ENERGY EFFICIENCY WORKFORCE TRENDS IN THE PACIFIC NORTHWEST POWER INDUSTRY:

Customer Service Representatives and Energy Conservation Program Managers

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About the WSU Energy Program

The WSU Energy Program is a recognized leader in energy research, development and technology transfer. The WSU Energy Program works with government agencies, power marketers, utility consortiums, educational institutions, private businesses and industries on projects that promote energy conservation, research, development of renewable energy sources, and economic and workforce development.

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Executive Summary

This report examines changes that have occurred – and are projected to continue – among two key occupations in the electric power industry of the Pacific Northwest. It furthers work begun with the study, *Workforce Challenges of Electric Sector Employers in Washington and Oregon*, which presented research conducted in 2008. That report described knowledge and skills required for a number of craft occupations and reported on anticipated hiring and predicted retirements. The study employed quantitative surveys, used to determine employment strength in several job classifications, and qualitative interviews, conducted to identify training and retention strategies. The resulting report focused on issues of transition in the industry, particularly in the craft occupations and for the largest utilities.

More recently, industry leaders expressed a need for similar information regarding two additional occupations for which they suspected skill needs were rising: energy efficiency/conservation (EE/C) program managers and customer service representatives (CSRs).

They were also interested to see an update of the original surveys. Those occupations were subsequently added to the 2013 survey, which was completed in October. Building on the findings from that research, this report integrates new interview data collected specifically for the energy conservation and customer service positions.

Findings

According to the information gathered for this report, the most significant changes that occurred in the targeted occupations are:

- **For Customer Service Representatives:**
    - Changes in other industries have amplified customers' service expectations. Service is expected to be continuously available, and CSRs are expected to be able to respond to a wide variety of questions on billing, rates, financing, and conservation.

- Increasing volume of information about conservation programs and resources.
- Together, these changes drive rising computer and communication skills requirements for CSRs.

- **For Energy Efficiency/Conservation Program Managers:**
  - While EE/C programs vary widely in structure and content, managers face the same need for workers with increasingly strong computer and communication skills. In many cases, the need for communication skills includes a need for marketing and sales abilities.
  - Knowledge demands are also expanding, primarily caused by the proliferating variety of complex energy conservation strategies, tools, and products.
- **For Both Occupations:**
  - There have been fewer retirements than anticipated in the industry, including EE/C program managers and CSRs, chiefly as a result of the recession.
  - Still, retirements remain a primary issue as the economy recovers, demand returns, and as workers continue to age.
  - Perhaps most notably, a close relationship now routinely exists between the customer service and energy conservation unit.

Recommendations

1. Pursue personnel policies that leverage energy efficiency professionals who may soon retire.
   a. Restructure the assignments of those nearing retirement to enable mentoring and training younger workers.
   b. Evaluate and codify critical assignments to insure that their processes, procedures, and knowledge are not lost.
   c. Rehire retirees as contractors to fill critical skill gaps or to mentor/train replacements.
   d. Expand training for mid-level personnel with input by senior workers on priorities.
   e. Seek out military veterans and workers from other industry sectors who might most easily adapt to the power industry.

2. Pursue and expand partnerships that can improve the energy efficiency labor supply for the industry.
   a. Continue to partner as an industry group with postsecondary education to increase the supply of new graduates prepared for work in the industry. NEET's partnership with the Pacific Northwest Center of Excellence for Clean Energy has helped to focus attention to the value of engaging education and training partners in this important work.
   b. Increase partnership with public K-12 education to enhance future workers' understanding of the industry and the range of work opportunities within it.

c. Simultaneously, understand the changing goals, values, and mores of the new generations, including the ways in which they are accustomed to working and communicating.

3. Continue to support the development and implementation of critical public policy that enhances the energy efficiency workforce.
    a. These activities should include strong support for targeted innovations in electric power education and training programs, as well as curriculum development and program delivery for universities, colleges and apprenticeships.
        - Occupational skill standards should be used to define industry requirements and enhance education and training program quality.
        - Work-based learning should be required of students at all levels to emphasize continuous learning and to connect academic and working skills.

4. Recommendations for future research
    a. Repeat the Workforce Challenges study, including "demand-side" energy efficiency-related occupations, in three to five years to continue tracking industry and energy workforce changes.
    b. Conduct additional occupation-specific research to clarify the causes and effects of retirement, general turnover, and growth in specific occupations.
    c. Analyze and compare enrollments, degree completions, and employment outcomes for students in Science/Technology/Engineering/Mathematics (STEM)-related programs throughout the Pacific Northwest.

