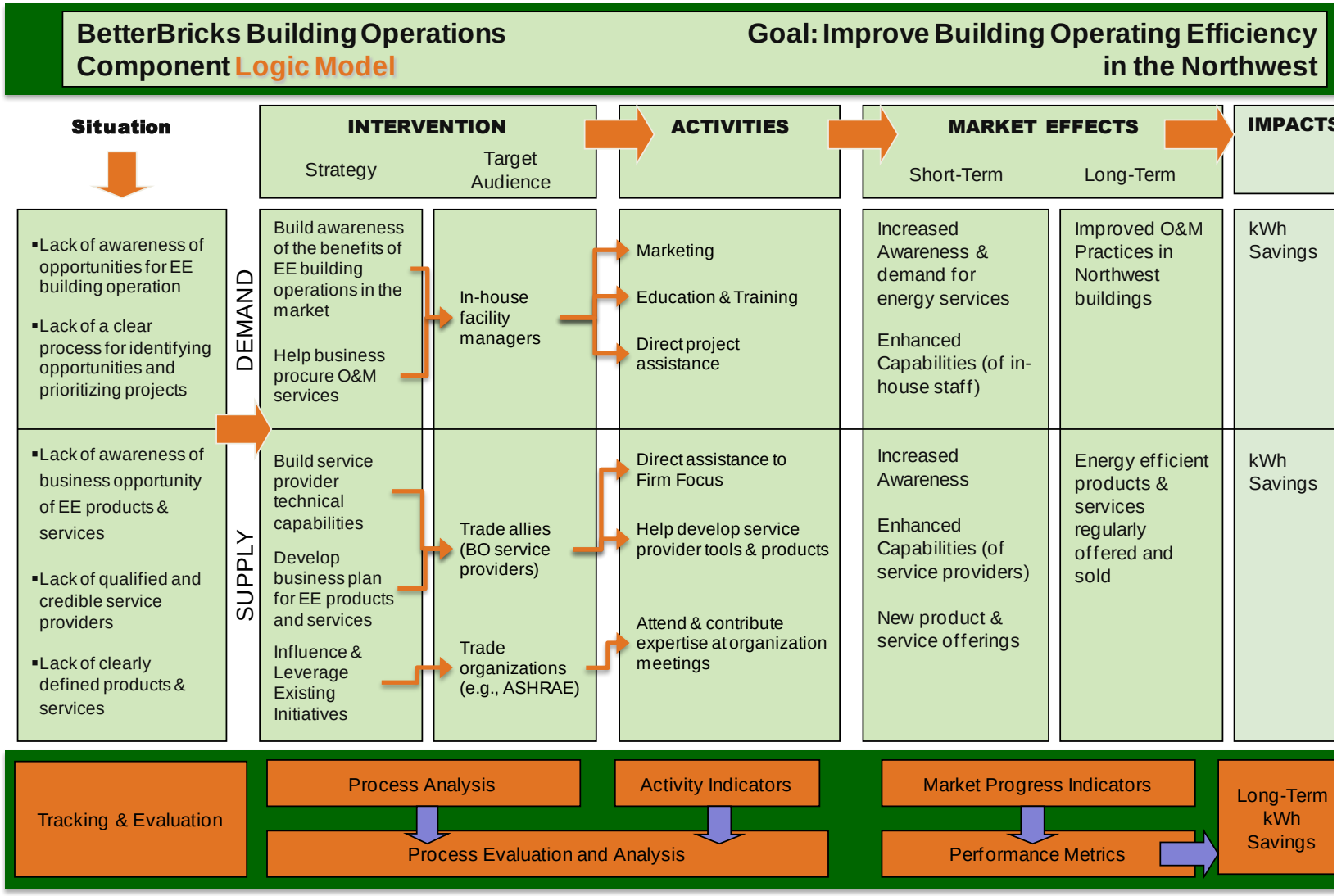


**Figure C.4: Simplified Logic Model for BetterBricks Building Operations (BOPS) Cross-Cutting Market**



# D ACE MODEL ASSUMPTION VALIDATIONS

## HEALTHCARE

This section presents the results of our efforts to validate assumptions used in the Alliance Cost Effectiveness (ACE) model for BetterBricks activity in the Hospitals and Healthcare market. Our efforts constitute only first steps in a complete validation of the ACE model assumptions, as lack of BetterBricks and regional data, coupled with a short project duration, limited our ability to validate many of the assumptions.

We use the following abbreviations in Table D.1:

- **D&C** = Design & Construction
- **ID** = Integrated Design
- **PID** = Partial Integrated Design
- **EEM** = Energy Efficiency Measures
- **OH** = Other Healthcare
- **BOps** = Building Operations
- **C.U.** = Capital Upgrades

Table D.1 identifies two documents included below in this section: *Market Adoption Estimation Approach* (Used in the ACE Review) and *Market Size Estimates* (Used in the ACE Review below). The table also identifies source documents provided to the NEEA evaluation manager under separate cover.

**Table D.1: Hospitals (H) and Other Healthcare (OH)**

| | Input Assumption | Finding | Recommendation | Sources |
|---|---|---|---|---|
| **1** | Market size (bldg. square footage) and annual growth<br>• H – 68.0 MMsf in 2004 to 87.4 MM sf in 2020<br>• OH – 84.7 MMsf in 2004 to 132.3 MMsf in 2020 | Our finding is that the latest Northwest Power and Conservation Council (NPCC) estimates/forecasts of hospital/healthcare floor space are:<br>• Hospitals – 64.3 MMsf in 2005 and 80.6 MM sf in 2020<br>• Other Healthcare – 62.2 MMsf in 2005 and 84.3 MMsf in 2020<br>*Other Healthcare* definition is based on NAICS code definition in model documentation, excluding residential facilities. | We recommend that NEEA update the Hospitals estimates to match the current Power Council estimates, which reflect a slow-down from prior estimates of new construction, likely attributable to the recession. | NPCC updated forecast commercial floor space data, provided by Massoud Jourabchi in November 2009.<br>*See below: Market Size Estimates* (Used in ACE Review)<br>Analysis calculations: *NWCouncilForecastNov09-1.xls* |
| **2** | Average energy utilization index (EUI)<br>Electric – Post 2004<br>• H: 25.3 kWh/sf<br>• OH: 14.3 kWh/sf<br>Electric – Pre 2005<br>• H: 31.4 kWh/sf-yr<br>• OH: 14.3 kWh/sf-yr<br>Gas – (assumptions not currently used, but may be used in the future)<br>• H: 154.1 kBtu/sf<br>• OH: 154.1 kBtu/sf | Our finding is that the most current applicable values are the 2009 CBSA (Core Based Statistical Area) median estimates:<br>Electric -<br>• H: 17.9 kWh/sf<br>• OH: 30.2 kWh/sf<br>In the near-term, we believe the median estimates are more appropriate than mean because the program likely does not treat the highest use buildings.<br>If vintage data were available in the Commercial Tracking System (CTS), we would suggest using median EUIs by vintage. | In the near-term, we recommend updating the EUI estimates to the current 2009 CBSA median estimates.<br>We recommend that the CTS record vintage, the model apply 2009 CBSA median estimates by vintage, and then apply vintage weights from the CTS.<br>We recommend using a combined fuel EUI in the future to account for changes in end-use fuel saturations over time, as a result of the change in building efficiency and fuel-type choices. | 2009 CBSA Update<br>Analysis explanation and tables: *Hospitals EUI.doc* |

Continued

| | Input Assumption | Finding | Recommendation | Sources |
|---|---|---|---|---|
| **3** | Linking Gas Savings Estimates to Electric Savings<br>Percent Application and percent Gas to Electricity Savings (when converted to kWh, for applicable measures) by Program<br>Building Operations<br>• BOps 20% 21%<br>• Procurement 0% 21%<br>• C.U. 100% 21%<br>Design and Construction<br>• ID 100% 100%<br>• PID 100% 100%<br>• EEM 50% 100% | See Input 13<br>To date insufficient data are available from impact validation efforts regarding proportion of gas to electricity savings in hospital building operations. Interviews with BetterBricks contractors suggest the proportion of savings should equal, at a first approximation, the proportion of fuel use (expressing both gas and electricity in Btus).<br>The current D&C research—for a sample of 9 projects, including 1 medical building—suggests deeper savings for gas than electricity. When both electricity and gas savings are denoted in Btus, electricity counts for 34% of this total and gas savings account for 66%. | Change assumptions according to findings from current research. | *See below: Design and Construction* |

Continued

| | Input Assumption | Finding | Recommendation | Sources |
|---|---|---|---|---|
| **4** | Background adoption (naturally occurring conservation) rate<br>Logistic curve used to forecast baseline<br>• 2008: 7.5% of Total Regional Savings<br>• 2023: 50% of Total Regional Savings<br>• 2030: 100% of Total Regional Savings | We find that:<br>491,393 square feet of newly constructed hospital/healthcare space is projected by the U.S. Green Building Council (USGBC) to be LEED Silver or better in 2009.<br>USGBC defines *Health* as healthcare buildings that do not list residential.<br>This estimate equals 29% of the projected new construction market for H/OH in 2009 (see Input 1).<br>Reviewing the small sample of impact evaluation D&C sites (includes one OH facility), we found about half of the sites that received BetterBricks D&C measures also were LEED Silver or better. Thus, there is overlap between LEED and BetterBricks (see Appendix G).<br>There are no currently available data to validate BOps background adoption estimates. | We recommend that NEEA confirm that LEED's sector definitions are consistent with the model definitions. NEEA should assess the extent of overlap between D&C and LEED for a larger sample that includes more H/OH observations. NEEA should assess the extent to which BetterBricks D&C efforts were critical to meeting LEED. In the absence of evidence of criticality, increase the background adoption D&C adoption rate to 15% (50% x 29%) for hospitals/healthcare in 2009.<br>Assessing the background rate of BOps adoption awaits efforts underway to clarify key performance indicators for BOps and to survey the market concerning these indicators.<br>In the long-term, we recommend that NEEA conduct regular market surveys to assess total regional market adoption and attribution (that is, for buildings that have adopted efficiency, determine whether their actions were influenced by NEEA, local utilities, other influences, or occurred on their own) and update the background adoption estimates using the survey results. | USGBC – LEED projected Silver, Gold and Platinum certifications by year for Montana, Idaho, Oregon and Washington<br>Analysis calculations: *sum LEED.xls*"<br>*See below: Design and Construction* |

Continued

| | Input Assumption | Finding | Recommendation | Sources |
|---|---|---|---|---|
| **5** | Building Operations: Annual adoption rate:<br>• H: 3% to 10%<br>• OH: 1% to 3% | We note that the Hospitals ACE model and Offices ACE model differ in the structuring of assumptions for Input 5.<br>For 2009, BetterBricks market adoption is estimated at:<br>• H: 950,000 square feet<br>• OH: 700,000 square feet<br>When combined with the latest 2009 sector population estimates (see Input 1), the fraction of existing square footage penetrated is estimated at:<br>• H: 0.9%<br>• OH: 0.7% | In the near-term, we recommend that NEEA update its market adoption estimates with the CTS adoption estimates reported here, combined with NEEA's estimates of local program adoption.<br>In the long-term, we recommend that NEEA improve the CTS to accurately record BOps efficiency activities at sites, year activity initiated (and, for C.U., completed), and attrition (drop out). Project completion and attrition rates will improve the BetterBricks market adoption estimates going forward.<br>See long-term recommendation for Input 4. NEEA should update total regional market adoption using survey results. | CTS<br>See Input 1<br>*See below:"Market Adoption Estimation Approach* (Used in ACE Reviews)<br>Analysis calculations:<br>• Market Adoption Estimation.xls<br>• Attrition Rate Estimation 2009.xls |

Continued

| | Input Assumption | Finding | Recommendation | Sources |
|---|---|---|---|---|
| **6** | Building Operations: Maximum achievable adoption rate by 2020<br>H:<br>• BOps: 67%<br>• Procurement: 67%<br>• C.U.: 55%<br>OH:<br>• BOps: 22%<br>• Procurement: 22%<br>• C.U.: 18% | We note that the Hospitals ACE model and Offices ACE model differ in the structuring of assumptions for Input 6.<br>The recommendation for Input 5 gives the 2009 market adoption (the lower bound of the current range).<br>• In order to reach 67% adoption by 2020, starting from a base of 3% (H), the annual adoption rate must increase by 11% each year (that is, from 3% in 2009, to 3.3% in 2010, to 3.8% in 2011, up to 9.5% in 2018).<br>• To reach 55% adoption by 2020, starting from a base of 3% (H), the annual adoption rate must increase by 7% each year.<br>• To reach 22% by 2020, starting from a base of 1% (OH), the annual adoption rate must increase by 10% each year.<br>• To reach 18% by 2020, starting from a base of 1% (OH), the annual adoption rate must increase by 7% each year.<br>*Cont.* | We recommend NEEA reduce its 2020 maximum achievable adoption rate, although we do not have sufficient data to suggest alternative percentages. | *Additional Opportunities for Energy Efficiency in New Hampshire,* prepared for the New Hampshire Public Utilities Commission by GDS Associates, Inc. |

Continued

| Input Assumption | Finding | Recommendation | Sources |
|---|---|---|---|
| **6** | Some of these assumptions seem overly optimistic.<br><br>And note that while the above analyses assume adoptions in 2009 of 3% (H) and 1% (OH), these are the recommendations for Input 5. According to CTS, the 2009 values are less than 1% (0.9% H and 0.7% OH).<br><br>While no data are available with direct bearing on BOps adoption rates, some inferences might be drawn from a 2009 technical potential study by GDS Associates for the New Hampshire Public Utilities Commission. This study estimates, for the nonresidential sector, market potential for C.U. savings equal to 31% of the technical potential. | | |

