

## The Consortium for Building Energy Innovation

CBEI is focused on generating impact in the small and medium-sized commercial buildings (SMSCB) retrofit market. CBEI is comprised of 14 organizations including major research universities, global industrial firms, and national laboratories from across the United States who collaborate to develop and demonstrate solutions for 50% energy reduction in existing buildings by 2030. The CBEI FINDINGS series highlights important and actionable technical, application, operation and policy research results that will accelerate energy efficiency retrofits when applied by various market participants. CBEI views these FINDINGS as a portal for stakeholders to access resources and/or expertise to implement change.

## Industry Education Needs

Retrofitting and improving the operational performance of existing buildings can save significant amounts of energy, reducing operating costs and greenhouse gas emissions. But these savings can only be realized with a skilled and competent workforce that knows how to design, audit, construct, commission and operate energy efficient buildings, particularly as building technologies become more advanced. The Department of Energy worked with the National Institute of Building Sciences (NIBS) and industry stakeholders to develop the Better Buildings Workforce Guidelines, voluntary national guidelines to improve the quality and consistency of commercial building workforce credentials for four key energy-related jobs: **Building Energy Auditor, Building Commissioning Professional, Building Operations Professional and Energy Manager**. The products of this work were Job Task Analyses (JTAs) for each of the positions, and certification schemes so that industry now has voluntary national guidelines from which to develop high quality and nationally recognized training and certification programs, helping to address challenges found in the energy efficiency workforce with quality, consistency, and scalability across certification and certificate programs.

CBEI's role was to build on this work and create a competency model for these four job titles. The goal of the competency model is to articulate and classify the competencies required for engagement and advancement of talented individuals needed to implement energy retrofit projects and operate energy efficient buildings. The model is intended to help match job requirements with industry-recognized skills, and reveal gaps in competencies in the industry to enhance the expansion of the energy retrofit market. It will also support the growth of the energy retrofit workforce by guiding the development of new education and training programs, or modifying the existing programs to address the missing components.

## *Research Finding: Advanced Commercial Buildings Workforce Competency Models*

The world of building energy retrofits is rapidly changing and becoming more complex, challenging the workforce to react to their ever changing physical, financial and technological environment.

Research has shown that up to 25 percent of the energy used in commercial buildings is wasted because many buildings still are not properly commissioned, operated, or maintained.

CBEI built upon earlier work conducted by the DOE and NIBS that developed guidelines to improve the competency of the U.S. workforce in four key Building Energy related jobs.

The Competency Model is a useful tool for education and training providers to develop curricula and programs to support the key roles of Energy Auditor, Energy Manager, Commissioning Professional and Building Operations Professional.

CBEI identified industry-wide and sector-specific competencies that define skill and knowledge areas for use by current and prospective practitioners in training themselves for these important jobs.

## What is a competency?

A competency is the capability to apply a set of related knowledge, skills, and abilities to successfully perform functions or tasks in a defined work setting. Competencies often serve as the basis for skill standards that specify the level of knowledge, skills, and abilities needed for success, as well as potential measurement criteria for assessing competency attainment.

## What is a competency model?

A competency model is a framework for defining the skill and knowledge requirements of a job. It is a collection of competencies that jointly define successful job performance. Competency models are the foundation for important human resource functions such as recruitment and hiring, training and development, and performance management.