Background

In 2008, the Washington State University (WSU) Energy Program completed a regional labor market and workforce study of electric power employers. For that study, the research team collected data regarding new hiring, anticipated retirements and replacements, hiring challenges, and workforce education needs.[1] The study outcome mirrored national predictions about the aging utility workforce, looming retirements, population trends, and other factors that were predicted to create considerable labor and skill gaps in the electric power industry. That initial study focused primarily on technical craft occupations: operators, mechanics, electricians, technicians and line workers. Non-craft occupations, such as the EE/C program manager and utility CSR, were not a focus of the original study.

Also in 2008, a group of regional utilities, electric power marketing organizations and other stakeholders convened a taskforce to identify and help resolve the most pressing issues constraining the success of energy efficiency initiatives in the Pacific Northwest, including workforce development. After several months of meetings with utility and energy efficiency professionals, the Northwest Energy Efficiency Taskforce (NEET) identified six major topic areas, and then assigned a series of work groups to further explore each of the topics. Each work group conducted background research and conducted focused discussions with work group participants and other experts to define the challenges, opportunities and recommendations deemed important for enhancing energy efficiency across the region.[2]

NEET leaders assigned one work group, which was entitled "Building the Energy Efficiency Workforce of the Future," to focus on labor and workforce development issues for the energy efficiency sector. The work group issued a final report in 2009 that noted, among other findings, that there was a lack of reliable data on regional employment, skill requirements, and education and training programs to support regional energy efficiency goals.[3] The work group recommended action on two workforce-related fronts:

- Define energy efficiency jobs, establish skill standards and identify job classifications, and create a clearinghouse for energy efficiency job openings in the region.
- Create a coordinating body to partner with energy efficiency entities, and increase regional coordination for training, educational programs, curriculum and skill standards.[4]

The work group also acknowledged that, like the energy industry as a whole, energy efficiency was characterized by a workforce that had become disproportionately older: many of the experienced energy efficiency professionals were fast approaching retirement age. Demographic trends also suggested that the labor pool available over the next two decades appeared to be shrinking, which was very likely to intensify competition for a smaller number of qualified new workers in the future. At the same time, technological innovations and grid modernization were raising employer expectations about the knowledge and skills needed to succeed in high-skill energy jobs.

Since the NEET report was released in 2009, the electric power industry has:

- Continued to transform how it generates, transmits and distributes electric power through the application of advanced technologies and processes.
- Embraced other smart grid innovations that have implications for the work and skill requirements of the energy workforce.
- Experienced weaker short-term demand for electric power and delayed departures by retirement-eligible employees due to economic uncertainty and weakened retirement portfolios caused by the deepest recession since the Great Depression.

How these factors affected the energy efficiency program management and customer service workforce were not well understood, which piqued NEET's interest in sponsoring additional research.

Purpose

This project was launched to provide current, systematic data on energy efficiency and customer service employment and to identify related labor market and workforce challenges in the Pacific Northwest. This study sought to find answers to the following questions:

- Have industry restructuring, new technology and the recession reduced the need for new hires or expanded demand in specific occupations and sectors?
- What are employers' estimates of the need to replace experienced personnel due to retirements?
- What gaps do employers anticipate, and what new succession plans or strategies do they have for filling these gaps?

Although the range of occupations in "demand side" (i.e., customer-interfacing) employment at utilities and similar organizations extends far beyond these two occupations, stakeholder priorities, resource constraints and the opportunity to leverage data collection through other research led the project sponsors to focus specifically on EE/C program manager and CSR occupations. The strategy also enabled the collection, analysis and interpretation of data at a deeper level, which project sponsors deemed to be more useful to stakeholders than a surface-level analysis of myriad demand-side occupations.

Methodology

To address these issues, WSU researchers supplemented the 2008 research, adding EE/C program managers and CSRs to the mix of occupations studied previously, and leveraging a portion of the research data collected for an expanded 2013 regional update of the original 2008 study.[5] The project reviewed existing research and collected new data directly from a sample of Northwest employers. The combined quantitative and interview data were used to generate:

- Near- and longer-term forecasts for new employment and replacement of retirees, and
- Strategies for filling key skill gaps.

To balance information from employers at multiple levels, the study gathered information by survey and by direct interview. As shown in

, 15 Northwest energy companies from Washington, Oregon, Idaho, Montana and Utah – representing a mix of utilities and related organizations of different types, sizes and geographic locations with employees in the two target occupations – were included. All participants were assured confidentiality.