Continued

| | Input Assumption | Finding | Recommendation | Sources |
|---|---|---|---|---|
| **7** | Design & Construction: Annual adoption rate<br>• 10% to 33% for hospitals<br>• 3% to 20% for other healthcare facilities<br>The Design and Construction adoption rates correspond to an annual change in total floor space and, therefore, are not cumulative. | For 2009, BetterBricks market adoption estimates are:<br>FID:<br>• H: 0<br>• OH: 388,001 square feet<br>PID:<br>• H: 0<br>• OH: 0<br>EE Measures:<br>• H: 1,103,052 square feet<br>• OH: 0<br>When combined with the latest 2009 sector new construction estimates (see Input 1), the fraction of new square footage penetrated is estimated at:<br>FID:<br>• H: 0%<br>• OH: 25%<br>PID:<br>• H: 0%<br>• OH: 0%<br>EE Measures:<br>• H: 130%<br>• OH: 0% | In the near-term, we recommend that NEEA update its market adoption estimates in consideration of the CTS adoption estimates reported here, NEEA's estimates of local program adoption, and the estimates of LEED adoption contained in this table.<br>In the long-term, we recommend that NEEA improve the CTS to accurately record D&C projects, including strategies, year initiated, and year completed or attrition (drop out). Project completion and attrition rates will improve the BetterBricks market adoption estimates going forward.<br>See long-term recommendation for Input 4. | CTS<br>See Input 1<br>*See below: Market Adoption Estimation Approach* (Used in ACE Review)<br>Analysis calculations:<br>• Market Adoption Estimation.xls<br>• Attrition Rate Estimation.xls |

Continued

| | Input Assumption | Finding | Recommendation | Sources |
|---|---|---|---|---|
| **8** | Adoption rate of new codes/standards<br>Every 5 years, the adoption rate starts over at year-1 levels, with increments of 25% each succeeding year<br>85% compliance factor | Our finding is that current Northwest code savings studies do not have sufficient detail to address the adoption rates and compliance factor assumptions in the model. | We recommend that NEEA consider incorporating adoption rates and compliance factors into future Northwest code savings studies to assess these inputs. | |
| **9** | Reduction in EUI because of new codes/standards: 25% in 2011, by 10% every subsequent 5 years | We estimate that hospital whole-building savings associated with code between 2005 and 2011 are 8%. This estimate excludes some measures that code will address, so the savings should be higher than 8%, though lower than savings for other buildings (offices are 14%). | We recommend that NEEA assume that code savings are 11% (8% + (14% - 8%) / 2) of the total hospital electric EUI.<br>We recommend that NEEA update these assumptions as the region finalizes its 2010 codes and as new code savings studies are conducted. | *Non-Residential Energy Savings From Northwest Energy Code Changes 2005-2008* (NEEA) December 4, 2009<br>• Montana IECC2003-IECC2006 increment: Adoption is assumed (savings from simulations for document referenced above before MT failed to adopt in 2008).<br>• Idaho/Montana IECC2006-2009 adoption: Adoption assumed. Savings estimated arbitrarily, assumed to be 4%.<br>• WA 2010: Savings from public testimony and NEEA-funded code savings estimates.<br>• OR 2010: Savings assumed to be the same rate as WA code.<br>Analysis calculations: *Code savings.xls* |

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| | Input Assumption | Finding | Recommendation | Sources |
|---|---|---|---|---|
| **10** | Plug Loads ramp up:<br>• 2011: 30% of EUI not affected by codes<br>• 2016: 40% of EUI not affected by codes<br>• 2021: 50% of EUI not affected by codes<br>• 2026: 60% of EUI not affected by codes<br>• 2031: 70% of EUI not affected by codes | Our finding for healthcare: 18% of EUI is not affected by codes. | Our recommendation is to lower the current assumption of 50% to 18% for hospitals/ healthcare of EUI not affected by codes. For 2011 onward, revisit this assumption as new data are available. | CEUS Itron March 2006 (plug + misc eq. + process/ total from Table E3) |
| **11** | Ramp-up period for Building Ops. Measures:<br>• 4 years, 7 years for Capital Upgrades<br>• 1 year measure savings lag | We do not have any data with which to assess these assumptions. | We recommend that NEEA improve the CTS to capture ramp-up rate and that future impact evaluations be designed, where possible, to address savings as a dynamic stream over several years. | |
| **12** | Ramp-up period for D&C measures:<br>• Concurrent (no ramp-up period)<br>• 1 year measure savings lag | See Input 11. | | |
| **13** | Savings rates (baseline is the 2005 EUI):<br>• BOps: 10%<br>• Procurement : 4%<br>• C.U.: 15%<br>• Integrated Design: 30%<br>• Partial Integrated Design: 20%<br>• Energy Efficiency Measures: 15%<br>*Lag implementation by one year* | To date, insufficient data are available from impact validation efforts to estimate either building operations or D&C savings for hospitals.<br>The *Draft Sixth Northwest Power Plan* produced by the NPCC provides savings estimates for retrocommissioning of 6% of electricity consumption and 5.3% of gas consumption. | For the NPCC, in support of its *Sixth Power Plan*, Research Into Action reviewed impact studies obtained from contacts across the country. That review found a handful of studies that might be relevant to ACE savings assumptions regarding C.U. and D&C energy efficiency measures. NEEA might want to pursue this resource. | *Draft Sixth Northwest Power Plan*, Northwest Power and Conservation Council<br>Research Into Action deliverable to the NPCC |

Continued

| | Input Assumption | Finding | Recommendation | Sources |
|---|---|---|---|---|
| **14** | Consumer Bldg Ops. Management costs<br>Resource Conservation Manager:<br>• 1/4 FTE for years 1-3<br>• 1/12 FTE for years 4-15 RCM<br>• 1 FTE = $80k<br>Strategic Energy Manager:<br>• 1/20 FTE all years<br>• exclude Capital Upgrades<br>• 1 FTE = $120k | We do not have any data with which to assess these assumptions. | | |
| **15** | Consumer D&C Management costs<br>Resource Conservation Manager:<br>• 1/4 FTE for years 1-3<br>• 1/12 FTE for years 4-15 RCM<br>• 1 FTE = $80k<br>Strategic Energy Manager:<br>• 1/20 FTE all years<br>• exclude EE measures for OH<br>• 1 FTE = $120k | We do not have any data with which to assess these assumptions. | | |
| **16** | Consumer D&C first costs (Net)<br>• ID: $0.99<br>• PID: $1.96<br>• EEM: $0.51 – H and $0.32 OH | We do not have any data with which to assess these assumptions. | For the NPCC, in support of its Sixth Power Plan, Research Into Action reviewed impact studies obtained from contacts across the country. That review found a handful of studies that might be relevant to ACE cost assumptions regarding C.U. and D&C energy efficiency measures. NEEA might want to pursue this resource. | Research Into Action deliverable to NPCC |

Continued

| | Input Assumption | Finding | Recommendation | Sources |
|---|---|---|---|---|
| **17** | Consumer Bldg. Ops. first costs (Net)<br>• BOps: $0.27<br>• C.U.: $0.35 – H and $0.11 OH<br>• Procurement: $0 | We do not have any data with which to assess these assumptions. | For the NPCC, in support of its Sixth Power Plan, Research Into Action reviewed impact studies obtained from contacts across the country. That review found a handful of studies that might be relevant to ACE cost assumptions regarding C.U. and D&C energy efficiency measures. NEEA might want to pursue this resource. | Research Into Action deliverable to NPCC |
| **18** | Time to market transformation: 15 years | We do not have any data with which to assess this assumption. | | |
| **19** | Price of electricity and load shape | We did not assess this assumption. | | |
| **20** | Line losses | We did not assess this assumption. | | |
| **21** | Local incentives – 65% of regional savings | We do not have any data with which to assess this assumption. | We recommend that NEEA collect information from NPCC and from the Bonneville Power Administration (BPA), Energy Trust of Oregon, and other major Northwest energy efficiency program administrators to determine local program adoption. Also, attempt to determine the extent of overlap with LEED for D&C measures. | Review of major Northwest programs such as Energy Trust and BPA through websites and interviews |
| **22** | Building Operations Target Market Size<br>aMWs available, except for the market energy penetrated by ID within five years | We are unable to use CTS to assess this assumption, based on incomplete data (vintage is not recorded). | We recommend that NEEA improve the CTS by collecting vintage of all buildings in order to assess this model assumption. | |

Continued

| | Input Assumption | Finding | Recommendation | Sources |
|---|---|---|---|---|
| **23** | Measure life<br>30 years for Design and Construction and 8 years for Building Operations measures. Building Operations should be 5 years; procurement should be 5 years (lamps 4, chiller 10-12 years, computers 4, rooftop equipment 15 years). Capital Upgrades is 15 to 20 years. Using an average of the measures, the measure life for Building Operations is 8 years. | We did not assess these assumptions. | A literature review might yield information relevant to assessing these assumptions. | |

## OFFICE REAL ESTATE

This section presents the results of our efforts to validate assumptions used in the Alliance Cost Effectiveness (ACE) model for BetterBricks activity in the Office Real Estate market. Our efforts constitute only first steps in a complete validation of the ACE model assumptions, as lack of BetterBricks and regional data, coupled with a short project duration, limited our ability to validate many of the assumptions.

We use the following abbreviations in Table D.2:

- **D&C** = Design & Construction
- **ID** = Integrated Design
- **PID** = Partial Integrated Design
- **EEM** = Energy Efficiency Measures
- **M/S** = Medium/Small Offices
- **BOps** = Building Operations
- **C.U.** = Capital Upgrades

Table D.2 identifies two documents included in this report: *Market Adoption Estimation Approach Used in ACE Review* and *Market Size Estimates Used in ACE Review*. The table also identifies source documents provided to the NEEA evaluation manager under separate cover.

**Table D.2: Offices Large and Medium/Small (M/S)**

| | Input Assumption | Finding | Recommendation | Source |
|---|---|---|---|---|
| **1** | Market size (bldg. square footage) and annual growth<br>• Large – 191.7 MMsf in 2005 to 297.3 MMsf in 2020<br>• M/S – 191.7 MMsf in 2005 to 297.3 MMsf in 2020<br>• Assuming owner-occupied is 30% of large and M/S<br>• Large>=100,000 square feet | Our finding is that the latest Northwest Power and Conservation Council (NPCC) estimates/forecasts of office floor space are:<br>• Large – 193.5 MMsf in 2005 and 247.3 MMsf in 2020<br>• M/S – 189.4 MMsf in 2005 and 242.1 MMsf in 2020 | We recommend that NEEA update the Office estimates to match the current Power Council estimates, which reflect a slow-down from prior estimates of new construction, likely attributable to the recession. | NPCC updated forecast commercial floor space data, provided by Massoud Jourabchi in November 2009.<br>*See below: Market Size Estimates* (Used in ACE Review)<br>Analysis calculations: *NWCouncilForecastNov09-1.xls* |
| **2** | Initial (2005) average energy utilization index (EUI)<br>Electric –<br>• 17.7 kWh/sf for Large<br>• 15.2 kWh/sf for M/S<br>Gas – (assumptions not currently used, but may be used in the future)<br>• 84.68 kBtu/sf for large offices<br>• 78.54 kBtu/sf for M/S offices<br>No difference in EUI by ownership type | Our finding is that the most current applicable values are the 2009 CBSA (Core Based Statistical Area) median estimates:<br>Electric -<br>• L: 16.7 kWh/sf<br>• M/S: 15.1 kWh/sf<br>In the near-term, we believe the median estimates are more appropriate than mean because the program likely does not treat the highest use buildings.<br>If vintage data were available in the Commercial Tracking System (CTS), we would suggest using median EUIs by vintage. | In the near-term, we recommend updating the EUI estimates to the current 2009 CBSA median estimates.<br>We recommend that the CTS record vintage, the model apply 2009 CBSA median estimates by vintage, and then apply vintage weights from the CTS.<br>We recommend using a combined fuel EUI in the future to account for changes in end-use fuel saturations over time, as a result of the change in building efficiency and fuel-type choices. | 2009 CBSA Update<br>Analysis explanation and tables: *Offices EUI.doc* |

Continued

| | Input Assumption | Finding | Recommendation | Source |
|---|---|---|---|---|
| **3** | Linking Gas Savings Estimates to Electric Savings<br>Percent Application and percent Gas to Electricity Savings (when converted to kWh, for applicable measures) by Program<br>Building Operations<br>• BOps 20% 21%<br>• Procurement 0% 21%<br>• C.U. 100% 21%<br>Design and Construction<br>• ID 100% 100%<br>• PID 100% 100%<br>• EEM 50% 100% | See Input 13<br>To date insufficient data are available from impact validation efforts regarding proportion of gas to electricity savings in office building operations. Interviews with BetterBricks contractors suggest the proportion of savings should equal, at a first approximation, the proportion of fuel use (expressing both gas and electricity in Btus).<br>The current D&C research suggests deeper savings for gas than electricity. When both electricity and gas savings are denoted in Btus, electricity counts for 34% of this total and gas savings account for 66%. | Change assumptions according to findings from current research. | *See below: Design and Construction* |

