1 Overview: Workforce Guidelines for Home Energy Upgrades
2 Standard Work Specifications
3 Training Program Accreditation and Workforce Certification
4 Implementation
Key Messages

1. Quality and price drive demand for a service

2. High-quality, low-cost home energy upgrades require:
   a. Industry-recognized standards and work specifications
   b. Good training
   c. Strong professional certifications

3. Workforce Guidelines help with all of these
Voluntary national guidelines to support *quality work* and a *skilled workforce* in the Weatherization Assistance Program and private residential energy efficiency upgrade industry

- **Developed by industry**, facilitated by NREL and EERE
- **Published by EERE in Summer 2011**
Four Components

**Workforce**
- Job Task Analyses
- Essential Knowledge, Skills, and Abilities

**Work**
- Technical Standards Reference Guide
- Standard Work Specifications

Workforce Guidelines for Home Energy Upgrades
Techniques, methods, or processes believed to be the most efficient and effective way of meeting the Standard Work Specifications (SWS)

Sets of guidelines or rules that govern work procedures and often invoke SWS and technical standards

Define the minimum requirements for high-quality work and conditions needed to achieve desired outcomes

Define safety, materials, installation, and application standards relevant to residential retrofits

Developed by

Companies, retrofit crews, or individuals

Retrofit program administrators or individual companies

Technicians and retrofit industry representatives (including building trades, manufacturers, and building scientists)

Industry or third-party standards development organizations, such as ASHRAE, ASTM, and BPI

* Workforce Guidelines for Home Energy Retrofits

Draft deliberative, for discussion purposes only. Not for citation.
Technical Standards

- Define the safety, materials, installation, and application standards, codes, and regulations applicable to residential energy efficiency retrofits

- Developed by government, industry, or third-party standards development organizations

- Examples
  - ASHRAE 62.2 (Ventilation for Acceptable Indoor Air Quality)
  - ASTM E1186 – 03 (Standard Practices for Air Leakage Site Detection)
  - OSHA 1926.28 (Safety and Health Regulations for Construction; Personal Protective Equipment)

- Residential Retrofit Guidelines will contain a Technical Standards Reference Guide for industry
Standard Work Specifications and You!
Standard Work Specifications

- Define the minimum requirements for high-quality work and the conditions necessary to achieve the desired outcomes of a given energy efficiency retrofit measure

- Standard Work Specifications are **outcome driven, but not prescriptive**

- When applicable, SWS are **based on existing technical standards**

- Fill a critical niche in the “standards landscape”

- Work specifications = **set the bar for quality work**
# Standard Work Specifications: Whole Wheat Bread

## Desired Outcome(s):
1. Fully cooked loaf of whole wheat bread
2. Bread slices fit evenly in a standard toaster
3. No holes in slices of bread
4. Brown crust that does not flake or break when sliced

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Desired Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loaf height</td>
<td>Loaf height shall not exceed 5.5”</td>
</tr>
<tr>
<td></td>
<td>Bread slices fit evenly in a standard toaster</td>
</tr>
<tr>
<td>Bread consistency</td>
<td>No slice shall have a hole greater than 2 centimeters</td>
</tr>
<tr>
<td></td>
<td>Slices accept spreads without falling through</td>
</tr>
<tr>
<td>Crust</td>
<td>The outer crust of the bread shall be lightly browned and must not flake or break when slicing</td>
</tr>
<tr>
<td></td>
<td>Crust maintains a clear border completely around each slice</td>
</tr>
<tr>
<td>Oven</td>
<td>Bread must be baked in an oven capable of maintaining a constant temperature of 350 degrees</td>
</tr>
<tr>
<td></td>
<td>Evenly-baked bread</td>
</tr>
</tbody>
</table>
### Bread Baking Protocols (Recipe)