The selection of the organizations was not based on statistical sampling procedures and the results cannot be reliably generalized to the electric power industry as a whole. The organizations represented the concentration of the regional industry, but many provide employment in nearby states, reflecting the regional nature of the labor market. The organizations include mostly public and privately-owned utilities and other organizations engaged in electric power generation, transmission and distribution.

Table 1. Participating Employers and Total Employment, 2013

Employer	Total Regional Employment
Avista	*1,672*
Bonneville Power Administration	*3,089*
Chelan County PUD	*643*
Flathead Electric Cooperative	*162*
Grant County PUD	*721*
Grays Harbor County PUD	*152*
Idaho Power	*2,081*
Northwestern Energy	*1,428*
PacifiCorp	*6,251*
Portland General Electric	*2,547*
Puget Sound Energy	*2,981*
Seattle City Light	*1,801*
Snohomish County PUD	*1,044*
Tacoma Power	*843*
U.S. Bureau of Reclamation	*1,093*
Total Employment	***26,508***

Survey topic areas included:

- Total employment and current employment by occupation.
- Current job vacancies, employment forecasts for new hires, and retirement replacements by occupation.
- Succession planning and related strategies.
- Current and future training needs.

The next section of the report includes contextual information about the energy industry, including a brief summary of the major changes in the industry and associated workforce-related trends. The findings section describes the analysis of the quantitative and qualitative data provided by regional employers.

Improved production, operating efficiency, and consolidation in the U.S. energy industry led to a 25 percent decrease in utility employment between 1990 and 2005 (Figure 1). During this period utility employment declined by 200,000, and reductions were made by industry and by many postsecondary institutions in education and training needed to support the industry. Since then, employment has remained fairly stable, even as the demand for energy and its consumption have increased.[6]

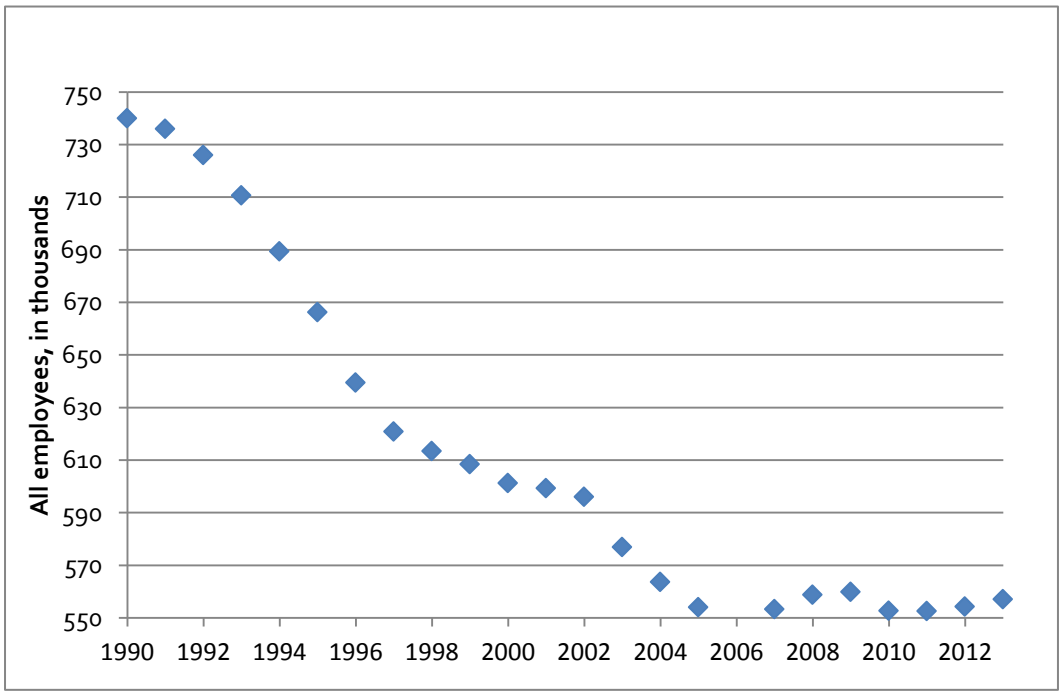
The nation's electrical energy system is becoming more sophisticated than ever before, with innovative technologies, information and communication systems enabling greater performance and reliability; however, its core physical infrastructure – the legacy generation, transmission and distribution systems that have existed for decades – is degrading and needs to be replaced.

