Meeting the Challenge of Energy Management in a Carbon-Constrained World

A National Science Foundation-Advanced Technology Education Project

Background Document for the Industry and Labor Task Force

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Abstract

This background document describes how current and future investment and public support for energy efficiency is driving growth in employment and forecasts for energy management employees. Although this diverse industry is difficult to define and much of the new anticipated employment will be in construction-related crafts, new investment through energy efficiency initiatives will likely spur new demand for energy management professionals in a broad range of auditing, analyst and management-level occupations. In all of these areas, current research suggests that employers find it difficult to hire individuals with the skills and experience they require, and that a lack of education and training capacity and other industry and labor market trends may conspire to limit economic growth and career opportunities in this sector. The design of the NSF-funded Energy Management project is poised to help fill the education and skill gaps, while leveraging and supporting other federally-funded regional projects related to the energy management workforce.

Introduction

Federal and state investments in energy efficiency have grown steadily in recent years. The American Center for an Energy Efficient Economy (ACEEE) estimated that in 2004 alone U.S. investments in energy efficiency totaled over $300 billion; by the end of 2008 the savings due to

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investments in energy efficiency totaled around $77.4 billion.[1] New federal ARRA funding for innovative projects that focus on energy efficient construction and renovation, and the application of new technologies and the effective management of energy systems has great potential to optimize energy use and generate thousands of new jobs in this growing economic sector in Washington and across the Pacific Northwest region.[2] One key issue is whether the existing energy management workforce can meet this new demand, and whether there is adequate education and training available to prepare new workers and upgrade the skills of existing energy management employees to support future growth.

The Project

The NSF-funded *Meeting the Challenge of Energy Management in a Carbon-Constrained World* project is designed to address the need for high quality education and training that prepares and furthers the skills of the energy management workforce. With the leadership and support of the Industry and Labor Task Force, the project will identify the high-priority occupations, skills and competencies required by industry, and transform that knowledge into value-added education and training programs, flexible delivery systems and teaching resources that will help ensure the development of a skilled and qualified energy management workforce.

The Context for Energy Management

The term energy management is generally used to describe initiatives, technologies and practices that aim at optimizing the use of energy resources; however, arriving at a precise definition of energy management is elusive. One reason pertains to the broad scope of the energy management function, which can be found in virtually all industry sectors in an economy, from homes to schools, commercial buildings and factories. Another reason is that the responsibility for energy management may be shared among many different occupations, and these jobs often vary by industry and by company. A major national study sponsored by the U.S. Department of Energy conducted by researchers at the Lawrence Berkeley National Laboratory (LBNL) describes the energy efficiency industry as:

> A multi-disciplinary industry, including engineers, economists, marketers, designers, and tradespeople. In many ways, it does not constitute an independent industry, since the activities of the industry, rather than being new efforts, often consist of a shift from standard practice to a more energy-efficient approach to design, building construction, and building operations.[3]

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[1] *The Size of the U.S. Energy Efficiency Market: Generating a More Complete Picture* Karen Ehrhardt-Martinez and John A. "Skip" Laitner, for the American Council for an Energy Efficient Economy (ACEEE), May 2008.

[2] See: Hardcastle, A. & Waterman-Hoey, S. (2009). *Energy efficiency industry trends and workforce development in Washington State. Study report, phase I.* Olympia, WA: Washington State University Extension Energy Program, for the Center of Excellence for Energy Technology, Centralia College (2009).