<table>
<thead>
<tr>
<th></th>
<th>Step Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Place bread flour in bowl.</td>
</tr>
<tr>
<td>2</td>
<td>Place 2 heaping tablespoons salt in bowl.</td>
</tr>
<tr>
<td>3</td>
<td>Place 2/3 cup canola oil in bowl.</td>
</tr>
<tr>
<td>4</td>
<td>Place ½ quart warm clover honey in bowl.</td>
</tr>
<tr>
<td>5</td>
<td>Place 4 tablespoons of yeast in mason jar with a lid that seals tightly.</td>
</tr>
<tr>
<td>6</td>
<td>Place 1½ tablespoons sugar in mason jar with yeast.</td>
</tr>
<tr>
<td>7</td>
<td>Place ½ cup warm water in mason jar.</td>
</tr>
<tr>
<td>8</td>
<td>Shake vigorously.</td>
</tr>
</tbody>
</table>

### Bread Baking Best Practices (Mom’s interpretation)

<table>
<thead>
<tr>
<th></th>
<th>Step Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Large wooden bowl works best to minimize spills.</td>
</tr>
<tr>
<td>2</td>
<td>Use kosher, non-iodized salt, not sea salt.</td>
</tr>
<tr>
<td>3</td>
<td>Pour the canola oil in a circular pattern to evenly distribute over the flour.</td>
</tr>
<tr>
<td>4</td>
<td>Microwave the honey in a glass measuring cup.</td>
</tr>
<tr>
<td>5</td>
<td>Use a mason jar that you’ve already checked for tightness in the seal.</td>
</tr>
<tr>
<td>6</td>
<td>Place 1½ tablespoons sugar in mason jar with yeast.</td>
</tr>
<tr>
<td>7</td>
<td>Use the same glass measuring cup as was used for the honey.</td>
</tr>
<tr>
<td>8</td>
<td>Put on some music; it helps with the shaking.</td>
</tr>
</tbody>
</table>
Draft SWS: Attic Insulation Prep
Detail—Knee Wall

<table>
<thead>
<tr>
<th>Specification(s)</th>
<th>Objective(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All knee walls will have a top and bottom plate or blockers installed using a</td>
<td>Eliminate bending, sagging or movement that may result</td>
</tr>
<tr>
<td>rigid material</td>
<td>in air leakage</td>
</tr>
<tr>
<td>All joints, cracks and penetrations will be sealed in finished material</td>
<td>Prevent air leakage through the top or bottom of the</td>
</tr>
<tr>
<td>including interior surface to framing connections</td>
<td>knee wall</td>
</tr>
<tr>
<td>Insulation will be installed using one of the following</td>
<td>Create an air barrier</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

33 ASTM E1186 - 04(2009)

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eere.energy.gov
Why Standard Work Specifications?

- No comprehensive set of standards for entire range of whole-home energy retrofit interventions

- Currently = Assortment of technical standards, work protocols, field guides, and best practices

- WAP community, home performance industry, consumers, financiers, manufacturers, and retrofit program administrators all looking for consistent national standards

- Time for federal leadership and industry partnership

- These are not new regulations or mandatory standards
Other industries have standards and specifications…

**Examples:**

- **Electronics** (Electronics Industry Alliance)
  
  *Develops standards for electronics quality & compatibility*

- **Wind Power** (Int. Electrotechnical Commission – IEC)
  
  IEC 61400-1 Wind Turbine Safety and Design
  
  IEC 61400-23 Blade Structural Testing
  
  IEC 61400-13 Mechanical Load Measurements

- **Golf Cars** (National Golf Car Mfr Association)
  
  *Safety and performance specs for design & performance of golf cars!*
  
  ANSI/NGCMA Z130.1 – golf cars
  
  ANSI/NGCMA Z135.1 – personal transport vehicles
Volunteers!
Four Components

- Workforce Guidelines for Home Energy Upgrades
- Technical Standards Reference Guide
- Workforce Specifications
- Essential Knowledge, Skills, and Abilities
- Standard Work Specifications
- Workforce Analyses
- Work Reference Guide
Four Home Energy Retrofit Job Classifications

- Energy Auditor
- Installer/Technician
- Crew Leader
- Quality Assurance Inspector
Job Task Analysis

- Identifies and inventories a job’s critical tasks.

- For a given job, a formal process for determining and cataloguing what a worker does.