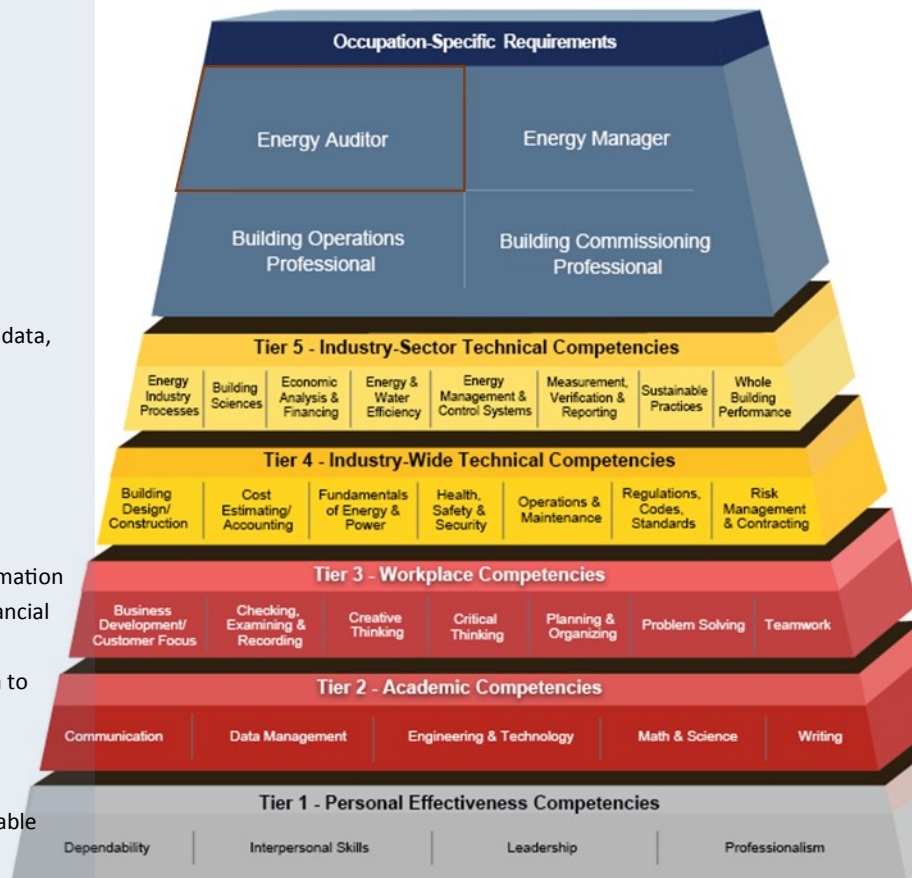
Organizations typically employ the frameworks by arranging knowledge and skill requirements into specific categories, such as personal effectiveness, academic, technical, industry, occupational, management, and workplace competencies.

### Energy Auditor “Standard” Competencies

- Ability to determine tools needed for an audit
- Ability to interpret thermography
- Building physics
- Building pressurization
- Minimum required time period of utility data
- Programming skills
- Sampling protocols and procedures
- Types of audits (level 1, 2, or 3, etc.)
- Typical energy analysis methodologies
- Typical energy usage by building type
- Typical percentage of end usage by occupancy type
- Understand available data types for weather (bin data, hourly data, TMY, etc.)
- Understanding of utility bill information

### Energy Auditor “Performance” Competencies

- Focuses on customer service/client satisfaction
- Approaches projects collaboratively (works with the client)
- Possesses technical competencies to gather appropriate information
- Applies analytical decision-making process to include both financial goals and energy saving goals
- Methodically collects data while considering the entire system to solve problems
- Develops practical solutions beyond energy consumption
- Communicates effectively with key stakeholders
- Delivers objective reports that are realistic, credible and verifiable
- Considers the client’s goals and needs



Each block in the pyramid above has data linked to it which can be accessed from the U.S. Department of Labor’s Competency Modeling Clearinghouse<sup>1</sup>. The website is highly interactive, with pop-up boxes and links appearing in response to mouse rollovers.

<sup>1</sup> <http://www.careeronestop.org/CompetencyModel/competency-models/Advanced-Commercial.aspx>

<sup>2</sup> <http://www.careeronestop.org/competencymodel>

<sup>3</sup> <http://cbei.psu.edu/variation-in-energy-audits>

## **CBEI's competency model for the Advanced Commercial Buildings Workforce is unique**

The Department of Labor's Competency Model Clearinghouse<sup>2</sup> features dozens of industry-wide competency models. CBEI's model is distinctive in that four specific job titles are modeled with shared competencies in the first five tiers (see figure below) with competencies unique to each role in the top tier. This helps employers, employees, job seekers and training and workforce organizations to see the commonalities and differences among the roles.