At the same time, there is growing political pressure to expand and integrate clean and renewable energy sources and increase energy efficiency to reduce environmental pollution, improve energy security, and spur economic development and job creation. Public policy and legislation have led public- and investor-owned utilities and governments to:

- Invest heavily in new research and technology upgrades to support a "smarter" electrical grid,
- Increase the use of renewable sources of generation,
- Boost consumer education, and
- Expand incentive programs to spur greater energy efficiency through consumer engagement.

Indeed, the nation's electrical power industry is in the midst of some of the most significant, long-term changes in its history.

Figure 1. U.S. Utilities Employment 1990-2013 (seasonally adjusted)



Source: U.S. Department of Labor, Bureau of Labor Statistics, 2013

Labor Shortages Anticipated

Effectively implementing systems changes to achieve these broad strategic goals will require a talented workforce. In the original 2008 *Workforce Challenges* study, a number of studies and reports were cited in which researchers and industry observers warned of a coming labor and skills shortage, due mainly to the predicted exodus of long-time, highly skilled, utility-sector craft workers who were expected to retire.[7] At that time, some national reports projected that as many as 50 percent of existing utility employees would retire during the following 10 years, creating critical shortages in the number of qualified workers available to replace experienced retirees in many key craft and professional occupations.[8]

Several of these studies cited related reasons why the utility industry was about to enter a period in which long-term labor challenges would likely worsen:

- Hiring freezes and downsizing that limited the influx of new skilled workers to the utility industry.

- Lack of succession planning within utilities to ensure continued upward mobility and stability of the workforce.
- Lack of training facilities adequate to support the need for new, appropriately skilled workers.
- A long decline in electric power engineering and engineering technology programs and degrees from U.S. colleges and universities.
- An aging electric utility workforce.
- Impacts of the aging baby-boom generation on the overall U.S. labor force.

By 2008, the national recession had begun to visibly erode the U.S. economy, leading to growing unemployment and weakening stock performance, which in turn reduced the value of pensions and retirement portfolios of thousands of Americans preparing to retire.[9] These factors, worsened by a sustained weakness in financial markets and few alternative employment options, led many prospective retirees to postpone their departures. The economic conditions in the energy industry were also negatively affected, as lower demand for transportation fuels and electrical energy forced utilities to trim staffs and budgets for some functions, departments and services, including workforce education and training.[10]

Subsequent discoveries of natural gas reserves and improved extraction of natural gas and oil enabled by hydraulic fracturing methods (or fracking) boosted supplies, which softened energy prices further while consumers continued to limit spending. These factors contributed to an already-anemic economic recovery in the energy industry. Weakness in energy markets also led to reduced investments in renewables and energy efficiency development.[11] For most utilities, including those in the Pacific Northwest, these economic factors meant that considerably fewer retirement-eligible employees left their utility jobs than had been expected.[12]

Finally, although the recession served to slow the loss of experienced utility employees, the weak economy also meant that few new positions became available at the entry level. Total employment in utilities remained fairly stable following the recession, but the number of mass layoff events reported by employers nearly doubled between 2007 and 2009.[13] The little new growth that occurred was mostly limited to those with experience; hiring at the entry level, including through registered apprenticeship programs, decreased. Federal economic stimulus funds provided through the American Recovery and Reinvestment Act (ARRA) supported energy projects that likely stimulated

some new hiring and moderated energy-related job reductions.[14] The biggest job-creation effects, however, likely went to manufacturers, information technology companies, technical service providers, and other suppliers of equipment and technical expertise for the utility sector.[15]