- Tasks are classified as either cognitive or psychomotor skills, and as critical, very important, and important for job performance.

- Examples: set up blower door, run test in accordance with ASTM E779, record results of blower door test in diagnostic software, etc.
Essential KSAs

- Identify the minimum *knowledge, skills, and abilities* that workers should possess to perform high-quality work

- Each Job Task has a corresponding set of essential KSAs

- Examples:
  - Demonstrate ability to blow insulation at appropriate air pressure and material quantity…
  - Demonstrate ability to prioritize air sealing measures to inhibit moisture migration…
  - Demonstrate knowledge of basic building science, including aligning barriers, stack effect, moisture transfer…
Retrofit Workforce Pyramid

Description

Evaluation/assessment of skill standards in accordance with ANSI 17024 Standard for Personnel Certification (or equivalent)

Minimum knowledge, skills, and abilities (KSAs) that workers should possess to perform high-quality work

Identifies and inventories a job’s critical tasks

Developed by

Accredited Training Programs and Accredited Certification Bodies

Retrofit technicians, trainers, and program officials with professional psychometricians

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Training and Credentials – Who Needs Them?

Requirements for some common occupations are stringent…

<table>
<thead>
<tr>
<th></th>
<th>Massage Therapy</th>
<th>Hair Styling</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Required Licensure?</strong></td>
<td><strong>YES</strong> Required in 31 states</td>
<td><strong>YES</strong> Required in all 50 states</td>
</tr>
</tbody>
</table>
| **Required Certification?** | **Required**  
  • Exam  
  • 500 - 1,000 hours min. supervised classroom training  
  • Required course content | **Required**  
  • State licensing exam + field demonstration  
  • HS degree  
  • State accredited training course (9-month minimum) |
| **Education**             | **Min. 500 hours**  
  • Study at accredited schools required                           | **9-month course at accredited institution; On-The-Job  
  • Continuing coursework**                                        |
| **State Regulation**      | **YES** Required in 50 states, PR and VI                         | **YES** Required in 50 states                                 |
Training and Credentials – Who Needs Them?

…while the requirements for other occupations are not as rigorous as you’d think…

<table>
<thead>
<tr>
<th>Required Licensure?</th>
<th>Tattoo Artists</th>
<th>Auto Mechanics</th>
</tr>
</thead>
</table>
|                     | • No national or state regulation  
|                     | • Some Local or county licensing | None required |
| Required Certification? | **No**  
|                     | 7 States require certification through American Academy of Micropigmentation (AAM), for “permanent make-up” tattoos only. | Voluntary only  
|                     | Exam and certificate available through National Institute for Automotive Service Excellence (ASE) |
| Education | • None required.  
|           | • Online courses, "tattoo academies," on-the-job apprenticeships (unregulated) | • None required.  
|           | • Many optional programs available (mostly through manufacturers) |
| State Regulation | 48 States require sanitation of equipment (which are two that don’t?) | No |
Training: Key Challenges

Proliferation of training and certificate programs for WAP and the Home Performance workforce
   – industry, labor, government, educational institutions, NGOs

1. Major infusion of Federal and State training dollars with no standards

2. No objective measure (3rd party assessment) of training program effectiveness

3. No uniform way for workers seeking training to assess the quality of the program or provider
Solution: Training Program Accreditation

- Voluntary, third-party assessment of training provider quality

- Interstate Renewable Energy Council (IREC)
  - Currently accredits solar training programs

- ISPQ International Standard 01022

- IREC will use the *DOE JTA and KSAs* as the foundational document for accreditation

- Available April 2011; more info shortly
Certification vs. Certificate

But what do they mean?
Certificate

- Demonstrates completion of a class or series of courses
- A one-time statement about an individual
- A snapshot defining an accomplishment
Professional certification

✓ Demonstrates competence

✓ Ongoing assessment with re-certification requirement

✓ Consumer expects that a "certification" claim ensures good workmanship.
## Certification vs. Certificate