[3] *Energy Efficiency Services Sector: Workforce Size and Expectations for Growth,* Lawrence Berkeley National Laboratory, October 2009, Charles Goldman and Merrian C. Fuller (LBNL), Jane S. Peters, Marjorie McRae, Nathaniel Albers, Susan Lutzenhiser, and Mersiha Spahic (Research Into Action, Inc.): http://www.epa.gov/RDEE/documents/leadership-meeting-08/goldman_napee_ee_workforce_needs_v2_122107.pdf

There are a number of specific occupations that are typically responsible for supporting the energy management function. Typical occupational titles mentioned as possible targets in the NSF project proposal include:

- Energy Management Analyst
- Residential Energy Auditor
- Lighting Auditor
- HVAC Auditor
- Energy Procurement Manager & Analyst
- Commercial Energy Auditor
- Energy Account Manager
- Energy Management Project Coordinator,
- Energy Management Program Coordinator
- Resource Conservation Manager
- Facility Manager, Building
- Performance Systems Specialists

Labor Supply and Demand for Energy Management Professionals

A growing body of research suggests that energy efficiency employment is likely to provide a large share of new employment in an emerging clean energy economy.[4] According to ACEEE, U.S. energy efficiency-related investments supported an estimated 1.63 million jobs in 2004, with the largest number of jobs represented by the buildings sector (900,000), which accounts for about 55 percent of all efficiency-related employment.[5] This finding is fairly consistent with recent research in Washington State regarding green economy employment, which found that two-thirds of green jobs in the energy efficiency sector were tied to construction.[6]

Research on the energy efficiency sector underscores the broad scope of energy management-related functions and occupations. A number of recent studies have attempted to characterize the industry, while also identifying current employment composition and future labor demand. But few systematic studies have been conducted that estimate employment in specific energy management jobs, including efficiency workforce labor and skill gaps, and related workforce

[4] *Putting renewables to work: How many jobs can the clean energy industry generate?* Kammen, D., Kapadia, K, and Fripp, M. (2004), Berkeley, CA: Goldman School of Public Policy, University of California. See also: *Green collar jobs in the U.S. and Colorado: Economic drivers for the 21st Century,* Bezdek, R. (2009), Management Information Services for the American Solar Energy Society, www.ases.org (January).

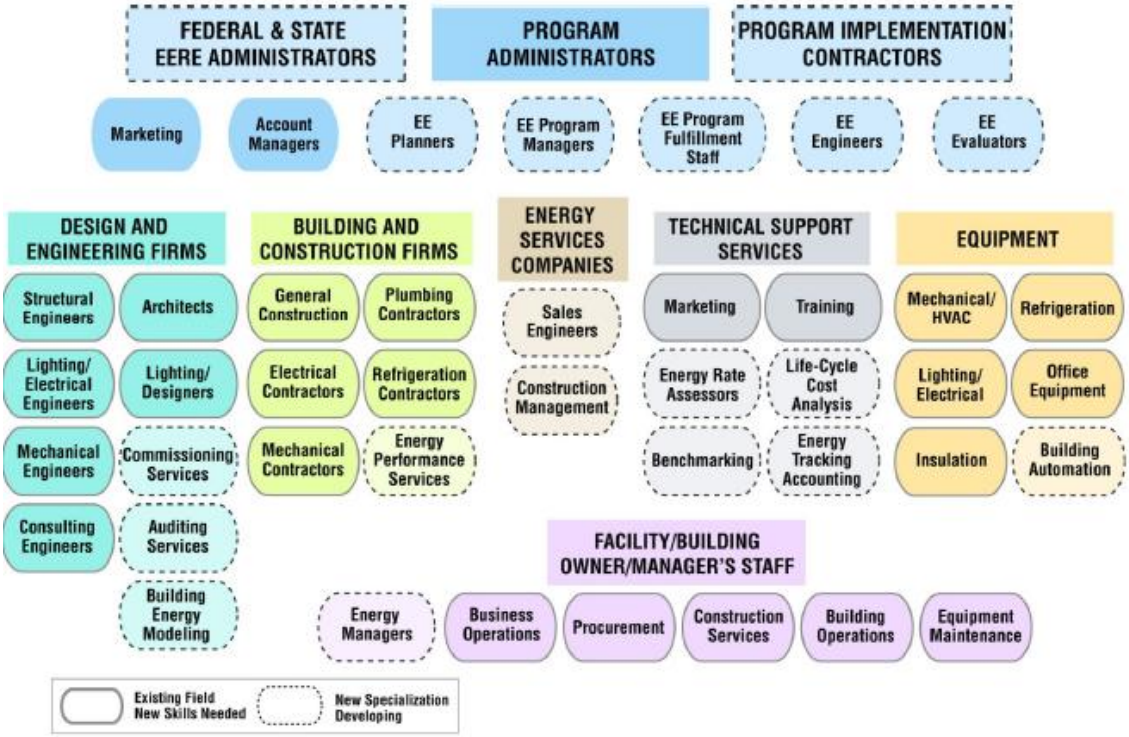
[5] *The Size of the U.S. Energy Efficiency Market: Generating a More Complete Picture* Karen Ehrhardt-Martinez and John A. "Skip" Laitner, for the American Council for an Energy Efficient Economy (ACEEE), May 2008.

