Building Technologies Office - Delivering Energy-Efficient Solutions

Emerging Technologies
- High-impact building technologies
- ~Five years to market-ready

Residential Building Integration
- Cost-effective technologies, tools, solutions
- Peak energy performance in new & existing homes

Commercial Building Integration
- Cost-effective technologies, tools, solutions
- Peak energy performance in new & existing commercial buildings

Codes & Standards
- Building energy code language with adoption/compliance strategy
- National appliance & equipment standards
Better Buildings Workforce Program

www.eere.energy.gov/workforce
National Institute of Building Sciences
Buildings Need to Perform Better

Buildings are one of the heaviest consumers of natural resources and account for a significant portion of the greenhouse gas emissions that affect climate change. In the U.S., buildings account for:

- 38% of all CO2 emissions\textsuperscript{12}
- 73% of electricity consumption\textsuperscript{13}
- Green buildings consume less energy. Compared to the average commercial building, the LEED Gold buildings in the General Services Administration’s portfolio generally\textsuperscript{14}:
  - Consume 25% less energy and 11% less water
  - Have 19% lower maintenance costs
  - 27% higher occupant satisfaction
  - 34% lower greenhouse gas emissions

Source: Green Building Facts published 17 Oct 2014 by USGBC
Growth in “Green” Building

• By 2015, an estimated 40-48% of new nonresidential construction by value will be green, equating to a $120-145 billion opportunity\(^1\)
• U.S. respondents to a 2012 international survey projected that 58% of their building activities in 2015 would be green\(^2\)
• More than 3.3 billion square feet of building space are LEED-certified (as of October 17, 2014)
• 41% of all nonresidential building starts in 2012 were green, as compared to 2% of all nonresidential building starts in 2005\(^3\)
• With energy efficiency financing having the potential to soar from $20 to $150 billion annually, over one million jobs could be created\(^5\)
• Approximately 61% of all construction projects are retrofit projects\(^23\).
• By 2015, the green share of the largest nonresidential retrofit and renovation activity will more than triple, growing to 25-33% of the activity by value—a $14-18 billion opportunity in major construction projects alone\(^25\).

Source: Green Building Facts published 17 Oct 2014 by USGBC
Energy Efficiency in Commercial Buildings

Commercial buildings have made significant progress in energy efficiency, with a particular focus on:

- Substantial retrofits to upgrade lighting, HVAC, and windows systems
- Advanced control strategies
- Energy efficient design of new buildings
- Encouraging use of more energy efficient electronic equipment

Commercial buildings may also:

- Have on-site facility managers who understand their role in daily energy management practices
- Have a commitment to improve sustainability
- Seek cost-effective methods for increased use of renewable energy
Value of Energy Management

• Energy efficiency improvements with very favorable payback periods often do not get implemented due to other operational priorities
• Energy efficiency projects that are implemented may not be sustained due to lack of supportive operational and maintenance practices
• Commissioning or re-commissioning new equipment or systems only addresses a point in time
• The only constant in the life of most commercial buildings is change - personnel, space use and configuration, operating hours -

Problem: Energy efficiency is not integrated into daily management practices.

Solution: Staff at all levels within an organization need to be engaged in the management of energy on an ongoing basis.
Barriers to Improving EE

• Patchwork of Technical Standards, Codes and Work Specifications
  – Not incorporated into workforce programs

• Lack of National Skill Standards for Emerging Energy-Related Jobs
  – Need comprehensive Job Analyses based on clear technical standards

• Nonaligned Training Content, Platforms, Programs
  – Training not always based on a Job Analysis; not up to date with technology and best practices
  – Availability, cost, and quality are also concerns

• No Infrastructure to Support National Credentials
  – “Diaspora” of certificate and certification programs (some overlapping or duplicative)

• Minimal Uptake of Accreditation Standards for Training and Certification Programs
  – Lack of demand because value proposition is not compelling

• Lack of Recognition of Quality Workforce Credentials
  – Employers and policymakers have a difficult time identifying quality workers
Better Buildings Workforce Guidelines

WHAT:
• DOE and NIBS are engaging industry stakeholders to develop voluntary national guidelines for commercial building workforce training and certification programs
• Focus on five key energy-related jobs: Building Energy Auditor, Building Commissioning Professional, Building Operations Professional, Energy Manager, and Facilities Manager (focus on Government Facilities and FBPTA)
• Guidelines can be used by existing training and certification organizations to upgrade or modify their existing program offerings or to develop new program offerings.
• Neither DOE or NIBS are developing new training or certification programs through this project—we are engaging industry to develop the guidelines that private market providers will use as the benchmark for quality.