Continued

| | Input Assumption | Finding | Recommendation | Source |
|---|---|---|---|---|
| 4 | Background adoption (naturally occurring conservation) rate<br>Logistic curve used to forecast baseline<br>• 2008: 7.5% of Total Regional Savings<br>• 2023: 50% of Total Regional Savings<br>• 2030: 100% of Total Regional Savings | We find that:<br>9,863,927 square feet of newly constructed office space is projected to be LEED Silver or better in 2009<br>USGBC defines Offices = non-governmental offices (primary category)<br>This estimate equals 136% of the projected new construction for offices in 2009 (see Input 1).<br>Reviewing the small sample of impact evaluation D&C sites (includes four office facilities), we found about half of the sites that received BetterBricks D&C measures also were LEED Silver or better. Thus, there is overlap between LEED and BetterBricks (see Appendix G)<br>There are no currently available data to validate BOps background adoption estimates. | We recommend that NEEA confirm that LEED's sector definitions are consistent with the model definitions. NEEA should assess the extent of overlap between D&C and LEED for a larger sample that includes more office observations. NEEA should assess the extent to which BetterBricks D&C efforts were critical to meeting LEED. In the absence of evidence of criticality, increase the background adoption D&C adoption rate to 50% (100% x 50%) for offices.<br>Assessing the background rate of BOps adoption awaits efforts underway to clarify key performance indicators for BOps and to survey the market concerning these indicators.<br>In the long-term, we recommend that NEEA conduct regular market surveys to assess total regional market adoption and attribution (that is, for buildings that have adopted efficiency, determine whether their actions were influenced by NEEA, local utilities, other influences, or occurred on their own) and update the background adoption estimates using the survey results. | USGBC – LEED projected Silver, Gold and Platinum certifications by year for Montana, Idaho, Oregon and Washington<br>Analysis calculations: *sum LEED.xls*"<br>*See below: Design and Construction* |

Continued

| | Input Assumption | Finding | Recommendation | Source |
|---|---|---|---|---|
| **5** | Building Operations: Annual adoption rate:<br>Large M/S<br>• BOps 1-10% 1-10%<br>• Procurement 1-10% 1-10%<br>• C.U. 3-7% 3-7%<br>Same rates by ownership type | We note that the Offices ACE model and Hospitals ACE model differ in the structuring of assumptions for Input 5.<br>For 2009, BetterBricks market adoption estimates for offices are 0 square feet/0%, as there are no projects completed in 2009 or estimated as completed in 2009 per the CTS database.<br>2009 BetterBricks market adoption for other building types (that is, all commercial space net offices and hospitals/ health care) are:<br>• 40,010 square feet<br>When combined with the latest 2009 sector new construction estimates (see Input 1), the fraction of new square footage penetrated for other buildings is estimated at:<br>• 0.001%<br>(See *market adoption estimation approach.doc* for a description of the approach.) | In the near-term, we recommend that NEEA update its market adoption estimates to be the lower bound of its current assumed range, unless estimates of local program adoption suggest otherwise.<br>In the long-term, we recommend that NEEA improve the CTS to accurately record BOps efficiency activities at sites, year activity initiated (and, for C.U., completed), and attrition (drop out). Project completion and attrition rates will improve the BetterBricks market adoption estimates going forward.<br>See long-term recommendation for Input 4. NEEA should update total regional market adoption using survey results. | CTS<br>See Input 1<br>*See below:"Market Adoption Estimation Approach* (Used in ACE Reviews)<br>Analysis calculations:<br>• Market Adoption Estimation.xls<br>• Attrition Rate Estimation 2009.xls |

Continued

| | Input Assumption | Finding | Recommendation | Source |
|---|---|---|---|---|
| **6** | Building Operations: Maximum achievable adoption rate by 2018<br><br>Large / M/S<br>• BOps 68% 68%<br>• Procurement 68% 68%<br>• C.U. 55% 55%<br><br>Same rates by ownership type | We note that the Offices ACE model and Hospitals ACE model differ in the structuring of assumptions for Input 6.<br><br>The recommendation for Input 5 gives 2009 market adoption (the lower bound of the current range). In order to reach 68% adoption by 2018, starting from a base of 1%, the annual adoption rate must increase by 39% each year (that is, from 1% in 2009 to 1.39% in 2010 to 1.9% in 2011, up to 19.4% in 2018). These assumptions seem overly optimistic.<br><br>For C.U., to reach 55% adoption starting from a base of 3%, the annual adoption rate must increase by 13% each year. This seems more realistic, yet note that, while 3% is the value recommended for Input 5, the adoption to date as tracked in CTS is miniscule.<br><br>While no data are available with direct bearing on BOps adoption rates, some inferences might be drawn from a 2009 technical potential study by GDS Associates for the New Hampshire Public Utilities Commission. This study estimates, for the nonresidential sector, market potential for C.U. savings equal to 31% of the technical potential. | We recommend NEEA reduce its 2020 maximum achievable adoption rate, although we do not have sufficient data to suggest alternative percentages. | *Additional Opportunities for Energy Efficiency in New Hampshire,* prepared for the New Hampshire Public Utilities Commission by GDS Associates, Inc. |

Continued

| | Input Assumption | Finding | Recommendation | Source |
|---|---|---|---|---|
| 7 | Design & Construction: Annual adoption rate<br><br>Large M/S<br>• I.D. 5-12% 2-4%<br>• P.I.D. 5-14% 6-7%<br>• E.E.M 18-20% 18-20%<br><br>Same rates by ownership type<br><br>The Design and Construction adoption rates correspond to an annual change in total floor space and, therefore, are not cumulative. | For 2009, BetterBricks market adoption estimates are:<br><br>FID:<br>• L: 0<br>• M/S: 199,677 square feet<br><br>PID:<br>• L: 599,999 square feet<br>• M/S: 37,323 square feet<br><br>EE Measures: 0<br><br>When combined with the latest 2009 sector new construction estimates (see Input 1), the fraction of new square footage penetrated is estimated at:<br><br>FID:<br>• L: 0%<br>• M/S: 6%<br><br>PID:<br>• L: 17%<br>• M/S: 1%<br><br>EE Measures: 0%<br><br>2009 BetterBricks market adoption for other building types (i.e., all commercial space net offices and hospitals/healthcare):<br>• FID: 1,332,683 square feet<br>• PID: 1,390,303 square feet<br>• EE Measures: 267,274<br><br>*Cont.* | In the near-term, we recommend that NEEA update its market adoption estimates in consideration of the CTS adoption estimates reported here, NEEA's estimates of local program adoption, and the estimates of LEED adoption contained in this table.<br><br>In the long-term, we recommend that NEEA improve the CTS to accurately record D&C projects, including strategies, year initiated, and year completed or attrition (drop out). Project completion and attrition rates will improve the BetterBricks market adoption estimates going forward.<br><br>See long-term recommendation for Input 4. | CTS<br><br>See Input 1<br><br>*See below: Market Adoption Estimation Approach* (Used in ACE Review)<br><br>Analysis calculations:<br>• Market Adoption Estimation.xls<br>• Attrition Rate Estimation.xls |

Continued

| | Input Assumption | Finding | Recommendation | Source |
|---|---|---|---|---|
| **7** | | When combined with the latest 2009 sector new construction estimates (see input 1), the fraction of new square footage penetrated is estimated at:<br>• FID: 4%<br>• PID: 4%<br>• EE Measures: 0.7% | | |
| **8** | Adoption rate of new codes/standards<br>Increments of 25% each succeeding year<br>85% compliance factor | Our finding is that current Northwest code savings studies do not have sufficient detail to address the adoption rates and compliance factor assumptions in the model. | We recommend that NEEA consider incorporating adoption rates and compliance factors into future Northwest code savings studies to assess these inputs. | |

Continued

| | Input Assumption | Finding | Recommendation | Source |
|---|---|---|---|---|
| **9** | Reduction in EUI because of new codes/standards: 25% in 2011, by 10% every subsequent 5 years | We estimate that office whole-building savings associated with code between 2005 and 2011 for offices are 14%. | We recommend that NEEA assume that code savings are 14% of the total office electric EUI.<br>We recommend that NEEA update these assumptions as the region finalizes its 2010 codes and as new code savings studies are conducted. | *Non-Residential Energy Savings From Northwest Energy Code Changes 2005-2008* (NEEA) December 4, 2009<br>• Montana IECC2003-IECC2006 increment: Adoption is assumed (savings from simulations for document referenced above before MT failed to adopt in 2008).<br>• Idaho/Montana IECC2006-2009 adoption: Adoption assumed. Savings estimated arbitrarily, assumed to be 4%.<br>• WA 2010: Savings from public testimony and NEEA-funded code savings estimates.<br>• OR 2010: Savings assumed to be the same rate as WA code.<br>Analysis calculations: *Code savings.xls* |
| **10** | Plug Loads ramp up:<br>• 2011: 30% of EUI not affected by codes<br>• 2016: 40% of EUI not affected by codes<br>• 2021: 50% of EUI not affected by codes<br>• 2026: 60% of EUI not affected by codes<br>• 2031: 70% of EUI not affected by codes | Our finding for offices: 24% of EUI is not affected by codes. | Our recommendation is to lower the current assumption of 50% to 24% for offices of EUI not affected by codes. For 2011 onward, revisit this assumption as new data are available. | CEUS Itron March 2006 (plug + misc eq. + process/ total from Table E3) |

Continued

| | Input Assumption | Finding | Recommendation | Source |
|---|---|---|---|---|
| **11** | Ramp-up period for Building Ops. Measures:<br>• 4 years, 7 years for Capital Upgrades<br>• 1 year measure savings lag | We do not have any data with which to assess these assumptions. | We recommend that NEEA improve the CTS to capture ramp-up rate and that future impact evaluations be designed, where possible, to address savings as a dynamic stream over several years. | |
| **12** | Ramp-up period for D&C measures:<br>• Concurrent (no ramp-up period)<br>• 1 year measure savings lag | See Input 11. | | |
| **13** | Savings rates (baseline is the 2005 EUI):<br>Building Operations:<br>• BOps: 10%<br>• Procurement: 4%<br>• C.U.: 15%<br>Design and Construction:<br>• ID: 50% (2006) 80% (2020)<br>• PID: 30% (2006) 50% (2020)<br>• EEM: 15%<br>*Lag implementation by one year* | The current report finds building operations savings for offices of 6.7% or less, depending on the specific BOPs activity (tune-up, Service Assistant, POES).<br>The *Draft Sixth Northwest Power Plan* produced by the NPCC provides savings estimates for retrocommissioning of 6% of electricity consumption and 5.3% of gas consumption.<br>*Appendix G: Design and Construction* supports an assumption of 22% for buildings receiving LEED Silver, Gold, or Platinum certification. This estimate was derived using a realization rate calculated from a sample of four buildings.<br>No other data are available to estimate D&C savings. | Use a savings rate for BOps of 7%.<br>Use a savings rate of 25% for Integrated Design. Savings for Partial Integrated Design are likely considerably less than those for Integrated Design.<br>Future evaluations should estimate LEED (or integrated design) savings rates and realization rates from random samples of sufficient numbers of buildings to provide the desired accuracy.<br>For the NPCC, in support of its *Sixth Power Plan*, Research Into Action reviewed impact studies obtained from contacts across the country. That review found a handful of studies that might be relevant to ACE savings assumptions regarding C.U. and D&C energy efficiency measures. NEEA might want to pursue this resource. | The current evaluation report.<br>*Draft Sixth Northwest Power Plan*, Northwest Power and Conservation Council<br>Research Into Action deliverable to the NPCC |

Continued

| | Input Assumption | Finding | Recommendation | Source |
|---|---|---|---|---|
| **14** | Consumer Bldg Ops. Management costs<br>• Large: 1/20 FTE SM = $3,750<br>• M/S: 1/50 FTE SM = $1,500<br>• Nothing for Capital Upgrades | We do not have any data with which to assess these assumptions. | | |
| **15** | Consumer D&C Management costs<br>• Large: 1/10 FTE SM = $7,500 (years 1-3, then $6,250)<br>• M/S: 1/25 FTE SM = $3,000<br>• Nothing for E.E.M. | We do not have any data with which to assess these assumptions. | | |
| **16** | Consumer Bldg. Ops. first costs<br>• BOps: $0.27/sf<br>• Procurement: net to zero<br>• C.U.: $0.11/sf – Large<br>• C.U.: $0.16/sf – S/M | We do not have any data with which to assess these assumptions. | For the NPCC, in support of its Sixth Power Plan, Research Into Action reviewed impact studies obtained from contacts across the country. That review found a handful of studies that might be relevant to ACE cost assumptions regarding C.U. and D&C energy efficiency measures. NEEA might want to pursue this resource. | Research Into Action deliverable to NPCC |
| **17** | Consumer D&C first costs<br>ID:<br>• Hard Cost: $0.00/sf<br>• Soft Cost: $0.97 (begins ramping down by 20% each year starting in 2008)<br>PID:<br>• Hard Cost: $1.19/sf<br>• Soft Cost: $0.54 (begins ramping down by 20% each year starting in 2008)<br>EEM<br>• Large: $0.44/sf<br>• M/S: $0.28/sf | We do not have any data with which to assess these assumptions. | | |

Continued

| | Input Assumption | Finding | Recommendation | Source |
|---|---|---|---|---|
| **18** | Time to market transformation: 15 years | We do not have any data with which to assess this assumption. | | |
| **19** | Price of electricity and load shape | We did not assess this assumption. | | |
| **20** | Line losses | We did not assess this assumption. | | |
| **21** | Local incentives – 65% of regional savings | We do not have any data with which to assess this assumption. | We recommend that NEEA collect information from NPCC and from the Bonneville Power Administration (BPA), Energy Trust of Oregon, and other major Northwest energy efficiency program administrators to determine local program adoption. Also, attempt to determine the extent of overlap with LEED for D&C measures. | Review of major Northwest programs such as Energy Trust and BPA through websites and interviews |
| **22** | Building Operations Target Market Size<br>aMWs available except for the market energy penetrated by ID within five years | We are unable to use CTS to assess this assumption, based on incomplete data (vintage is not recorded). | We recommend that NEEA improve the CTS by collecting vintage of all buildings in order to assess this model assumption. | |
| **23** | Measure life<br>30 years for Design and Construction and 8 years for Building Operations measures. Building Operations should be 5 years; procurement should be 5 years (lamps 4, chiller 10-12 years, computers 4, rooftop equipment 15 years). Capital Upgrades is 15 to 20 years. Using an average of the measures, the measure life for Building Operations is 8 years. | We did not assess these assumptions. | A literature review might yield information relevant to assessing these assumptions. | |

## ACE VALIDATION METHODOLOGY MARKET ADOPTION ESTIMATE

The following is the market adoption estimation approach used in the ACE review.