[6] See: *2009 Washington State Green Economy Jobs* (2010), Washington State Employment Security Department, Labor Market and Economic Analysis. See also: *Washington State's Green Economy: A Strategic Framework.* Washington State Department of Community, Trade and Economic Development (Now Department of Commerce), (2009).

issues. The LBNL study referenced above included data collected from several leading states including Washington, and provides a useful starting point for identifying some of the common key sectors, businesses and occupations that comprise the energy efficiency industry.[7] The research also shows how energy efficiency program activities can translate into changes in specific job categories (see below).

[7] *Energy Efficiency Services Sector: Workforce Size and Expectations for Growth*, Lawrence Berkeley National Laboratory, October 2009, Charles Goldman and Merrian C. Fuller (LBNL), Jane S. Peters, Marjorie McRae, Nathaniel Albers, Susan Lutzenhiser, and Mersiha Spahic (Research Into Action, Inc.): http://www.epa.gov/RDEE/documents/leadership-meeting-08/goldman_napee_ee_workforce_needs_v2_122107.pdf

Commercial and Industrial Providers of Energy Efficiency Services



Definitions: EE - Energy efficiency, EERE – Energy efficiency and renewable energy

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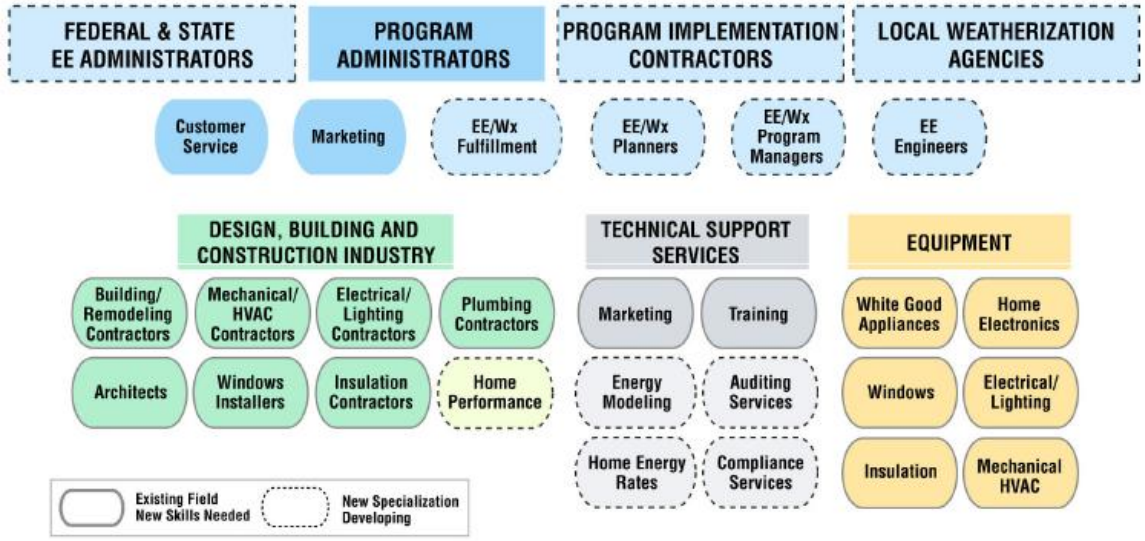
Residential Sector Providers of Energy Efficiency Services