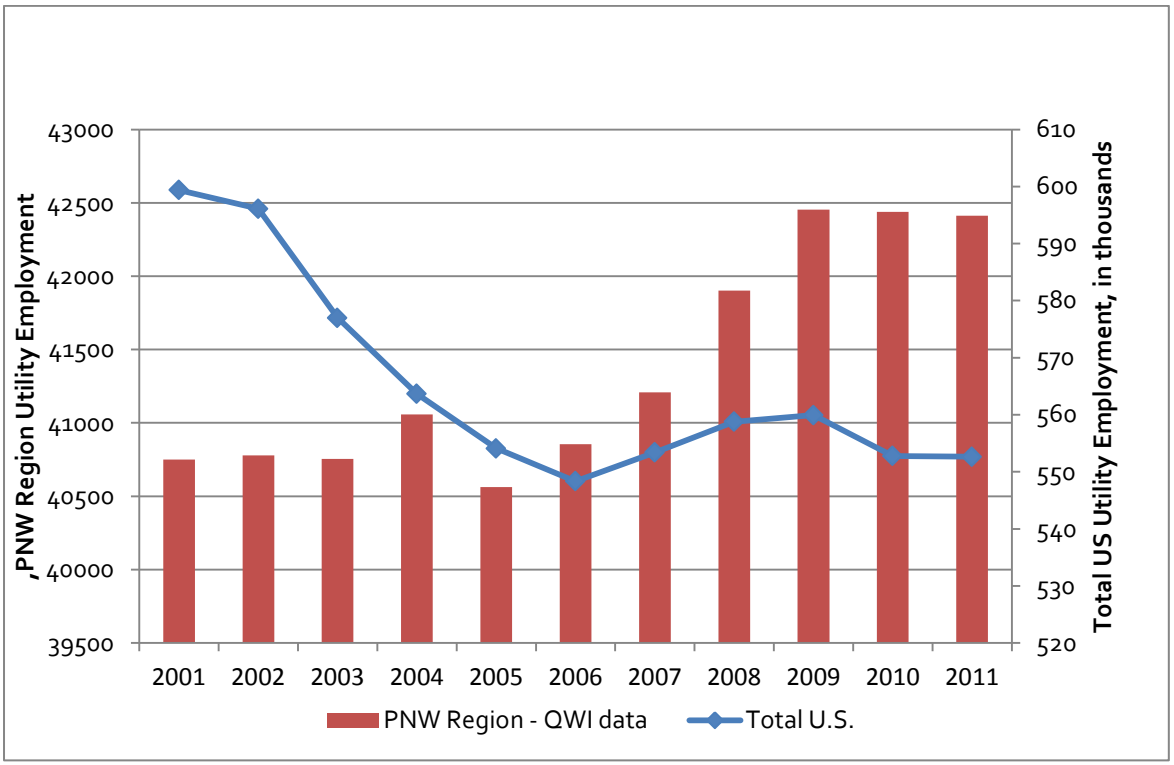
During this period, the workforce challenges associated with recruiting, hiring, and retaining qualified employees continued to plague energy employers, even as the pool of job-seekers increased.[16] As the economy continues to improve, there is a renewed concern among energy industry observers and employers about the potential disruptions that may result when the improved financial circumstances of would-be retirees – a group that continues to grow in number over time – leads them to implement their planned departures.[17]

The Electric Sector in the Pacific Northwest

Compared to the rest of the nation, electric power employment in the Pacific Northwest enjoyed relative stability and even some growth in the past decade.[18] As shown in **Figure 2**, while national employment in utilities remained mostly flat over the past several years, Pacific Northwest utilities experienced modest growth, with only negligible declines in employment following the peak in 2009.

As noted earlier, ARRA funding may have helped cushion the blow for utilities: organizations across the five Pacific Northwest states were awarded more than $4.2 billion from the U.S. Department of Energy alone for various energy-related projects, including research and development, power generation, energy efficiency, smart grid demonstration projects, and environmental initiatives such as cleanup at Washington's Hanford Nuclear Reservation.[19] Of that total, more than $115 million was awarded directly to regional utilities in the Pacific Northwest to support utility-based projects. This total does not include additional ARRA awards by other federal agencies, or energy awards to non-utilities that have indirectly supported utility employment or workforce education.

Figure 2. Growth versus Decline: U.S. and Pacific Northwest Utility Employment, 2001-2011



Sources: U.S. Bureau of Labor Statistics, Quarterly Census of Employment & Wages (federal) and U.S. Census Bureau, Quarterly Workforce Indicators (non-federal).

Electricity Demand Growth Forecast

The regional demand for electrical power is forecast to grow in the decades to come. The Northwest Power Conservation Council (NWPCC) reported in 2005 that the industry was poised for growth over the next two decades, with increases estimated at 40 percent between 2003 and 2025, or around 7,000 average megawatts. In NWPCC's Sixth Power Plan, its most current, electricity demand in the medium-case forecast is anticipated to grow from about 19,000 average megawatts in 2007 to 25,000 average megawatts by 2030 (**Table 2**). The average annual rate of growth in this forecast is about 1.2 percent. This level of growth does not take into account reductions in energy demand from new conservation resources, which could reduce demand further. The Sixth Power Plan proposes to meet 85 percent of the new load growth for electrical power in the region over the next 20 years through energy efficiency (primarily) and renewables.[20]

Table 2. Sixth Northwest Power Plan Electricity Demand Forecast Range, in Average Megawatts (MWa)