### Data Sources

- BetterBricks Commercial Tracking System (CTS) extract
- *Northwest Council Forecast Population and New Construction by Sector* (*NWCouncilForecastNov09..xls*, generated by Mike Kennedy with input data provided by Massoud Jourabch, Northwest Power and Conservation Council)

### Approach

1. Set completion date for projects that are missing the completion date (82% of projects) by assuming that projects are completed three years after initiation.
2. Map recommended measures to program measure categories (i.e., Design & Construction [D&C]: fully integrated, partially integrated, energy efficiency measures only; Building Operations [BOps]: BOps, capital upgrades, procurement) using the following definitions:
    a. **Fully Integrated Design** (FID): six or more qualified integrated measures[9] in three or more systems[10]
    b. **Partially Integrated Design** (PID): two or more integrated measures, but not enough to meet FID criteria
    c. **Energy Efficiency Measures Only**: any and/or all non-integrated measures, plus up to one integrated measure
    d. **Building Operations** (BOps): CTS does not provide enough information to categorize BOps projects into *BOps* or *capital upgrades*. Therefore, all the BOps projects are reported as *BOps*.
    e. **Procurement**: There are no procurement measures in the database

[9] In CTS database, a total of 22 unique strategy ideas were recorded in the fields *strat1* through *strat21* (three different daylighting measures were combined into one daylight measure). Of those, all but the following seven measures were considered as integrated measures: efficient electric lighting, lighting controls, occupancy sensors for lighting, efficient HVAC equipment, scheduling/optimization, high efficiency glazing, and insulation beyond code.

[10] The 22 unique measures were categorized into six different categories – *lighting*, *HVAC*, *ventilation*, *glazing*, *insulation*, and *other*. Each of these categories are referred as a system.

3. Estimate the number of projects completed in 2009 (where completion date is 2009), by market sector (i.e., large office buildings, small office buildings, healthcare, hospitals, and other) and measure category (i.e., FID, PID, energy efficiency measures, BOps).
4. Adjust the 2009 completed projects estimates (step 3) for attrition by estimating and applying an attrition rate to account for the fact that not all initiated projects are completed within three years (and there is no way of knowing which projects are incomplete in the database).
    a. Compute the fraction of projects in the CTS that do not have any recommended measures within three years of project initiation for projects initiated between 2003 and 2006, by Hospitals, Offices, Other, and BOps vs. D&C projects.
    b. Arbitrarily divide that fraction in two (since some projects will not have recorded measures that were completed, but it is unknown what fraction) for the estimated attrition rate.
5. Estimate the square footage penetrated in 2009 by multiplying the number of projects (step 4), by the average 2009 project square footage (used since square footage is missing 32% of the time), by market sector (i.e., large office buildings, small office buildings, healthcare, hospitals, and other) and measure category (i.e., FID, PID, energy efficiency measures, and BOps)
6. Calculate the 2009 adoption rate by dividing the 2009 square footage (step 5) penetrated by the total market size, based on the recent Power Council estimates (see input 1).
    a. **BOps Market Size**: 2009 population estimates do not account for prior program adoption.
    b. **D&C Market Size**: 2009 new construction estimate is used, which does not reflect cumulative new construction available for adoption in 2009 (some fraction of which was likely to have been penetrated by the program).

## ACE VALIDATION ESTIMATES OF MARKET SIZE

The following are the market size estimates used in the ACE review.

### Office

**Market Segments Growth in Total Floor Space (MM square feet)**

| Year | Owner Occupied (Non-governmental) | | Non-Owner Occupied (Governmental) | | Total | |
|---|---|---|---|---|---|---|
| | Large | Medium/Small | Large | Medium/Small | Large | Medium/Small |
| **2005** | 193.5 | 189.4 | 61.6 | 60.4 | 255.1 | 249.8 |
| **2006** | 198.1 | 194.0 | 63.1 | 61.8 | 261.3 | 255.8 |
| **2007** | 201.6 | 197.4 | 64.2 | 62.9 | 265.9 | 260.3 |
| **2008** | 205.3 | 201.0 | 65.4 | 64.1 | 270.7 | 265.1 |
| **2009** | 208.7 | 204.3 | 66.5 | 65.1 | 275.2 | 269.4 |
| **2010** | 214.5 | 210.0 | 64.3 | 63.0 | 278.8 | 273.0 |
| **2011** | 218.1 | 213.5 | 65.4 | 64.0 | 283.5 | 277.6 |
| **2012** | 221.6 | 217.0 | 66.5 | 65.1 | 288.1 | 282.1 |
| **2013** | 225.1 | 220.4 | 67.5 | 66.1 | 292.6 | 286.5 |
| **2014** | 228.2 | 223.5 | 68.4 | 67.0 | 296.7 | 290.5 |
| **2015** | 231.3 | 226.5 | 69.4 | 67.9 | 300.7 | 294.4 |
| **2016** | 234.2 | 229.3 | 70.2 | 68.8 | 304.5 | 298.1 |
| **2017** | 237.1 | 232.2 | 71.1 | 69.6 | 308.2 | 301.8 |
| **2018** | 240.2 | 235.2 | 72.0 | 70.5 | 312.2 | 305.7 |
| **2019** | 243.4 | 238.3 | 73.0 | 71.5 | 316.4 | 309.8 |
| **2020** | 247.3 | 242.1 | 74.1 | 72.6 | 321.4 | 314.7 |

## Health / Hospitals

**Market Segments Growth in Total Floor Space (MM square feet)**

| Year | Hospitals | Other Health | Total |
|---|---|---|---|
| **2004** | 60.6 | 133.1 | 193.6 |
| **2005** | 64.3 | 137.2 | 201.5 |
| **2006** | 65.3 | 140.8 | 206.2 |
| **2007** | 66.9 | 143.8 | 210.7 |
| **2008** | 68.5 | 146.9 | 215.4 |
| **2009** | 70.2 | 150.2 | 220.3 |
| **2010** | 70.8 | 152.5 | 223.3 |
| **2011** | 71.4 | 155.0 | 226.5 |
| **2012** | 72.4 | 158.1 | 230.5 |
| **2013** | 73.5 | 161.6 | 235.1 |
| **2014** | 74.5 | 165.0 | 239.5 |
| **2015** | 75.6 | 168.6 | 244.2 |
| **2016** | 76.6 | 171.8 | 248.4 |
| **2017** | 77.6 | 175.4 | 253.0 |
| **2018** | 78.6 | 179.2 | 257.8 |
| **2019** | 79.6 | 182.5 | 262.1 |
| **2020** | 80.6 | 185.9 | 266.4 |

# E SURVEYS AND INTERVIEW GUIDES

We intended the surveys to be no more than 20 minutes in length; in fact, the average time ranged across the markets between 14 and 19 minutes for nonparticipants. Average administration times for participants ranged from approximately 20 to 30 minutes, depending on the detail the respondent chose to provide.

## DESIGN AND CONSTRUCTION (D&C) MARKET SURVEY – 9/28/10

Hi, my name is _____ from Research Into Action and I'm calling on behalf of the Northwest Energy Efficiency Alliance BetterBricks program. I am not selling anything. We are talking to architects from a select sample of firms who design commercial office buildings and healthcare facilities in the Pacific Northwest.

IF CONTACT NAME KNOWN: I would like to speak with [Name]

IF CONTACT NAME NOT KNOWN: I would like to speak with the person at this office of your firm who is most familiar with your business in the office and healthcare markets, such as an owner, principal or senior designer. Who would that be?

NAME:

TITLE:

PHONE:

WHEN GET CORRECT PERSON: Hi, my name is __ calling from Research Into Action on behalf of BetterBricks, a program of the Northwest Energy Efficiency Alliance. I am not selling anything. We are doing a survey on design practices, and I am talking to architects to better understand the way in which office and healthcare buildings in the Pacific Northwest are designed.

Your participation in this study is very important, and the results of this research will guide many professional development activities targeted to architects in the Northwest over the next five years. Your responses are completely confidential.

If needed: Appointment date and time:_____

[IF ASKED] We would be happy to send you an executive summary for the results from this study, and the full study will be published on NEEA's website in early 2011.

SC1. Before we begin, I'd like to confirm that your organization is involved in the architectural or design aspect of commercial office buildings or healthcare facilities in the Pacific Northwest?

1. Yes, involved
2. No, not involved IF NOT, THANK AND TERMINATE

SC2. We would like information about your firm's design practices for commercial office buildings and/or healthcare facilities in the Pacific Northwest. Would you be able to provide us information on your work in these areas?

1. Yes
2. No ==> Is there another senior person at your firm responsible for commercial office or healthcare projects with whom we might speak? IF NOT, THANK AND TERMINATE

## About the Contact

Q1. Would you please tell me your title?

Q6. About how many new or renovated office and healthcare buildings in the Pacific Northwest have you been personally involved in designing since the beginning of 2008 (including those you are working on now)? _____ (Range 0-97)

Q7. And how many square feet did those new or renovated buildings represent? _____ (Range 1-1,000,000)

Q7a (If Q7=D/K) Would you say those new or renovated buildings were more than or less than 50,000 square feet?

1. More
2. Less

SC2. (IF Q6 is less than 3 AND Q7 is less than 50,000 square feet or Q7a =2) We are talking to architects who have designed at least 3 new commercial or institutional projects or a total of 50,000 square feet in the Pacific Northwest since 2008. Is there another senior person at your firm who might have such experience? IF NOT, THANK AND TERMINATE.

## About The Firm

Q17. How many offices does your firm have in the four states of the Pacific Northwest? [If necessary: Washington, Oregon, Idaho, and Montana] (Range 1-97)

Q18. How many employees work at your location? Would you say…

1. Less than 10,
2. 10-24,
3. 25 or more,

(If Q18=1) Thank you for your time, but we are looking to speak with organizations with 10 or more employees. Have a good day. (TERMINATE)

Q19. And how many of those are architects? (Range 1-997)

Thinking about all the projects in the Pacific Northwest that your office was involved in since the beginning of 2008--not just offices and healthcare--I'm going to ask you to give me your best estimate of the percentage breakdown of that square footage for several criteria: [IF SF NOT KNOWN, JUST IDENTIFY THE MARKETS IN WHICH THE FIRM HAS DESIGNED BUILDINGS BY ENTERING "101"]

What percent of the overall square footage was for buildings located in:

Q21. Washington (Range 0-100, 101=DK, but have buildings in this market, 102=DK)

Q22. Oregon (Range 0-100, 101=DK, but have buildings in this market, 102=DK)

Q24. Idaho (Range 0-100, 101=DK, but have buildings in this market, 102=DK)

Q25. Montana (Range 0-100, 101=DK, but have buildings in this market, 102=DK)

What percent of the overall square footage was for buildings in the following sectors?:

Q27. Hospital/medical/medical offices (Range 0-100, 101=DK, but have buildings in this sector, 102=DK)

Q28. Office Buildings (government and private) (Range 0-100, 101=DK, but have buildings in this sector, 102=DK)

Q29. K-12 schools (Range 0-100, 101=DK, but have buildings in this sector, 102=DK)

What percentage of the overall square footage was for buildings by the following project type?: NOTE; IF THESE DO NOT ADD TO 100 PERCENT, ASK THE RESPONDENT TO RE-ESTIMATE

Q30. Owner occupied _____%

Q31. Developer-built-to-lease _____%

What percentage of the overall square footage was for buildings by the following project type?: NOTE; IF THESE DO NOT ADD TO 100 PERCENT, ASK THE RESPONDENT TO RE-ESTIMATE

Q32. Design-build _____%

Q33. Design-bid-build _____%

## EUI, ES, Goals, Studies, Plans

Thank you for that background information. Now I have questions on your business practices. These questions explore your practices with all of your projects since 2008. [If needed, "not just your office and healthcare projects."]

Q34. Do any of your projects have written energy efficiency goals?

1. Yes
2. No

Q35. (if Q34=1) About what percentage of your projects have specific energy efficiency goals or targets other than meeting code? Would you say…

1. Zero
2. Less than Half,
3. About Half,
4. More than Half,
5. Virtually All

(if Q34=1) Using those same categories, about what percentage of your buildings over the past three years were designed to be …

Q37. ....at least 10% more efficient than code?

1. Zero
2. Less than Half,
3. About Half,
4. More than Half,
5. Virtually All

Q38. ...at least 25% more efficient than code?

1. Zero
2. Less than Half,
3. About Half,
4. More than Half,
5. Virtually All

Q39. Have any of the design projects you completed in the past three years obtained a certification rating such as LEED, Living Building, Green Globe, Earth Advantage?