<table>
<thead>
<tr>
<th>Certification</th>
<th>Certificate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Results from an assessment process</td>
<td>Results from an educational process</td>
</tr>
<tr>
<td>Typically requires some amount of professional experience</td>
<td>For both newcomers and experienced professionals</td>
</tr>
<tr>
<td>Awarded by a third-party, standard-setting organization</td>
<td>Awarded by training and educational programs or institutions</td>
</tr>
<tr>
<td>Indicates mastery/competency</td>
<td>Indicates completion of a course (s)</td>
</tr>
<tr>
<td>Standards set through a defensible, formal process</td>
<td>Course content set a variety of ways</td>
</tr>
<tr>
<td>Has on-going requirements to maintain</td>
<td>Is the end result</td>
</tr>
</tbody>
</table>

*Source: U.S. Office of Personnel Management  
August 13, 2008 Memo*
Multiple credentials…

Do they help or confuse the market?
It depends.

Depends on how they’re built; what competencies they’re assessing; and how they assess the competencies.
Credentialing: Key Challenges

1. Lots of different credentials
   - Certifications and certificates galore
   - Credentials are not always transferable across programs and geographies (impedes mobility)
   - What’s a worker or a consumer to do?

2. Competencies (Job Tasks and KSAs) upon which certifications are built are all different and in need of strengthening

3. Certification exams need to better assess field capabilities

4. Many credentials are too expensive and are not always available in all locations
Solution: Stronger, Better Certifications

- Build a stronger, more coherent retrofit workforce certification architecture

- **Certifications should be based on national, industry-recognized workforce competencies (Job Task Analyses and Knowledge, Skills, and Abilities)**

- **No new DOE or NREL certification**
Proposed Certification Framework

Worker Competencies Developed:

Four retrofit occupations:
- Auditor
- Installer
- Crew Leader
- Inspector

Job Tasks and KSAs

Certification Scheme

NREL convenes 4 certification scheme committees with volunteer industry reps

Certification Body

Designs exam, writes questions and administers certifications based on ANSI 17024 standard

Community Colleges

Training Centers

Affiliated Testing Centers

Affiliated testing centers deliver/proctor the exam

Develops certification blueprint and general criteria for each certification
Seeking Volunteers

Criteria for Serving

- Volunteer
- Independent & impartial
- High-quality professional reputation
- Knowledgeable about the job category
- Abide by ANSI17024 requirements
  - Confidentiality
  - Forego doing training for a period of 2 years *(scheme committee only)*

Scheme Committees

- Installer/technician certification
- Crew leader certification
- Auditor certification
- Inspector certification

Must be available May 17-20 in Golden, Colorado
Benefits of Workforce Guidelines

The Workforce Guidelines will benefit:

- **U.S. Workers**, by establishing a clear skill set upon which to base worker credentials and support workforce mobility up career ladders and across career lattices

- **American Homeowners**, by increasing confidence among consumers and the energy-efficiency finance community that retrofit work will produce the expected energy savings

- **State, local or Utility Retrofit Program Administrators** by providing a clear definition and baseline for quality assurance

- **Training Providers**, by assisting them in developing and upgrading course content and training curriculum, leading to better and more consistent training programs and a skilled workforce that can produce high-quality retrofit work
America Has Been Here Before…

Prepare for WINTER Now!

- Take dealer's advice—on amount and kind of fuel to buy and when to accept delivery.
- Check your heating plant—clean and repair equipment—install controls and other fuel-saving devices.
- Winterize your home—insulate walls and ceilings, install storm sash, weather-strips, and caulking.

How to Keep Warm with Less Fuel This Winter

1. Insulate walls and ceilings
2. Weatherstrip windows—caulk cracks
3. Order storm sash early
4. Have your furnace and controls checked for burning efficiency

Act now…while men and materials are available

When you ride ALONE, you ride with Hitler!

Join a Car-Sharing Club TODAY!

Nobody Loves a HOT WATER HOG
Benjamin Goldstein  
Project Lead  
*Workforce Guidelines for Home Energy Upgrades*  

[Contact Information](mailto:benjamin.goldstein@ee.doe.gov)  

[Website](http://weatherization.energy.gov/retrofit_guidelines/)