WHY:
• Improve quality and reduce confusion and uncertainty in commercial workforce credentialing programs
• Accelerate energy savings, carbon reductions, and clean energy job creation
# Value Propositions

<table>
<thead>
<tr>
<th>Workforce</th>
<th>Employers</th>
<th>Building Owners/Managers</th>
<th>EE Program Administrators or Regulators</th>
<th>Training and Certification Programs</th>
</tr>
</thead>
</table>
| • Better credentials  
• Clearer career paths | • Better workforce  
• Increased customer demand  
• Greater profits | • Confidence and trust in certified contractors  
• Higher quality work  
• Faster payback | • Increased demand for clean energy services  
• Job creation  
• Criteria to recognize credentials | • Able to distinguish their programs as “Better Buildings” recognized  
• Tool to increase demand for workforce credentials |
Help Government and the Market Identify High Quality Training and Certification Programs
ENERGY STAR: From Confusion to Confidence

Which products demonstrate the top energy performance?

Define Performance
Voluntary ENERGY STAR performance specifications, developed with market input

Verify
Products tested by accredited third-party laboratory and reviewed by certification body

Recognize
ENERGY STAR= products benefit from consumer trust in energy performance

CONFUSION  CONFINDECE
Better Buildings Workforce Guidelines

Who are the skilled and qualified workers in advanced energy occupations?

Define Skills
Voluntary Better Buildings Workforce Guidelines, defined by industry and government

Verify
Third-party accreditation of certification or training programs

Recognize
DOE recognition of accredited programs—consumer trust in program quality and workforce performance

CONFUSION  CONFIDENCE
Framework for a Better Buildings Workforce

<table>
<thead>
<tr>
<th>Technical Standards</th>
<th>Skills Standards</th>
<th>Curricula &amp; Training</th>
<th>Industry-Recognized Certifications</th>
<th>Third-Party Accreditation</th>
<th>Driving Market Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standards, codes, and specifications defining safe, durable, high-quality work</td>
<td>Define the job tasks and the knowledge, skills &amp; abilities workers need to perform them well</td>
<td>Built on clear learning objectives and aligned with technical and skills standards</td>
<td>National, industry &amp; government recognized certifications built on common blueprints when appropriate</td>
<td>Evaluation of program quality and alignment with industry-recognized content</td>
<td>Policy mechanisms and recognition of accredited workforce credentialing programs</td>
</tr>
</tbody>
</table>

Program Area Goal: Support a high-quality commercial buildings workforce
Path to Better Buildings Workforce Guidelines

National Institute of Building Sciences

Commercial Workforce Credentialing Council (CWCC)

Board of Advisors → Board of Direction

Subject Matter Expert (SME) Committees
Revise and validate job task analyses; develop certification schemes and certificate program requirements

New NIBS Council comprised of public- and private-sector stakeholders
Establishes CWCC policies and procedures; decides committee compositions; builds support for guidelines

Building Energy Auditor
Building Commissioning Professional
Energy Manager
Building Operations Professional
Facility Manager (Government and FBPTA focus)

OUTCOMES
Voluntary guidelines for industry-delivered Better Buildings Workforce credentials

Professional certification schemes AND Certificate program requirements

National Institute of BUILDING SCIENCES
NREL
Better Buildings
# Five Better Buildings Workforce Job Titles

## Project Scope

<table>
<thead>
<tr>
<th>Job Titles</th>
<th>Job Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Building Energy Auditor</strong></td>
<td>The Commercial Building Energy Auditor is an energy solutions professional who assesses building systems and site conditions, analyzes and evaluates equipment and energy usage, and recommends strategies to optimize building resource utilization.</td>
</tr>
<tr>
<td><strong>Building Commissioning Professional</strong></td>
<td>The Building Commissioning (Cx) Professional is an individual who leads, plans, coordinates and manages a commissioning team to implement commissioning processes in new and existing buildings.</td>
</tr>
<tr>
<td><strong>Energy Manager</strong></td>
<td>An Energy Manager is responsible for managing and continually improving energy performance in commercial buildings by establishing and maintaining an energy program management system that supports the mission and goals of the organization.</td>
</tr>
<tr>
<td><strong>Building Operations Professional</strong></td>
<td>The Building Operations Professional manages the maintenance and operation of building systems and installed equipment, and performs general maintenance to maintain the building’s operability, optimize building performance, and ensure the comfort, productivity and safety of the building occupants.</td>
</tr>
<tr>
<td><strong>Facility Manager (FBPTA focus)</strong></td>
<td>Manages, monitors and coordinates facility operations and supervises and communicates with staff to ensure efficient, sustainable operations and the satisfaction of the facility occupants. Federal Buildings Personnel Training Act ~50,000 Government; ~100,000 Contractors ~ $31 billion dollars in Federal Facilities O&amp;M Costs</td>
</tr>
</tbody>
</table>
Better Buildings Workforce Guidelines (BBWG)