1. Yes
2. No

Q40. (if Q39=1) What certifications? (Do not read, responses are pre-codes. Multiple responses allowed)

1. LEED
2. Living Building,
3. Green Globe,
4. Earth Advantage,
5. Other (specify)

Q41. (if Q40=1) How many of your projects completed in the past three years received LEED certification? (Range 1-997)

Q42. How many of those were LEED Platinum? (Range 0-997. NOTE: Response cannot be greater than Q41)

Q43. How many of those were.LEED Gold? (Range 0-997. NOTE: Response cannot be greater than Q41)

Q44. How many of those were LEED Silver? (Range 0-997. NOTE: Response cannot be greater than Q41)

Q45. Please rate your agreement with the following statement, where "1" indicates strongly disagree and "5" indicates strongly agree: The current LEED criteria guarantee energy efficient buildings.

1 2 3 4 5

Please let me know for about what proportion of your design projects you have done the following in the last three years:

Q57. Calculated the energy use per square foot of completed buildings (if necessary: also known as energy intensity, energy utilization index, or EUI)

1. Zero
2. Less than Half,
3. About Half,
4. More than Half,
5. Virtually All

Q58. (if Q57=1 through 5) Compared the energy use of completed buildings to the energy use as modeled during design

1. Zero
2. Less than Half,
3. About Half,
4. More than Half,
5. Virtually All

Q59. (if Q57=1 through 5) Used energy use per square foot results to establish key performance indicators across projects?

1. Zero
2. Less than Half,
3. About Half,
4. More than Half,
5. Virtually All

Q60. Completed a formal Post Occupancy evaluation or assessment?

1. Zero
2. Less than Half,
3. About Half,
4. More than Half,
5. Virtually All

Q61. Reported the results of a post-occupancy assessment or energy use calculation to the building owners?

1. Zero
2. Less than Half,
3. About Half,
4. More than Half,
5. Virtually All

Q62. Do you have any post-occupancy evaluations planned for any projects currently in design?

1. Yes
2. No

## Integrated Design

Q126. How familiar are you with the architectural design process called Integrated Design? Would you say…

1. Not at all,
2. Somewhat, or
3. Very

Q127. (if Q126=2 or 3) Has your firm used Integrated Design for any of its new construction, addition or renovation design projects in the last three years?

1. Yes
2. No

Q128. (if Q127=1) What proportion of your projects over the last three years has used integrated design elements?

1. Zero
2. Less than Half,
3. About Half,
4. More than Half,
5. Virtually All

For your projects over the last three years--thinking about the different people who were included on the design team from the beginning of the project, please tell me the extent of involvement each of the following groups had. Please indicate if the group was never or rarely included, sometimes included, or almost always included from the beginning of the design process:

Q130. The engineering consultant

1. Never or rarely included
2. Sometimes included, or
3. Almost always included

Q131. The general contractor

1. Never or rarely included
2. Sometimes included, or
3. Almost always included

Q132. Owner's representatives

1. Never or rarely included
2. Sometimes included, or
3. Almost always included

Q133. Representatives of the operations and maintenance staff

1. Never or rarely included
2. Sometimes included, or
3. Almost always included

Q134. The commissioning agent
1. Never or rarely included
2. Sometimes included, or
3. Almost always included

Q135. Representatives of the building users or occupants
1. Never or rarely included
2. Sometimes included, or
3. Almost always included

Q136. Thinking of these groups as possible members of the integrated team, about what proportion of projects used some sort of integrated team?
1. Zero
2. Less than Half,
3. About Half,
4. More than Half,
5. Virtually All

Q137. And considering just those projects that used some sort of integrated team, about how often did the integrated teams meet, on average, before the end of schematic design?
1. Daily
2. Several times a week
3. Several times a month
4. Once per month
5. Every other month
6. Less frequently than every other month

Q138. And how often, on average, did they meet after the end of schematic design?
1. Daily
2. Several times a week
3. Several times a month
4. Once per month
5. Every other month
6. Less frequently than every other month

Q139. Other than for code compliance, on how many of your last five projects did you use energy modeling to determine the design?

1. 1
2. 2
3. 3
4. 4
5. 5
6. 0

Q140. (if Q139=1-5) For those projects where you used energy modeling, on average, how many times during the design process was the whole building energy use modeled? (Range 1-97)

Q141. Were energy use models done for any of the individual buildings systems, such as cooling or lighting, by themselves?

1. Yes
2. No

Q142. (if Q141=1) Which systems were modeled? (Record)

In how many of your last five projects – if any – were the following features present:

Q144. A design charette was held where the designer meets with the owner, building operator, and consulting engineers?

1. 1
2. 2
3. 3
4. 4
5. 5
6. 0

Q145. Daylighting with controls, used to reduce electric lighting

1. 1
2. 2
3. 3
4. 4
5. 5
6. 0

Q146. Building orientation was selected to minimize heating, cooling, or lighting loads

1. 1
2. 2
3. 3
4. 4
5. 5
6. 0

Q147. Thermal mass of the building served to reduce heating and cooling loads

1. 1
2. 2
3. 3
4. 4
5. 5
6. 0

Q148. A major system--such as the chiller, boiler, ventilation, or lighting system-- was designed to use less significantly less energy than in comparable facilities or required by code.

1. 1
2. 2
3. 3
4. 4
5. 5
6. 0

Q150. Occupancy sensors were used to control ventilation

1. 1
2. 2
3. 3
4. 4
5. 5
6. 0

Q151. Energy efficient equipment was specified

1. 1
2. 2
3. 3
4. 4
5. 5
6. 0

Q152. Occupancy sensors were used to control lighting

1. 1
2. 2
3. 3
4. 4
5. 5
6. 0

Q153. Commissioning began during the design process

1. 1
2. 2
3. 3
4. 4
5. 5
6. 0

Q154. A plan was made for operator or occupant training

1. 1
2. 2
3. 3
4. 4
5. 5
6. 0

## Contracts

Q157. Do any of your design contracts with clients include specific energy efficiency requirements?

1. Yes
2. No

Q159. (if Q157=1) Can you briefly describe some of the energy efficiency provisions? (Probe for other than LEED) (Record)

## Commitment

Q161. Does the senior management of your firm believe a priority on energy efficient design will provide the firm with a strategic advantage?

1. Yes
2. No

Q163. Has your firm formally adopted, through policies and procedure statements, energy efficiency and sustainability goals for your design projects?

1. Yes
2. No

Q164. Has your firm accepted the AIA 2030 Challenge targets?

1. Yes
2. No

Q165. Have you formally adopted the AIA 2030 Commitment?

1. Yes
2. No

Q166. Does your firm consider energy efficiency to be part of its market identity?

1. Yes
2. No

Q167. Do your firm's marketing materials describe Integrated Design specialties?

1. Yes
2. No

Q168. Do your firm's marketing materials describe the advantages of energy efficient or high performance buildings?

1. Yes
2. No

Q169. Do your firm's marketing materials highlight its capabilities or successes with energy efficiency or sustainability?

1. Yes
2. No

Q170. Does your organization's website contain a section specifically featuring your sustainability or energy efficiency credentials, successes or related awards you have received?

1. Yes
2. No

Q176. About what proportion of your clients come to you specifically looking for designs that are more energy efficient than code? Would you say…

1. Zero
2. Less than Half,
3. About Half,
4. More than Half,
5. Virtually All

## Organization

Q178. Which best describes how your firm incorporates energy efficiency expertise into its design teams?

1. Sustainability specialists or advisors work with design teams,
2. A specific team does most of the sustainable and energy efficient designs,
3. Most teams have considerable expertise in sustainability and energy efficiency,
4. Most teams have some expertise in sustainability and energy efficiency, 5. Or something else (specify)

Q179. Does your firm have an in-house energy efficiency or sustainability specialist or group?

1. Yes
2. No

Q182. Has your firm retained outside energy efficiency or sustainability specialists or groups?

1. Yes
2. No

Q183. Do you have a mechanical engineer on staff that specifically supports energy efficient design?

1. Yes
2. No

Q184. In selecting engineering consultants, has your firm included in its criteria demonstrated Integrated Design or energy efficiency capability?

1. Yes
2. No

## Staff Training and Recognition

Q188. Have you or other staff participated in any seminars or training related to any aspect of energy efficiency and building design?

1. Yes
2. No

Q190. (if Q188=1) What organizations sponsored the presentation or training? (Do not read, responses are pre-codes. Multiple responses allowed, probe for additional responses)

1. AIA,
2. Cascadia Green Building Council,
3. Other (specify)

Q191. About what proportion of your design staff are LEED accredited? Would you say…

1. Zero
2. Less than Half,
3. About Half,
4. More than Half,
5. Virtually All

Q193. Does you firm allocate staff time to improving capability in energy efficiency?

1. Yes
2. No

Q194. Is energy efficiency included in your professional development planning for any staff?

1. Yes
2. No

Q196. Does your firm consider demonstrated competence in energy efficiency as a factor in promotion decisions?

1. Yes
2. No

Q198. Does your firm recognize its energy efficiency or sustainability achievements in staff meetings and credit key individuals and teams?

1. Yes
2. No

## Better Bricks Touch

Q200. Have you received project assistance or information from the Integrated Design Labs at state universities in Washington, Idaho, or Montana or from the Energy Studies in Buildings Lab at the University of Oregon?

1. Yes
2. No

Q201. Before today, have you heard of an organization called the Northwest Energy Efficiency Alliance or NEEA?

1. Yes
2. No

Q202. Before today, have you heard of BetterBricks or BetterBricks.com?

1. Yes
2. No

Q203. (if Q202=1) Have you or any of your staff visited the website BetterBricks.com and its Design and Construction section?

1. Yes
2. No

Q204. (if Q203=1) Have you or any of your staff used any ideas, materials or tools from the Better Bricks website?

1. Yes
2. No

Q206. (if Q202=1) Have you heard of the annual BetterBricks Awards for excellence in energy-efficient buildings?

1. Yes
2. No

Q207. (if Q206=1) Have you or any of your staff attended the BetterBricks Awards?

1. Yes
2. No

Q210. (if Q201=1 OR Q202=1) Have you seen any print advertisements or feature stories on Better Bricks or NEEA, or about a firm or facility involved with Better Bricks or NEEA?

1. Yes
2. No

Q211. (if Q201=1 OR Q202=1) Did BetterBricks or NEEA information, training, or assistance directly influence any your firm's practices regarding energy efficiency?

1. Yes
2. No

Q212. (if Q211=1) In what way? (Record)

Q213. (if Q201=1 OR Q202=1) Are there areas of your practice involving energy efficiency that have been enhanced by BetterBricks or NEEA activity?

1. Yes
2. No

Q217. Can you name three firms whose energy efficiency practices have influenced those of your firm?

1. Gave response
2. cannot name any firms

That's all of my questions. Thank you very much for your time.

## OFFICES AND REAL ESTATE (ORE) MARKET SURVEY – 9/29/10

Hi, my name is _____ from Research Into Action and I'm calling on behalf of the Northwest Energy Efficiency Alliance BetterBricks program. I am not selling anything. We are talking with experts from a select sample of real estate firms about key trends in energy efficiency and sustainability in the Northwest office market.

IF CONTACT NAME KNOWN: I would like to speak with [Name]

IF CONTACT NAME NOT KNOWN: a person who is responsible for asset management, property management, or portfolio operations for commercial office real estate. This position likely is responsible for budgets and planning across multiple buildings. Who would that be?

Name:

Title:

Phone:

[LIKELY TITLES: VP of Property Management, Senior Property Manager, Property Manager, General Manager, Asset Manager, Facility Director, Facility Manager, Manager of Facility Operations, Chief Engineer]

WHEN GET CORRECT PERSON Hi, my name is __ calling from Research Into Action on behalf of BetterBricks, a program of the Northwest Energy Efficiency Alliance. I am not selling anything. We are doing a survey on key trends in energy efficiency and sustainability in the Northwest office market.

Your participation in this study is very important, and the results of this research will guide many professional development activities for commercial real estate professionals in the Northwest over the next five years. Your responses are completely confidential. Is this a good time to talk or can we schedule another time? Our interviews take about 20 minutes.

If needed: Appointment date and time:_____

[IF ASKED] We would be happy to send you an executive summary for the results from this study, and the full study will be published on NEEA's website in early 2011.

SC1. Do your responsibilities include the management of operations and profitability for office buildings in the Pacific Northwest?

1. Yes
2. No ➔ Is another senior person at your firm responsible for asset or property management or portfolio operations with whom we might speak? IF NOT, THANK AND TERMINATE

## About The Contact

Q1. Please tell me your title?

Which of the following do your responsibilities cover?

Q2. Asset management
1. Yes
2. No

Q3. Property management
1. Yes
2. No

Q4. Portfolio management
1. Yes
2. No

IF NONE APPLY, THANK AND TERMINATE

Q6. For how many office buildings in the Pacific Northwest are you responsible? _____ (Range 0-97)

Q7. About how much square footage do these office buildings comprise? _____ (Range 1-1,000,000)

Q7a. (If Q7=D/K) Would you say those buildings you are responsible for were more than or less than 50,000 square feet?
1. More
2. Less

SC2. (If Q6 less than 3 and Q7 is less than 50,000 square feet or Q7a=2): We are talking to commercial real estate managers with responsibility for at least 3 office buildings or a total of 50,000 square feet of offices in the Pacific Northwest. Is there another senior person at your firm responsible for asset management, property management or portfolio operations who might have such experience? IF NOT, THANK AND TERMINATE

## About The Firm

Which of these roles does your firm play in the office real estate market in the four sates of the Pacific Northwest (If necessary: Washington Oregon, Idaho, and Montana)?