Definitions: EE - Energy efficiency, Wx – Weatherization

The LBNL study further attempted to project how much additional labor demand would be generated by future investments in energy efficiency, following several different growth scenarios. The high-growth scenario estimated a four-fold increase in energy efficiency employment by 2020, to as many as 1.3 million workers. Even under the low-growth scenario, employment during the same period would double.[8]

It is important to note that the majority of new employment identified by LBNL was tied to construction and insulation contracting firms and related trade occupations, however new investments in energy-efficient products, technologies and control systems are also expected to generate new employment demand for energy management-related professionals as well.

In addition to concerns about a lack of qualified trades workers to support future growth in energy efficiency, there are also concerns about shortages of energy management-related professionals. Indeed, among the major workforce challenges identified by LBNL researchers was concern about a shortage of management-level employees with energy efficiency experience, and a shortage of experienced energy efficiency engineers. These challenges are reflected in other state and regional research studies regarding energy efficiency workforce capacity and future employment demand that included energy-management occupations.[9]

Future Demand Drivers

In the Pacific Northwest increased demand for energy management professionals is all but certain to occur over the next two decades, however existing employment forecasts are unclear. For instance, Washington identifies Resource Conservation Managers and Energy Advisors as "in-demand" occupations, due mainly to a projected 5.6 percent growth rate (over 1,500 jobs) between 2008 and 2018. But this occupation is clustered within a broadly-defined "Business Operations Specialists, All Other" category, which includes a number of unrelated jobs like 'customs brokers' and 'security management specialists.' Thus, systematic forecasts for specific energy occupations are not readily available.

Nevertheless, a continued state and regional policy emphasis on environmental protection, clean energy and economic development in the Northwest bodes well for energy management jobs growth. One reason is that Washington, Oregon and Montana have established renewable energy portfolio standards requiring utilities to provide green power to consumers. Washington was the first state to also include energy efficiency as a qualified activity it can use to meet those

[8] Employment and growth estimates differ markedly from the ACEEE study cited earlier due to differences in study definitions, methodology and forecasting models.

[9] The California Community College system has completed a series of studies of energy efficiency employment and future demand which align with the general findings of national studies. For examples, see: http://www.coeccc.net/energy/. See also: *Workforce Development Needs of the Energy Efficiency Industry: Survey Results from Washington and Oregon.* Seattle, WA: Northwest Energy Efficiency Council, 2009.

targets.[10] Washington has actively promoted energy efficiency as a strategy to help curb greenhouse gas emissions, encourage clean energy development, and support new job creation and growth in the green economy.

Projections about long-term increases in energy demand and costs have also spurred regional efforts to promote energy efficiency as the "lowest cost" alternative. The Northwest Power Planning Council's recently released 6th Power Plan calls for aggressive action to leverage new energy efficiency opportunities as the demand for energy continues to rise. In short, the plan identifies enough conservation to be available and cost-effective to meet 85 percent of the region's load growth for the next 20 years.[11] Achieving these aggressive targets will require staffing in a growing number of key energy management positions in utilities, energy services companies, construction-related industry sectors and companies, and for customers of utilities for whom energy management specialists will become an increasingly important position in their organizations.

Supplying a Skilled Workforce: Is Washington Prepared?

The question remains whether Washington's existing education and training system is poised to support anticipated growth in energy management-related industries and the new demand for skilled workers that this expansion will require. Even though the national recession and lack of tax revenues has reduced economic activity in the energy sector, while swelling the ranks of the unemployed, energy is one of the few sectors to enjoy federal stimulus project funding. And, the specialized nature of most energy management jobs means that employers still require specialized skills and knowledge that is not readily available, even though the overall labor pool has grown. Indeed, the preponderance of existing research and projections about growth in energy management suggests, that utilities and energy efficiency service providers have difficulty attracting trained and experienced professional and technician personnel with expertise to perform energy efficiency work. At the same time, there appears to be a general lack of adequate education and training capacity to ensure the availability of a skilled energy management workforce.[12]