	Actual 2007	2010	2020	2030	Growth Rate 2010-2020	Growth Rate 2020-2030	Growth Rate 2010-2030
Low	19,140	18,860	20,463	22,010	0.8%	0.7%	0.8%
Medium	19,140	19,292	21,820	25,275	1.2%	1.5%	1.4%
High	19,140	19,591	22,651	27,761	1.5%	2.1%	1.8%

Source: Northwest Power and Conservation Council, 2010

Clean and Renewable Energy

According to the Energy Information Administration, renewables (including hydropower) made up around 13 percent of U.S. electricity generation in 2011, and over half of all renewable energy goes to produce electricity.[21] Wind has led all non-hydro sources of renewable generation, growing from just six billion kilowatt hours (kWh) in 2000 to 140 billion kWh in 2012. Individual states are also providing policy leadership for clean energy, which has spurred the development of renewables and energy efficiency. In the Pacific Northwest, most states have legislatively established renewable energy portfolio standards and environmental policies that require or encourage the development of renewable energy sources and energy efficiency; only Idaho does not have renewable portfolio standards or goals.[22]

States in the region have also aggressively pursued economic development and environmental strategies aimed at increasing the use of renewables and energy efficiency in an effort to reduce greenhouse gas emissions, revitalize their economies, and boost job growth. Since 2001, the region has witnessed considerable increases in non-hydropower generation capacity, especially wind power, with additional growth in bio-energy, geothermal, and solar.[23] Clean energy development has also added employment in the region among utilities, contractors and consulting firms, renewable energy manufacturers, and suppliers.

The Smart Grid

The development and use of smart grid technology is changing how utilities generate, transmit, and distribute electrical power. While there are many definitions, "smart grid" generally denotes a set of technologies that can be used to upgrade the current electrical grid.[24] These technologies are shifting how the industry interacts with and manages our nation's complex energy system, while providing new opportunities for consumer engagement. Substantial investments in grid upgrades have already occurred, and the provision of recession-era funding under ARRA since 2009 has extended earlier work and supported many new upgrade projects, including several among electric-sector consortia partners in the Pacific Northwest region.[25]

The existing grid has served its intended purpose well, but it is worn out; its major physical systems need to be replaced. One report concluded that the electric power industry will need to invest up to $1.5 trillion to upgrade its physical infrastructure between 2010 and 2030.[26] Efforts to shift to clean and renewable sources of generation will require upgrades to the existing electrical grid so it is flexible enough to achieve high levels of penetration by renewables and enhance efficiency. At the same time, concerns about the causes of climate change have grown, and electricity generation is the single largest contributor of greenhouse gases in the U.S.[27]

The use of smart grid technology is expected to impact the work and skill needs of energy employees; however, some reports suggest that many of the basic technical competencies required by skilled craft positions are not expected to change.[28] The broader implications for workforce skill needs may be more subtle and tied to greater understanding of systems and integration, cross-disciplinary knowledge and teamwork, and other foundational workplace skills.[29]

- The design, installation, and integration of advanced metering and communications devices is expected to vastly increase the volume and frequency of information available to utilities with which to monitor and improve system performance.
- The collection and management of "big data" requires specialized data management and analysis expertise that most utilities currently lack.[30]

While engineers and other professional employees will lead the development and integration of these technologies, operations and maintenance personnel must also work with these new systems, which call for a deeper understanding of system integration and an expanded use of interdisciplinary, team-