Q13. Owner
1. Yes
2. No

Q14. Developer
1. Yes
2. No

Q15. Manager
1. Yes
2. No

Q16. Any other roles (please specify) _____

IF Q15 NE 1, THANK AND TERMINATE

Q17. How many offices does your firm have in the fours states of the Pacific Northwest? [If necessary: Washington, Oregon, Idaho, and Montana] (open-ended)

Q18. How many employees work at your location? Would you say…
1. Less than 10
2. 10-24
3. 25 or more

(IF Q18=1) Thank you for your time, but we are looking to speak with organizations with 10 or more employees. Have a good day. (TERMINATE).

Q20. What category best describes the total square footage of commercial real estate managed by your office? Would you say…
1. Less than 2 million
2. 2 million to less than 4 million, or
3. 4 million or more

And about what percentage of this square footage is in each of the following geographic areas: [NOTE: If respondent replies D/K, PROBE: You may be uncertain of the percentage of overall square footage, but do you have buildings in this market?]

Q21. Seattle/ Bellevue/Puget Sound (Range 0-100, 101=DK, but have buildings in this market, 102=D/K)

Q22. Portland Metro (Range 0-100, 101=DK, but have buildings in this market, 102=D/K)

Q23. Spokane (Range 0-100, 101=DK, but have buildings in this market, 102=D/K)

Q24. Boise (Range 0-100, 101=DK, but have buildings in this market, 102=D/K)

Q25. Elsewhere in the Pacific Northwest (Range 0-100, 101=DK, but have buildings in this market, 102=D/K)

## EUI, ES, Goals, Studies, Plans

Thank you for that background information. Now I have questions on your business practices.

You indicated that about [READ IN Q6] buildings are currently under your responsibility or oversight.

Please let me know for about what proportion of these buildings you have done the following in the last two years: Please use the categories of None, Less than Half, About Half, More than Half, Virtually All

Q64. Obtained an ENERGY STAR score

1. None
2. Less than Half
3. About Half
4. More than Half
5. Virtually All

Q65 (if Q64=2-5) Kept the ENERGY STAR score current by regularly updating the information

1. None
2. Less than Half
3. About Half
4. More than Half
5. Virtually All

Q66. (if Q64=2-5) Set a goal or target for energy use or energy use reduction [Note: target can be for multiple buildings considered collectively and does not need to be for an individual building]

1. None
2. Less than Half
3. About Half
4. More than Half
5. Virtually All

Q67. (if Q64=2-5) Conducted a study to identify ways to reduce building energy use

1. None
2. Less than Half
3. About Half
4. More than Half
5. Virtually All

Q68. (if Q64=2-5) Created a plan to reduce building energy use

1. None
2. Less than Half
3. About Half
4. More than Half
5. Virtually All

Q69. (if Q64=2-5) Taken steps to reduce building energy use

1. None
2. Less than Half
3. About Half
4. More than Half
5. Virtually All

Q71. (if Q69=2-5)Have you seen an improvement in the energy performance of any of your buildings?

1. Yes
2. No

Q72. (if Q71=1) What changes did you make that likely led to the improved energy performance? (open-ended)

## EUI and ES Details

Q85. (if Q64=2-5) AND (if Q66=2-5) Have you used the ENERGY STAR results to help in establishing an energy use or savings target? [If needed, the results on ENERGY STAR score]

1. Yes
2. No

Q87. Have you used ENERGY STAR results to attract a new client?

1. Yes
2. No

Q88. (if Q64=2-5) Have you reported ENERGY STAR results to building owners decision makers?

1. Yes
2. No

Q89 (if Q64=2-5) Have you trained any of your staff in using ENERGY STAR Portfolio Manager?

1. Yes
2. No

## Study Details

Q92. (if Q67=2 or 3) You mentioned you have conducted a study to identify ways to reduce building energy use, but have not done so for all of your buildings. Do you currently have plans to study most of the remaining buildings over the next two years?

1. Yes
2. No

Q93. (if Q67=1, 4 or 5) Do you have plan within the next two years to conduct a study to identify opportunities to reduce building energy use?

1. Yes
2. No

Q94a. (if Q67=2-5) Was more than one building studied?

1. Yes
2. No

Q94. (if Q67=2-5) Who conducted the study, was it: (PROGRAMMERS NOTE: If Q94a=1, allow multiple responses for Q94. If Q94a=2, Q94 is single response only)

1. The utility
2. Staff working for your firm
3. Contractors, or
4. Someone else (specify)

Q95. (if Q67=2-5) Did the study look for operations and maintenance changes that might lower energy costs?

## Plan Details

You indicated you have created a plan to reduce building energy use. Which of the following describe the plan? [If respondent having indicates several plans with different characteristics, ask if any of the plans include any of the following]

Q98. (if Q68=2-5) Plan is written (If necessary, "not jut generally understood")

1. Yes
2. No

Q99. (if Q68=2-5) Plan includes numeric goals for energy savings or use
1. Yes
2. No

Q101. (if Q68=2-5) Plan includes a timeline
1. Yes
2. No

Q103. (if Q68=2-5) Plan includes a budget
1. Yes
2. No

Q104. (if Q68=2-5) Plan is authorized by senior management
1. Yes
2. No

Q105. (if Q68=2-5) Senior management receives updates on plan achievements
1. Yes
2. No

## Goal Details in Absence of Plan

You indicated you have created a goal to reduce building energy use. Which of the following describe the goal? [If respondent indicates having several goals with different characteristics, ask if any of the goals include any of the following]

Q108. (if Q66=2-5 AND Q68=1, D/K or Ref) Goal is written (If necessary, "not jut generally understood"
1. Yes
2. No

Q109. (if Q66=2-5 AND Q68=1, D/K or Ref) Goal specifies numeric targets for energy savings or use
1. Yes
2. No

Q110. (if Q66=2-5 AND Q68=1, D/K or Ref) Goal includes a completion date

1. Yes
2. No

Q112. (if Q66=2-5 AND Q68=1, D/K or Ref) Goal includes a budget

1. Yes
2. No

Q113. (if Q66=2-5 AND Q68=1, D/K or Ref) Goal is authorized by senior management

1. Yes
2. No

Q114. (if Q66=2-5 AND Q68=1, D/K or Ref) Senior management receives updates on progress toward goal

1. Yes
2. No

## Action Details

Q116. (if Q69=2-5) For any of your buildings, have you replaced existing equipment with high-efficiency equipment in the last two years?

1. Yes
2. No

Q117. (if Q69=2-5) For any of your buildings, have you made any no or low cost changes in operations or maintenance to reduce energy costs in the last two years?

1. Yes
2. No

## Contracts

Q157. Do any of your contracts with equipment service providers include energy efficiency requirements?

1. Yes
2. No

Q158. Has your firm adopted language specific to energy efficiency in your leasing and property management contracts?

1. Yes
2. No

Q159. (if Q158=1) Can you briefly describe some of the energy efficiency provisions? (open-end)

## Commitment

Q161. Does the senior management of your organization believe a commitment to sustainability or energy efficient facilities will provide the organization with a strategic advantage?

1. Yes
2. No

Q162. Please rate the extent to which you agree with the following statement, where "1" signifies strongly disagree and "5" signifies strongly agree: Decreasing a building's typical energy use increases its asset value.

1 2 3 4 5

Q163. Have energy efficiency and sustainability goals been formally adopted through a mission statement or policy and procedures statements?

1. Yes
2. No

Q166. Does your firm consider energy efficiency to be part of its brand identity?

1. Yes
2. No

Q169. Do your firm's marketing materials highlight its capabilities or successes with energy efficiency or sustainability?

1. Yes
2. No

Q170. Does your organization's website contain a section specifically featuring your sustainability or energy efficiency credentials, successes or related awards you have received?

1. Yes
2. No

Does your firm communicate with any of the following groups about energy efficiency and sustainability for the property?

Q172. Tenants?

1. Yes
2. No

Q173. Property management teams?

1. Yes
2. No

Q174. Owners?

1. Yes
2. No

Q175. Service providers?

1. Yes
2. No

## Organization

Q179. Has your firm established a specific individual, team or committee responsible for energy use reduction and/ or sustainability?

1. Yes
2. No

## Staff Training and Recognition

Q186. Have you trained any of your building engineers and operators in how to conduct studies to identify energy savings opportunities?

1. Yes
2. No
3. Not-applicable: Do not employ staff appropriate for this

Q187. Have you identified contractors with demonstrated capability to conduct studies to identify energy savings opportunities?

1. Yes
2. No

Q188. Have you or other staff participated in any seminars or training related to any aspect of energy efficiency in office real estate?

1. Yes
2. No

Q190. (if Q188=1) What organizations sponsored the presentation or training? (open-ended with pre-codes, check all that apply, continue to probe with "Anything else?":)

1. BOMA
2. ULI (Urban Land Institute)
3. IFMA
4. AIA
5. Cascadia Green Building Council
6. CEM
7. Other (specify)

Q193. Does you firm allocate staff time for improving capability in energy efficiency?

1. Yes
2. No

Q194. Is energy efficiency included in your professional development planning for any staff?

1. Yes
2. No

Q195. Would you say that over the last year staff have received more training in energy efficiency than in previous years?

1. Yes
2. No

Q196. Does your firm consider demonstrated competence in energy efficiency as a factor in promotion decisions?

1. Yes
2. No

Q197. Is energy efficiency included in job descriptions of managerial staff positions?

1. Yes
2. No

Q198. Does your firm recognize its energy efficiency or sustainability achievements in staff meetings and credit key individuals and teams?

1. Yes
2. No

## Better Bricks Touch

Q201. Before today, have you heard of an organization called the Northwest Energy Efficiency Alliance or NEEA?

1. Yes
2. No

Q202. Before today, have you heard of BetterBricks or BetterBricks.com?

1. Yes
2. No

Q203. (if Q202=1) Have you or any of your staff visited the website BetterBricks.com and its Office Real Estate section?

1. Yes
2. No

Q204. (if Q203=1) Have you or any of your staff used any ideas, materials or tools from the Better Bricks website?

1. Yes
2. No

Q205. (if Q204=1)What was the topic? (open-ended w/ pre-codes, check all that apply)

1. Leasing
2. Property Management Agreements
3. Other (specify)

Q206. (if Q202=1) Have you heard of the annual BetterBricks Awards?

1. Yes
2. No

Q207. (if Q206=1) Have you or any of your staff attended the BetterBricks Awards?

1. Yes
2. No

Q209. Have you seen the High Performance Portfolio Framework?

1. Yes
2. No

Q210. (if Q201=1 or Q202=1) Have you seen any print advertisements or feature stories on Better Bricks or NEEA, or about a firm or facility involved with Better Bricks or NEEA?

1. Yes
2. No

Q211. (if Q201=1 or Q202=1) Did BetterBricks or NEEA information, training, or assistance directly influence any your firm's practices regarding energy efficiency?

1. Yes
2. No

Q212. (if Q211=1) In what way? (open-ended)

Q213. (if Q201=1 or Q202=1) Are there areas of your practice involving energy efficiency that have been enhanced by BetterBricks or NEEA activity?

1. Yes
2. No

Q214. (if Q21=1-101) Have any of your buildings participated in the Kilowatt Crackdown competitions?

Q215 (if Q22=1-101) Have any of your buildings participated in the Office Energy Showdown competitions?

Q217. Can you name three firms whose energy efficiency practices have influenced those of your firm? (open-ended)

1. Gave response
2. Cannot name any firms

That's all of my questions. Thank you very much for your time.

## HOSPITALS AND HEALTHCARE MARKET SURVEY – 10/04/10

Hi, my name is _____ calling on behalf of the Northwest Energy Efficiency Alliance BetterBricks program.

[If FF=0] I am not selling anything. We are talking with facility directors from a select sample of hospitals about key trends in hospital facility operations in the Northwest.

IF CONTACT NAME KNOWN: I would like to speak with [Name]

[If FF=0] IF CONTACT NAME NOT KNOWN: the Director of Facilities or manager responsible for facility operations. Who would that be?

Name:

Title:

Phone:

[If FF=0; WHEN GET CORRECT PERSON] Hi, my name is __ calling on behalf of BetterBricks, a program of the Northwest Energy Efficiency Alliance. I am not selling anything. We are surveying hospital facility directors on current practices in facility operations in the Northwest. Your participation in this study is very important, and the results of this research will guide many professional development activities for hospital facilities staff in the Northwest over the next five years. Your responses are completely confidential. Is this a good time to talk or can we schedule another time? Our interviews take about 20 minutes.

If needed: Appointment date and time:_____

[IF ASKED] We would be happy to send you an executive summary for the results from this study, and the full study will be published on NEEA's website in early 2011.

SC1. Are you responsible for decisions about facility operations and management for hospital facilities in the Pacific Northwest?

1. Yes
2. No ➔Is there another senior person responsible for decisions about facility operations and management with whom we might speak? IF NOT, THANK AND TERMINATE

### About the Contact

Q1. Please tell me your title?

Q5. Do your responsibilities include directing new construction, major renovation or additions for your organization?

1. Yes
2. No

Q6. How many beds are in the facilities you are responsible for? Would you say

1. 1-149
2. 150-249
3. 250-349, or
4. 350 or more

[IF LESS THAN 150 BEDS] We are talking with Facility Directors at larger facilities, those with at least 150 beds. So that is all my questions for you. Thank you very much. TERMINATE

## About the Firm

Q17. How many acute-care locations does your organization have in the four states of the Pacific Northwest? [If necessary: Washington, Oregon, Idaho, and Montana] (Range 1-97)

Q18. About how many staff work in operations and maintenance at this location? Would you say…

1. 1-4
2. 5-9
3. 10-24, or
4. 25 or more

## EUI, ES, Goals, Studies, Plans

Thank you for that background information. Now I have questions on your business practices.

You indicated that about [Read in Q17] buildings are currently under your responsibility or oversight.