Research on anticipated energy industry retirements and general population trends add further credence to employers' concerns about the future of the energy management workforce. In a nutshell, national and regional studies suggest that the energy industry as a whole is likely to experience an exodus of skilled workers to retirement over the next several years. At the same time, state population trends show that the number of working-age individuals will continue to

[10] For details on Initiative 937, see the Washington Department of Commerce website: http://www.commerce.wa.gov/site/1001/default.aspx. For a summary of state renewable portfolio standards and targets, see: http://apps1.eere.energy.gov/states/maps/renewable_portfolio_states.cfm#map. Washington's RPS calls for 15 percent of generation to come from qualified renewable sources by 2010, including 'all cost-effective conservation.'

[11] Northwest Power and Conservation Council Sixth Plan: http://www.nwcouncil.org/energy/powerplan/6/default.htm

[12] In addition to the sources cited above, the California Community Colleges' Centers of Excellence-Economic and Workforce Development initiative conducted a series of regional studies of energy efficiency occupations that also substantially support these findings. See: http://www.coeccc.net/energy/

shrink through 2030, while the number of individuals who will be of retirement age will grow considerably.[13] This means that the future pool of potential labor is likely to be smaller, and that there will be intense competition among energy companies for individuals who possess the kinds of general and specialized skills needed in most energy management occupations.[14]

In 2008 the Northwest Energy Efficiency Taskforce (NEET), a group of regional public and private utilities, launched a series of industry staffed work group discussions, which included workforce development ('Workforce of the Future'). Existing research and input from utility partners was collected and reviewed to pinpoint high-priority themes and action steps. Based on its review, the Workforce work group identified three key themes and challenges to the development of a regional energy efficiency workforce:

1. Lack of data for energy efficiency workforce development
2. A lack of strategic coordination among energy efficiency workforce development players
3. Lack of funding for workforce development training

NEET subsequently contracted with the Pacific Northwest Center of Excellence for Clean Energy at Centralia College to provide coordination for these issues and to serve as a energy efficiency workforce and education information clearinghouse. NEET is also interested in sponsoring additional research to define the regional energy efficiency workforce, to identify skill requirements for key occupations, and to support expansion of education and training options to build the skills and pipeline for new and existing energy efficiency employees.

Bridging the Gaps: Identifying Needs and Leveraging Resources

The NSF-funded *Meeting the Challenge of Energy Management in a Carbon-Constrained World* project will provide resources, leadership and the focus needed to fill some of the information and programmatic gaps identified in the research and articulated by Washington energy employers. Moreover, the project will be able to leverage work now underway under the auspices of the Pacific Northwest Center of Excellence for Clean Energy at Centralia College, which is leading a five-state consortia project under a $5 million Department of Energy (DOE) grant that focuses on the education and training requirements of the Smart Grid workforce in the Pacific Northwest. Some of the occupations targeted under the DOE grant will align with the NSF-ATE project, which will help propel our understanding of energy management occupations and the education and training programs needed to support them.

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[13] "Long-term forecast of the Washington labor force." Washington State Office of Financial Management, 2009: http://www.ofm.wa.gov/economy/longterm/2009/lt09ch2.pdf;

[14] See: Ashworth, M. (2006). "Preserving knowledge legacies: Workforce aging, turnover, and human resource issues in the U.S. electric power industry." International Journal of Human Resource Management, 17(9): 1658-1687; "Workforce trends to deliver utility industry a knock-out blow." Hay Group, working paper (www.haygroup.com), 2005; "Workforce trends in the electric utility industry." U.S. Department of Energy, August 2006; . Hardcastle, A. (2008). *Workforce Challenges of Electric Sector Employers in Washington and Oregon*. WSU Extension Energy Program (January). See also: Hardcastle, A. & Waterman-Hoey, S. (2009). *Energy Efficiency Industry Trends and Workforce Development in Washington State.* WSU Extension Energy Program (November).