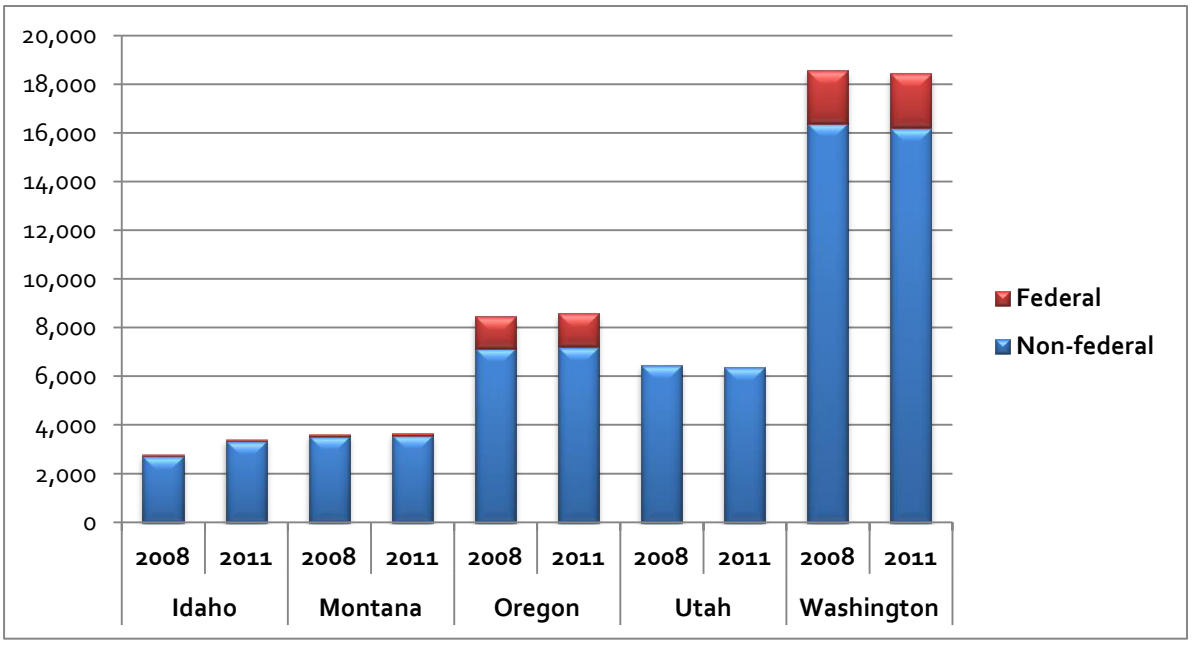
based approaches to problem solving.[31] Even utility customer service representatives – a key entry-point for utility careers – require higher levels of knowledge and skill needed to function effectively in a smart grid environment.[32]

Utility Employment in the Pacific Northwest

Electric power generation, transmission, and distribution activities support thousands of jobs across the Pacific Northwest. In addition to employment in utility organizations, the region's large hydropower presence contributes employment through federal agencies and jobs that support numerous hydropower installations in the region, especially in Washington and Oregon, where major dams along the Columbia River and other waterways are federally owned and operated.

In 2011, federal and non-federal utility organizations employed approximately 40,463 people across the five-state region (Figure 3). Washington leads the region in total utility employment, with more than 18,000 jobs, including around 2,000 federal employees, many of whom support hydroelectric projects on the Columbia River and its tributaries. Even with the recession, utility employment in this region has remained relatively stable between 2008 and 2011.[33]

Figure 3. Federal and Non-Federal Utility Employment by State: 2008 and 2011



Sources: U.S. Bureau of Labor Statistics, Quarterly Census of Employment & Wages (federal) and U.S. Census Bureau, Quarterly Workforce Indicators (non-federal).

An Economic Engine

The availability of reliable electrical power forms the basis for all economies. Indeed, electricity is a product that underpins virtually all economic activity, and its importance in the development of modern societies is crucial.

Just as electrical power serves as a powerful economic catalyst, the region's electrical utilities also support regional and state economies directly in the form of payroll and tax revenues. In 2011, for instance, utilities across the five-state region provided nearly $2.8 billion in payroll.[34] Washington state, with its large utilities employment base, provided over half of the region's total utility payroll ($1.46 billion), followed by Oregon and Utah.

The economic contribution of utility jobs to the regional economy is also a function of the high wages (and benefits) offered by utility employers. On average, regional utility wages are 82 percent higher than the average for jobs across all industries; annual utility wages for the region are approximately $75,008, compared to just $41,008 for jobs across all industries.[35]

U.S. employment in utilities is expected to decline somewhat over the next seven years. Table 3 shows that nationally, total utility employment is expected to decline by 6.5 percent between 2010 and 2020.[36] The Pacific Northwest offers a mixed picture: Private-sector utility employment across the five states is expected to decline only modestly, while Idaho and Washington are expecting modest growth. In contrast, Montana, Oregon, and Utah are expected to see declines.[37]

Table 3. National and State Utility Employment Change, 2010-2020

	National	Idaho	Montana	Oregon	Utah	Washington	Five-State Total
Percent Change 2010-2020	-6.5%	9.5%	-5.3%	-2.2%	-13.5%	6.1%	**-1.4%**

Sources: State information is from the Quarterly Census of Employment and Wages data maintained by the U.S. Bureau of Labor Statistics[38]