The U.S. Department of Energy (DOE) and the National Institute of Building Sciences (Institute) through its Commercial Workforce Credentialing Council (CWCC) have worked with industry stakeholders to develop voluntary national guidelines aimed at improving the quality and consistency of commercial building workforce credentials for four key energy-related jobs.

<table>
<thead>
<tr>
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<tr>
<td>Building Energy Auditor</td>
<td>The Commercial Building Energy Auditor is an energy solutions professional who assesses building systems and site conditions, analyzes and evaluates equipment and energy usage; and recommends strategies to optimize building resource utilization.</td>
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<tr>
<td>Building Commissioning</td>
<td>The Building Commissioning (Cx) Professional is an individual who leads, plans, coordinates and manages a commissioning team to implement commissioning processes in new and existing buildings.</td>
</tr>
<tr>
<td>Professional</td>
<td></td>
</tr>
<tr>
<td>Energy Manager</td>
<td>An Energy Manager is responsible for managing and continually improving energy performance in commercial buildings by establishing and maintaining an energy program management system that supports the mission and goals of the organization.</td>
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<tr>
<td>Building Operations</td>
<td>The Building Operations Professional manages the maintenance and operation of building systems and installed equipment, and performs general maintenance to maintain the building's operability, optimize building performance, and ensure the comfort, productivity and safety of the building occupants.</td>
</tr>
<tr>
<td>Professional</td>
<td></td>
</tr>
</tbody>
</table>

To gain access to the Job Task Analyses for each position, related supporting materials and information about the CWCC and the process used to create the Job Task Analyses, you must register and accept the Terms of Use that follow.
Better Buildings Workforce Guidelines

A Government and Industry Partnership to Advance Commercial Workforce Quality

<table>
<thead>
<tr>
<th>NIBS* CWCC** develops Better Buildings Workforce Guidelines</th>
<th>Guidelines for certification programs (common certification schemes)</th>
<th>Guidelines for certificate programs (content outlines and learning objectives)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry Technical Standards</td>
<td>Industry certification bodies</td>
<td>Certificate program providers</td>
</tr>
<tr>
<td>Job task analyses***</td>
<td>ISO/IEC 17024</td>
<td>IREC 14732 and/or others TBD</td>
</tr>
</tbody>
</table>

Which are implemented by:

Which seek accreditation under appropriate standard:

Department of Energy recognizes accredited programs meeting voluntary Better Buildings Workforce Guidelines

*National Institute of Building Sciences
**Commercial Workforce Credentialing Council

***Building Energy Auditor; Building Commissioning Professional; Energy Manager; Building Operations Professional; Facility Manager (Government and FBPTA focus)
BBWG – A DOE Recognized Program

Criteria for recognition:
1) ANSI/IAS accredited per BBWG JTAs & schemes
2) Fill out online form with basic information on program on Workforce Partnership website

DOE recognition:
1) Provide logo and wording for use by certification bodies
2) List certification body on Workforce Partnership website
3) Recognize at Better Buildings Summit and in BB press release materials
# Path to Better Buildings Workforce Guidelines

## INITIAL JOB TITLES
Building Energy Auditor • Building Commissioning Professional
Energy Manager • Building Operations Professional

## U.S. Department of Energy
- Provides vision, funding, and technical support for the Better Buildings Workforce Guidelines project
- Engages Federal agencies and industry stakeholders to participate in the guidelines project
- Enlists the National Institute of Building Sciences (NIBS) to develop the guidelines

## National Institute of Building Sciences
- NIBS charters the Commercial Workforce Credentialing Council (CWCC)
  - CWCC establishes the scope and composition of five Subject Matter Expert (SME) committees
  - SME committees complete the guidelines for each occupation

## Credentialing Program Providers
- Develop training/certificate programs or professional certifications based on the guidelines
- Submit programs for third-party accreditation