Additionally, this model stands out because of the focus on "performance" competencies. A performance competency is an attribute, knowledge, skill, ability or other characteristic that contributes to successful job performance and differentiates high performers from average or low performers. They include the characteristics or competencies that employees call upon and consistently utilize. When one thinks about what makes a successful energy auditor, is it just the ability to interpret thermography, or is it also the focus on customer service/client satisfaction (raising the likelihood of converting an energy audit into an energy efficiency project)? For example, for the Energy Auditor job title, the "standard" competencies (in the top tier) tend to be more technical as illustrated in the list to the left, however, the performance competencies tend to be more oriented to 'softer' skills including and client focus which leader to greater effectiveness at the job.

### **Why is competency important?**

The world of building energy retrofits is rapidly changing because of changing energy supplies, environmental impact of energy use, and advances in technology. Buildings are very complex systems that must react to their ever changing environment; provide health, safety and comfort to their occupants; and respond to economics of energy supply. Research shows that up to 25 percent of the energy used in commercial buildings is wasted because many buildings still are not properly commissioned, operated, or maintained. A well-defined competency model is a good tool for any business to improve the ability of staff to focus on delivering solutions.

### **Why is a competency model important for improving existing building performance?**

CBEI's assessment of ASHRAE Level II audits within the region reveals a significant breadth of capabilities, results, recommendations and credibility. Multiple Level II audits conducted at the Philadelphia Navy Yard Building 101 showed a wide divergence in focus, scope and projected results<sup>3</sup>. Energy auditing is often the first entry point for energy retrofits, which requires money to conduct and should yield consistent potential savings. Improving competency in this area is not only good for business; it improves energy efficiency of building stock.

Similarly, as building energy systems become more complex, building commissioning competency becomes more important. CBEI's experience in its newly retrofitted headquarters demonstrates that competent commissioning, particularly with respect to measurement and verification sensors, needs improvement.

Working with Real Estate Investment Trusts in the region, CBEI found a dearth of skilled building operators and a need to provide training competencies for this skill set.

Building energy management, particularly at the portfolio level, is facilitated by the availability and analysis of data. New competency requirements have emerged that require education and training focus.

## Lessons Learned

Competency modeling for a group of positions such as was done for the Advanced Commercial Buildings Workforce (ACBW) can be challenging and resource intensive. This effort would not have been possible without all the work which preceded and paralleled it to create the Better Buildings Workforce Guidelines which included the foundational material of the job task analyses and industry partnerships. This effort spanned a two-year period and was staffed by doctoral students in Workforce Education & Development and Architectural Engineering, with the Principal Investigator from Penn State’s Architectural Engineering Department and significant technical support provided by Facility Engineering Associates.

As the JTA analysis was performed, investigators identified knowledge and skill competencies that overlapped between the four job titles.

- Industry Wide Technical Competencies (Tier 4) are common to all four jobs, drawing upon aspects of the Building and Construction Industry.
- Industry Sector Technical Competencies (Tier 5) were found to be more specific to the building energy retrofit segment.
- Occupation Specific Requirements define workplace performance; inform training curricula, and articulate requirements for credentials and certifications.

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## Moving Forward

A companion piece of work to the ACBW Competency Model is the ACBW Career map which builds on the Competency Model. The Career Map will include:

- the ability to plot emerging entry-level and professional -level credentials
- the articulation of clear pathways for advancement for incumbent workers in the building trades and construction industry professions, and
- the identification of strategic entry points for veterans and other job seekers.

The Career Map will be available in early 2016. It will demonstrate how these advanced energy-related commercial buildings jobs fit into a logical career progression from the building trades and construction industry professions via an engaging web tool available to students, workers, employers, policymakers, education and training providers, and the human capital/workforce development community.

The advanced commercial building competency model can be found at:

<http://www.careeronestop.org/CompetencyModel/competency-models/Advanced-Commercial.aspx>