Please let me know for about what proportion of these buildings you have done the following in the last three years: Please use the categories of None, Less than Half, About Half, More than Half, Virtually All

Q57. Calculated the energy use per square foot (EUI=1) (if necessary: also known as energy intensity, energy utilization index, or EUI)

1. None
2. Less than Half
3. About Half
4. More than Half
5. Virtually All

Q63 (if Q57=2-5) Kept the estimate of energy use per square foot current by regularly updating the information

1. None
2. Less than Half
3. About Half
4. More than Half
5. Virtually All

Q64. Obtained an ENERGY STAR score

1. None
2. Less than Half
3. About Half
4. More than Half
5. Virtually All

Q65 (if Q64=2-5) Kept the ENERGY STAR score current by regularly updating the information

1. None
2. Less than Half
3. About Half
4. More than Half
5. Virtually All

Q66. Set a goal or target for energy use or energy use reduction [Note: target can be for multiple buildings considered collectively and does not need to be for an individual building]

1. None
2. Less than Half
3. About Half
4. More than Half
5. Virtually All

Q67. Conducted a study to identify ways to reduce building energy use

1. None
2. Less than Half
3. About Half
4. More than Half
5. Virtually All

Q68. Created a plan to reduce building energy use

1. None
2. Less than Half
3. About Half
4. More than Half
5. Virtually All

Q69. Taken steps to reduce building energy use

1. None
2. Less than Half
3. About Half
4. More than Half
5. Virtually All

Q71. (if Q69=2-5) Have you seen an improvement in the energy performance of any of your buildings?

1. Yes
2. No

Q72. (if Q71=1) What changes did you make that likely led to the improved energy performance? (open-ended)

Q73. Are you familiar with life-cycle cost analysis, also called total cost of ownership analysis?

1. Yes
2. No

Q74. (if Q73=1) Which statement best describes your organization's investment decision-making with respect to life-cycle cost analysis. Would you say you:

1. Have not used nor plan to use life-cycle cost analysis
2. Have plans to use life-cycle cost analysis for some investments
3. Have made investments based on lowest life-cycle cost

## EUI and ES Details

Q76. (if Q64=1, D/K or Ref AND Q57=2-5) You indicated you've calculated the energy use per square foot. What tool did you use, if any? (multiple response) (do not read)

1. ENERGY STAR Portfolio Manager
2. Energy Expert
3. Utility Manager Pro
4. Avista IQ
5. Microsoft Excel
6. Other (specify)

(if Q64=1, D/K or Ref AND Q57=2-5) READ: What are you comparing the results to? Are you…

(if Q64=2-5) READ: You indicated you've obtained an ENERGY STAR score. What are you comparing the results to? Are you…

Q80. (if Q57=2-5 or Q64=2-5) Comparing across buildings you are responsible for?

1. Yes
2. No

Q81. (if Q57=2-5 or Q64=2-5) Comparing across buildings in the region?

1. Yes
2. No

Q82. (if Q57=2-5 or Q64=2-5) Comparing performance of the same building over time?

1. Yes
2. No

Q83. (if Q66=2-5) Comparing building performance to energy use goals?

(if Q57=2-5 or Q64=2-5) Have you done any of the following with the results? Have you… [If needed, the results on energy use per square foot or ENERGY STAR score]

Q85. (if Q66=2-5) Used results to help in establishing an energy use or savings target?

1. Yes
2. No

Q88. Reported results to building owners decision makers

1. Yes
2. No

Q89. (if Q64=2-5) Have you trained any of your staff in using ENERGY STAR Portfolio Manager?

1. Yes
2. No

## Study Details

Q92. (if Q67=2-3) You mentioned you have conducted a study to identify ways to reduce building energy use, but have not done so for all of your buildings. Do you currently have plans to study most of the remaining buildings over the next two years?

1. Yes
2. No

Q93. (if Q67=1) Do you have plan within the next two years to conduct a study to identify opportunities to reduce building energy use?

1. Yes
2. No

Q94a. (if Q67=2-5) Was more than one building studied?

1. Yes
2. No.

Q94. (if Q67=2-5) Who conducted the study, was it: (PROGRAMMERS NOTE: If Q94a=1, allow multiple responses for Q94. If Q94a=2, Q94 is single response only)

1. The utility
2. Staff working for your firm
3. Contractors, or
4. Someone else (specify)

Q95 (if Q67=2-5) Did the study look for operations and maintenance changes that might lower energy costs?

1. Yes
2. No

## Plan Details

You indicated you have created a plan to reduce building energy use. Which of the following describe the plan? [If respondent having indicates several plans with different characteristics, ask if any of the plans include any of the following]

Q98. (if Q68=2-5) Plan is written (If necessary, "not jut generally understood")

1. Yes
2. No

Q99. (if Q68=2-5) Plan includes numeric goals for energy savings or use

1. Yes
2. No

Q100. (if Q68=2-5) Plan includes specific action items

1. Yes
2. No

Q101. (if Q68=2-5) Plan includes a timeline

1. Yes
2. No

Q102. (if Q68=2-5) Plan identifies the responsible parties
1. Yes
2. No

Q103. (if Q68=2-5) Plan includes a budget
1. Yes
2. No

Q104. (if Q68=2-5) Plan is authorized by senior management
1. Yes
2. No

Q105. (if Q68=2-5) Senior management receives updates on plan achievements
1. Yes
2. No

## Goal Details in absence of plan

You indicated you have created a goal to reduce building energy use. Which of the following describe the goal? [If respondent indicates having several goals with different characteristics, ask if any of the goals include any of the following]

Q108. (if Q66=2-5 AND Q68=1) Goal is written (If necessary, "not just generally understood")
1. Yes
2. No

Q109. (if Q66=2-5 AND Q68=1) Goal specifies numeric targets for energy savings or use
1. Yes
2. No

Q110. (if Q66=2-5 AND Q68=1) Goal includes a completion date
1. Yes
2. No

Q111. (if Q66=2-5 AND Q68=1) Goal identifies the responsible parties
1. Yes
2. No

Q112. (if Q66=2-5 AND Q68=1) Goal includes a budget
1. Yes
2. No

Q113. (if Q66=2-5 AND Q68=1) Goal is authorized by senior management
1. Yes
2. No

Q114. (if Q66=2-5 AND Q68=1) Senior management receives updates on progress toward goal
1. Yes
2. No

## Action Details

Q116. (if Q69=2-5) For any of your buildings, have you replaced existing equipment with high-efficiency equipment in the last three years?
1. Yes
2. No

Q117. (if Q69=2-5) For any of your buildings, have you made any no or low cost changes in operations or maintenance to reduce energy costs in the last three years?
1. Yes
2. No

Please indicate whether in the last two years you have done any of the following or identified the need to do so….

Q119. (if Q69=2-5) Improved the scheduling of equipment, such as lighting and HVAC?
1. Yes
2. No

Q120. (if Q69=2-5) Corrected situations of simultaneous heating and cooling?
1. Yes
2. No

Q121. (if Q69=2-5) Adjusted the outside air usage or economizer functioning?

1. Yes
2. No

Q122. (if Q69=2-5) Recalibrated sensors in the last two years?

1. Yes
2. No

## Integrated Design

Q124. In the last three years, has your organization initiated any new construction, renovation, or addition project?

1. Yes
2. No

Q125. (if Q124=1) Did you have any involvement in the design of that project?

1. Yes
2. No

Q126. How familiar are you with the architectural design process called Integrated Design? Would you say…

1. Not at all
2. Somewhat, or
3. Very

Q127. (if Q126=2 or 3) Has your organization used integrated design for any of its new construction, addition or renovation design projects in the last three years?

1. Yes
2. No

Q139. (if Q125=1) Other than for code compliance, did you use energy modeling to determine the design?

1. Yes
2. No

Q144. (if Q125=1) Was a design charette held where the architect meets with the owner, building operator, and consulting engineers?

1. Yes
2. No

Q148. (if Q125=1) Was any major system--such as the chiller, boiler, ventilation, or lighting system--designed to use less significantly less energy than in comparable facilities or required by code?

1. Yes
2. No

Q149. (if Q148=1) What system? (open-ended w pre-codes. Do Not Read)

1. chiller
2. boiler
3. ventilation
4. lighting
5. Other (specify)

Q155. (if Q126=2 or 3) Does your organization plan to request for future new construction projects that your A&E team be experienced in or willing to learn Integrated design?

1. Yes
2. No

## Contracts

Q157. Do any of your contracts with equipment service providers include energy efficiency requirements?

1. Yes
2. No

Q158. Has your organization included energy efficiency requirements in any of its specs for equipment purchases?

1. Yes
2. No

Q159. (if Q158=1) Which equipment specs have included energy efficiency requirements? (open-end)

## Commitment

Q161. Does the senior management of your organization believe a commitment to sustainability or energy efficient facilities will provide the organization with a strategic advantage?

1. Yes
2. No

Q163. Have energy efficiency and sustainability goals been formally adopted through a mission statement or policy and procedures statements?

1. Yes
2. No

Q166. Does your organization consider sustainability or energy efficiency to be part of its market identity?

1. Yes
2. No

## Organization

Q179. Has your firm established a specific individual, team or committee responsible for energy use reduction and/ or sustainability?

1. Yes
2. No

## Staff Training and Recognition

Q186. Have you trained any of your building engineers and operators in how to conduct studies to identify energy savings opportunities?

1. Yes
2. No
3. (vol) Not Applicable - don't employ staff appropriate for this

Q187. Have you identified contractors with demonstrated capability to conduct studies to identify energy savings opportunities?

1. Yes
2. No

Q188. Have you or any of the O&M staff participated in any seminars or training related to energy efficiency?

1. Yes
2. No

Q189. (if Q188=1) About what proportion of the O&M staff have received training related to energy efficiency? Would you say…

1. Less than Half
2. More than Half, or
3. Virtually All

Q190. (if Q188=1) What organizations sponsored the presentation or training? (open-ended with pre-codes, Do not read, multiple response, continue to probe with "Anything else?":)

1. BOC
2. CEM
3. IFMA
4. AIA
5. Cascadia Green Building Council
6. OSHE
7. WASHE
8. Society of Healthcare Engineers
9. Conferences
10. PGE
11. Utility
12. Seattle IDL (Integrated Design Lab)
13. Practice Greenhouse
14. University of Washington
15. Community colleges
16. Other (specify)

Q191. (if Q188=1) Have you or any of your staff received certifications relating to energy efficiency?

1. Yes
2. No

Q192. (if Q191=1) What certifications? (Pre-codes, do not Read):

1. BOC
2. CEM
3. Other (specify)

Q193. Does your organization allocate time for your operations staff to improve capability in energy efficiency?

1. Yes
2. No

Q194. Is energy efficiency included in your professional development planning for any staff?

1. Yes
2. No

Q195. Would you say that over the last two years operations staff have received more training in energy efficiency than in previous years?

1. Yes
2. No

Q196. Does your organization consider demonstrated competence in energy efficiency as a factor in promotion decisions?

1. Yes
2. No

Q197. Is energy efficiency included in job descriptions of operational staff positions?

1. Yes
2. No

Q198. Does your organization recognize its energy efficiency or sustainability achievements in staff meetings and credit key individuals and teams?

1. Yes
2. No

## Better Bricks Touch

Q200. Have you received project assistance or information from the Integrated Design Labs at state universities in Washington, Idaho, or Montana or from the Energy Studies in Buildings Lab at the University of Oregon?

1. Yes
2. No

Q201. Before today, have you heard of an organization called the Northwest Energy Efficiency Alliance or NEEA?

1. Yes
2. No

Q202. Before today, have you heard of BetterBricks or BetterBricks.com?

1. Yes
2. No

Q203. (if Q202=1) Have you or any of your staff visited the website BetterBricks.com and its Healthcare section?

1. Yes
2. No

Q204. (if Q203=1) Have you or any of your staff used any ideas, materials or tools from the Better Bricks website?

1. Yes
2. No

Q206. (if Q202=1) Have you heard of the annual BetterBricks Awards for excellence in energy-efficient buildings?

1. Yes
2. No

Q207. (if Q206=1) Have you or any of your staff attended the BetterBricks Awards?

1. Yes
2. No

Q208. (if Q207=1) Has anyone in your organization received a BetterBricks Award?

1. Yes
2. No

Q210. (if Q201=1 or Q202=1) Have you seen any print advertisements or feature stories on Better Bricks or NEEA, or about a firm or facility involved with Better Bricks or NEEA?

1. Yes
2. No

Q211. (if Q201=1 or Q202=1) Did BetterBricks or NEEA information, training, or assistance directly influence any your firm's practices regarding energy efficiency?

1. Yes
2. No

Q212. (if Q211=1) In what way? (open-ended)

Q213. (if Q201=1 or Q202=1) Are there areas of your practice involving energy efficiency that have been enhanced by BetterBricks or NEEA activity?

1. Yes
2. No

Q217. Can you name three firms whose energy efficiency practices have influenced those of your firm? (open-ended)

1. Gave response
2. Cannot name any firms

That's all of my questions. Thank you very much for your time.

## BUILDING OPERATORS (BOPS) MARKET SURVEY – 10/28/10

Intro A: Hi, my name is _____ calling on behalf of the Northwest Energy Efficiency Alliance BetterBricks program.

I am not selling anything. We are talking with experts from a select sample of mechanical contractors about key trends in building systems operations and servicing in the Northwest.

IF CONTACT NAME KNOWN: I would like to speak with [Name]

IF CONTACT NAME NOT KNOWN: a sales manager who is responsible for mechanical operations and service contracts with commercial offices or healthcare facilities. Who would that be?