## Accreditation Bodies
- Evaluate whether programs meet the guidelines

## Commercial Buildings Professionals
- Obtain high-quality, nationally-recognized credentials

## Building Owners/Managers
- Hire skilled and qualified workers

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<table>
<thead>
<tr>
<th>U.S. Department of Energy</th>
<th>National Institute of Building Sciences</th>
<th>Credentialing Program Providers</th>
<th>Accreditation Bodies</th>
<th>Commercial Buildings Professionals</th>
<th>Building Owners/Managers</th>
</tr>
</thead>
</table>
Additional Market Pull

City Energy Project: Audit and Commissioning Ordinances

Federal Buildings Personnel Training Act

Public Law 111–308
111th Congress

An Act
To provide for the training of Federal building personnel, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the “Federal Buildings Personnel Training Act of 2010”.

SEC. 2. TRAINING OF FEDERAL BUILDING PERSONNEL.
(a) IDENTIFICATION OF CORE COMPETENCIES.—Not later than 18 months after the date of enactment of this Act, and annually thereafter, the Administrator of General Services, in consultation with representatives of relevant professional societies, industry associations, and apprenticeship training providers, and after providing notice and an opportunity for comment, shall identify the

Employers, Building Owners, Certification Programs and more
<table>
<thead>
<tr>
<th>CITY/STATE</th>
<th>ADOPTED</th>
<th>BENCHMARKING</th>
<th>REPORTING AND DISCLOSURE</th>
<th>AUDIT AND UPGRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Comm</td>
<td>MF</td>
<td>To Local Gov’t</td>
</tr>
<tr>
<td>California</td>
<td>2007</td>
<td>5k SF+</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>Austin</td>
<td>2008</td>
<td>10k SF+</td>
<td>5+ units</td>
<td>✓</td>
</tr>
<tr>
<td>DC</td>
<td>2008</td>
<td>50k SF+</td>
<td>50k SF+</td>
<td>✓</td>
</tr>
<tr>
<td>Washington State</td>
<td>2009</td>
<td>10k SF+</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>New York City</td>
<td>2009</td>
<td>50k SF+</td>
<td>50k SF+</td>
<td>✓</td>
</tr>
<tr>
<td>Seattle</td>
<td>2010</td>
<td>20k SF+</td>
<td>20k SF+</td>
<td>✓</td>
</tr>
<tr>
<td>San Francisco</td>
<td>2011</td>
<td>10k SF+</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>Philadelphia</td>
<td>2012</td>
<td>50k SF+</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>Minneapolis</td>
<td>2013</td>
<td>50k SF+</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>Boston</td>
<td>2013</td>
<td>35k SF+</td>
<td>35+ units</td>
<td>✓</td>
</tr>
<tr>
<td>Chicago</td>
<td>2013</td>
<td>50k SF+</td>
<td>50k SF+</td>
<td>✓</td>
</tr>
<tr>
<td>Montgomery Co. MD</td>
<td>2014</td>
<td>50k SF+</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>Cambridge</td>
<td>2014</td>
<td>25k SF+</td>
<td>50+ units</td>
<td>✓</td>
</tr>
</tbody>
</table>

Data courtesy Institute for Market Transformation
Skilled Trades & Energy Efficiency

- **US EE & RE Firms:** mismatch of skills of available workers, exacerbated by retirements

- **President’s Jobs Council:** “Lack of alignment between what employers need and what skills are taught and delivered is becoming a critical problem for business and the nation.” [2011 Year End Report, p. 13]

- **U.S. higher education system not producing skilled workers**

  *Energy-related job categories particularly lacking skilled workers*
  - **CEWD—Utility Sector**
  - **EE and RE Sector**
Outreach Programs

1. Commercial Buildings Energy Efficiency Workforce Labor Market Analysis
2. Curriculum Outlines and Learning Objectives
3. Community College Program Development
   – Mapping CO and LO to Course Modules and Competency Model
4. Analysis of energy related training and certification programs in California
Status and Rollout Plan

Completed

- License Agreement Finalized
- BB Logo & Guidelines Finalized
- DOE Recognition Criteria Finalized
- Revised BBWG Fact Sheet Finalized
- Post on NIB’s website, DOE site updated
- DOE/NIBS press release

Next Steps

- Identify best path forward on BOP JTA
- Complete supporting materials for community colleges and identify best path forward on certificate program recognition
- Continued engagement with GSA and other federal agencies to include preferential language in contract
- Ongoing engagement with cities developing energy efficiency legislation
Questions?

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April 29, 2015