Name:

Title:

Phone:

[WHEN GET CORRECT PERSON] Hi, my name is __ calling on behalf of BetterBricks, a program of the Northwest Energy Efficiency Alliance. I am not selling anything. We are surveying mechanical contractors on current practices in mechanical systems servicing and maintenance in Northwest office and healthcare facilities. Your participation in this study is very important, and the results of this research will guide many professional development activities for mechanical contractors in the Northwest over the next five years.

If needed: Appointment date and time:_____

[IF ASKED] We would be happy to send you an executive summary for the results from this study, and the full study will be published on NEEA's website in early 2011.

SC1. Do your responsibilities cover marketing, sales, and contracts for mechanical systems operations and servicing to commercial office buildings and/or healthcare clients in the Pacific Northwest?

1. Yes
2. No -> Is there another senior person at your firm responsible for marketing, sales, and contracts in the office building or healthcare sectors with whom we might speak? IF NOT, THANK AND TERMINATE. If another respondent comes to the phone, return to Intro A

### About the Contact

Q1. Please tell me your title?

Q6. For how many commercial office buildings are you responsible? _____ (Range 0-97)

Q7. About how much square footage do these commercial office buildings comprise? (Range 1-1,000,000)

Q8. For how many healthcare buildings are you responsible? ____ (Range 0-97)

Q9. About how much square footage do these healthcare buildings comprise? (Range 1-1,000,000)

SC2. [IF Q6 + Q8 LESS THAN 3 AND Q7 + Q9 LESS THAN 250,000 SQUARE FEET] We are talking to sales managers with responsibility for at least 3 buildings or a total of 250,000 square feet in the Pacific Northwest. Is there another sales manager at your firm who might have such experience? IF NOT, THANK AND TERMINATE. If another respondent comes to phone, return to Intro A.

## About the Firm

About what proportion of your firm's revenue comes from the following market sectors?...

Q10. Residential (Range 0-100)

Q11. Commercial (Range 0-100)

Q12. Industrial (Range 0-100)

SC3. [IF Q11 LESS THAN 50%, THANK AND TERMINATE]

Which of the following activities does your firm engage in for building mechanical systems?

Q13. Design
1. Yes
2. No

Q14. Installation
1. Yes
2. No

Q15. Servicing
1. Yes
2. No

SC4. [IF Q15=2 THANK AND TERMINATE]

Q17. How many offices does your firm have in the four states of the Pacific Northwest? [If necessary: Washington, Oregon, Idaho, and Montana] (open-ended)

Q18. About how many employees work at your location? Would you say…
1. 1-4
2. 5-9
3. 10-24
4. 25 or more

SC5. [IF Q18=1 or 2 THANK AND TERMINATE]

Q19. About how many of these are engaged in the equipment servicing arena—both sales and operations? _____ (Range 0-97)

In which of the following regions does your firm have a market presence?

Q21. Seattle/ Bellevue/Puget Sound
1. Yes
2. No

Q22. Portland Metro
1. Yes
2. No

Q23. Spokane
1. Yes
2. No

Q24. Boise
1. Yes
2. No

Q26. Elsewhere in the Pacific Northwest

1. Yes
2. No

## EUI, ES, Goals, Studies, Plans

Thank you for that background information. Now I have questions on your business practices. These questions explore your practices with your entire customer base. [If needed, "not just your office and healthcare customers."]

Q46. Do you have written service protocols for energy efficiency service offerings to include in contracts?

1. Yes
2. No

Which of the following, if any, are included in any of your service packages?...

Q48. Tracking building energy costs?

1. Yes
2. No

Q49. Calculating the energy use per square foot or ENERGY STAR score?

1. Yes
2. No

Q50. Conducting a study focused on energy savings opportunities?

1. Yes
2. No

Q52. (if Q48, Q49, or Q50=1) What do you call your service package that includes these features? (open-ended)

Q53. (if Q48, Q49, or Q50=1) Are these service packages sold by your entire sales force, or are there energy efficiency specialists that sell these services?

1. All
2. Specialists

Q54. (if Q48, Q49, or Q50=1) Do you have sales targets for these products?

1. Yes
2. No

Q55a. Earlier you mentioned you mentioned you are responsible for the operation of [READ IN Q6 response] buildings. For about how many of these buildings are you providing any energy efficiency services? (Range 1-97) [PROGRAMMERS NOTE: Q55a cannot be GT Q6]

Please let me know for about what proportion of these buildings you have done the following in the last two years: Please use the categories of None, Less than Half, About Half, More than Half, Virtually All

Q57. Calculated the energy use per square foot (if necessary: also known as energy intensity, energy utilization index, or EUI)

1. None
2. Less than Half
3. About Half
4. More than Half
5. Virtually All

Q63. (if Q57=2-5) Kept the estimate of energy use per square foot current by regularly updating the information

1. None
2. Less than Half
3. About Half
4. More than Half
5. Virtually All

Q64. Obtained an ENERGY STAR score

1. None
2. Less than Half
3. About Half
4. More than Half
5. Virtually All

Q65. (if Q64=2-5) Kept the ENERGY STAR score current by regularly updating the information

1. None
2. Less than Half
3. About Half
4. More than Half
5. Virtually All

Q66. Set a goal or target for energy use or energy use reduction [Note: target can be for multiple buildings considered collectively and does not need to be for an individual building]

1. None
2. Less than Half
3. About Half
4. More than Half
5. Virtually All

Q67. Conducted a study focused on energy saving opportunities

1. None
2. Less than Half
3. About Half
4. More than Half
5. Virtually All

Q68. Created a proposal for services to address energy savings opportunities

1. None
2. Less than Half
3. About Half
4. More than Half
5. Virtually All

Q69. Taken steps to reduce building energy use

1. None
2. Less than Half
3. About Half
4. More than Half
5. Virtually All

Q70. About what proportion of your contracts, if any, specifically include pursuing energy efficiency by such things as making needed adjustments to equipment schedules, sensors, and controls? Please use the same categories (None, Less than Half, About Half, More than Half, Virtually All)

Q71. (if Q69=2-5) Have you seen an improvement in the energy performance of any of your customers?

1. None
2. Less than Half
3. About Half
4. More than Half
5. Virtually All

Q72. (if Q71=1) What changes did you make that likely led to the improved energy performance? (open-ended)

## EUI and ES Details

Q76. (if Q64=1 and Q57=2-5) You indicated you've calculated the energy use per square foot. What tool did you use, if any? (open-ended w/ Pre-codes, do not read:)

1. ENERGY STAR Portfolio Manager
2. Energy Expert
3. Utility Manager Pro
4. Avista IQ
5. Microsoft Excel
6. Other (specify)

[If Q64=1 and Q57-2-5] READ: What are you comparing the results to? Are you comparing…

[if Q64=2-5] READ: You indicated you've obtained an ENERGY STAR score. What are you comparing the results to? Are you…

[If Q57=2-5 or Q64=2-5 ask the following]

Q80. Comparing across buildings you are responsible for?
1. Yes
2. No

Q81. Comparing across buildings in the region?
1. Yes
2. No

Q82. Comparing performance of the same building over time?
1. Yes
2. No

Q83. (if Q66=2-5) Comparing building performance to energy use goals?
1. Yes
2. No

[if Q57=2-5 or Q64=2-5] Have you done any of the following with the results? Have you… [If needed, the results on energy use per square foot or ENERGY STAR score]

Q85. (if Q66=2-5) Used results to help in establishing an energy use or savings target?
1. Yes
2. No

Q87. Used results to attract a new client
1. Yes
2. No

Q88. Reported results to building owners decision makers
1. Yes
2. No

Q89. (if Q64=2-5) Have you trained any of your staff in using ENERGY STAR Portfolio Manager?
1. Yes
2. No

Q90. (if Q89=1) And are these staff in clerical, sales, or operations positions? (multiple record)

1. Clerical
2. Sales
3. Operational

## Action Details [If Action=1]

Q116. (if Q69=2-5) For any of your customers, have you replaced existing equipment with high-efficiency equipment in the last two years?

1. Yes
2. No

Q117. (if Q69=2-5) For any of your customers, have you made any no or low cost changes in operations or maintenance to reduce energy costs in the last two years?

1. Yes
2. No

Please indicate whether in the last three years for any of your buildings you have done any of the following or identified the need to do so….

Q119. (if Q69=2-5) Improved the scheduling of equipment, such as lighting and HVAC?

1. Yes
2. No

Q120. (if Q69=2-5) Corrected situations of simultaneous heating and cooling?

1. Yes
2. No

Q121. (if Q69=2-5) Adjusted the outside air usage or economizer functioning?

1. Yes
2. No

Q122. (if Q69=2-5) Recalibrated sensors in the last two years?

1. Yes
2. No

## Contracts

Q158. Has your firm adopted any contract language specific to energy efficiency?

1. Yes
2. No

Q159. (if Q158=1) Can you briefly describe some of the energy efficiency provisions? _____

## Commitment

Q161. Does the senior management of your firm believe that energy efficiency services are a viable product?

1. Yes
2. No

Q168. Do your firm's marketing materials describe the advantages of energy efficient or high performance buildings?

1. Yes
2. No

Q169. Do your firm's marketing materials highlight its capabilities or successes with energy efficiency or sustainability?

1. Yes
2. No

Q170. Does your organization's website contain a section specifically featuring your sustainability or energy efficiency credentials, successes or related awards you have received?

1. Yes
2. No

## Organization

Q179. Does your firm have an energy efficiency or sustainability services group?

1. Yes
2. No

Q180. (if Q179=1) Does this group work independently or work with other teams?

1. Independently
2. With other teams

Q181. (if Q179=2) Would you characterize most of your services group as having a little energy efficiency expertise, a moderate amount, or considerable expertise?

1. A little efficiency expertise
2. A moderate amount
3. Considerable expertise

## Staff Training and Recognition

Q186. Have you trained any of your technicians or engineers in how to conduct studies to identify energy savings opportunities?

1. Yes
2. No
3. Not-applicable; Do not employ staff appropriate for this

Q188. Have you or any of the sales and operations staff participated in any seminars or training related to energy efficiency?

1. Yes
2. No

Q189. (if Q188=1) About what proportion of the sales and operations staff have received training related to energy efficiency? Would you say Less than Half, More than Half, Virtually All

1. Less than Half
2. More than Half
3. Virtually All

Q190. (if Q188=1) What organizations sponsored the presentation or training? (open-ended with pre-codes, check all that apply, continue to probe with "Anything else?":)

1. BOC
2. CEM
3. IFMA
4. AIA
5. Cascadia Green Building Council
6. OSHE
7. WASHE
8. society of healthcare engineers
9. conferences
10. PGE
11. utility
12. Seattle IDL (Integrated Design Lab)
13. Practice Greenhealth
14. University of Washington
15. community colleges
16. other (specify)

Q191. (if Q188=1) Have you or any of the staff received certifications relating to energy efficiency?

1. Yes
2. No

Q192. (if Q191=1)What certifications? Pre-codes, do not read:

1. BOC
2. CEM
3. Other (specify)

Q193. Does you firm allocate time for your sales and operations staff for training in energy efficiency?

1. Yes
2. No

Q194. Is energy efficiency included in your professional development planning for any staff?

1. Yes
2. No

Q195. Would you say that over the last year staff have received more training in energy efficiency than in previous years?

1. Yes
2. No

Q196. Does your organization consider demonstrated competence in energy efficiency as a factor in promotion decisions?

1. Yes
2. No

Q197. Is energy efficiency included in job descriptions of operational staff positions?

1. Yes
2. No

Q198. Does your organization recognize its energy efficiency or sustainability achievements in staff meetings and credit key individuals and teams?

1. Yes
2. No

## Better Bricks Touch

Q201. Before today, have you heard of an organization called the Northwest Energy Efficiency Alliance or NEEA?

1. Yes
2. No

Q202. Before today, have you heard of BetterBricks or BetterBricks.com?

1. Yes
2. No

Q203. (if Q202=1) Have you or any of your staff visited the website BetterBricks.com and its Building Operations section? [WEB=1]

1. Yes
2. No

Q204. (if Q203=1) Have you or any of your staff used any ideas, materials or tools from the Better Bricks website?

1. Yes
2. No

Q206. (if Q202=1) Have you heard of the annual BetterBricks Awards for excellence in energy-efficient buildings?

1. Yes
2. No

Q207. (if Q206=1) Have you or any of your staff attended the BetterBricks Awards?

1. Yes
2. No

Q209. Have you seen the Fat Building brochure?

1. Yes
2. No

Q210. (if Q201=1 or Q202=1) Have you seen any print advertisements or feature stories on Better Bricks or NEEA, or about a facility involved with Better Bricks or NEEA?

1. Yes
2. No

Q211. (if Q201=1 or Q202=1) Did BetterBricks or NEEA information, training, or assistance directly influence any your firm's practices regarding energy efficiency?

1. Yes
2. No

Q212. In what way? (open-ended)

Q213. (if Q201=1 or Q202=1) Are there areas of your practice involving energy efficiency that have been enhanced by BetterBricks or NEEA activity?

1. Yes
2. No

Q214. (if Q21=1) Have any of your clients had buildings that participated in the Kilowatt Crackdown competitions?

1. Yes
2. No

Q215. (if Q22=1)Have any of your clients had buildings participated in the Office Energy Showdown competitions?

1. Yes
2. No

Q216. (if Q214 or Q215=1) Have these clients requested energy efficiency services from you?

1. Yes
2. No

Q217. Can you name three firms whose energy efficiency practices have influenced those of your firm? (open-ended)

1. Gave response
2. Cannot name any firms

That's all of my questions. Thank you very much for your time.