Supplying an Educated Workforce

Federal and state funding sources have also targeted investments in workforce education and training that support the energy industry, especially projects that have the potential to create new jobs or up-skill employees to improve productivity and prevent dislocations.[39] Although some of the ARRA -funded projects have produced mixed results, others have generated good workforce training and placement outcomes while strengthening the connections between energy employers and education and training providers across the region.[40] Federal and state legislation and economic policies supporting clean energy continue to focus attention on boosting development of companies and products that would spur economic growth, enhance environmental protection, and spur new employment opportunities in "green" jobs.[41]

Skill shortages reported by electric power employers in 2008 were exacerbated by the skill gaps in industry sectors such as manufacturing, which serve as a secondary source of skilled labor for energy companies. More recent studies suggest that, while the skill gaps reported by employers in these industries have improved somewhat, some serious gaps remain.[42] Labor and skill shortages in affiliated industries have limited the ability of electric-sector employers to attract and hire applicants from those economic sectors.

Long-term, there continue to be serious concerns about the ability of U.S. education and training institutions to meet the future skill requirements of current employers and to prepare workers for emerging economic opportunities, which are expected to require much higher levels of skill in science, technology, engineering and mathematics (STEM).[43] The energy industry is already highly dependent on the talents of individuals with strong STEM preparation, and the development and application of new technologies is driving up the demand for STEM competencies among new and existing workers.

Beyond the STEM basics, competencies necessary for innovation, competitiveness, and productivity are required in industries and occupations at all levels – including energy craft and professional jobs. The scarcity of new workers with these competencies within and outside of the energy industry will present additional long-term labor supply challenges for utility employers.

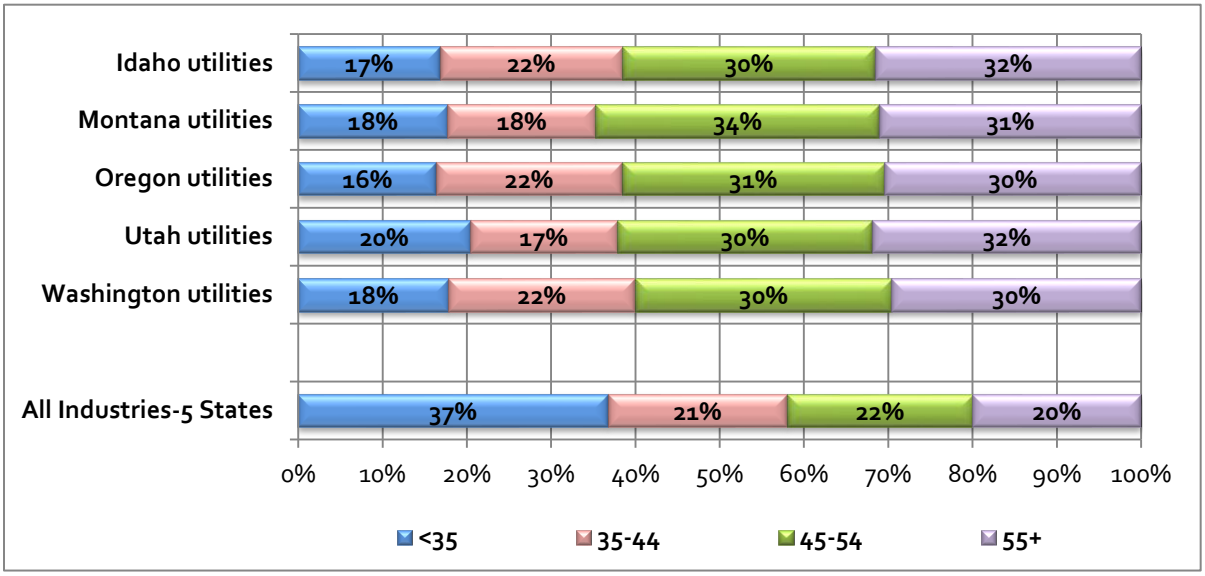
Population Dynamics – The Changing Labor Force

The future labor supply has been a rising concern in the U.S. for many years as the baby-boom generation ages. Demographic trends suggest that while the future labor pool will be smaller and more ethnically diverse, its members may also be less well-prepared than in the past.[44]

The national recession led to double-digit unemployment, and the U.S. unemployment rate, which has exceeded 8 percent since 2009, is now expected to persist at or near that level until 2014.[45] Despite a weaker demand for labor, the challenges associated with an aging workforce are a long-term concern for electric power employers nationally and in the Pacific Northwest. National survey data shows that in 2010, the average age of the utility workforce was 46, and the number of utility employees with more than 30 years of service has increased by 5.2 percent since 2006.[46] Thus, while the recession has reduced overall employment demand in all industries, including utilities, the aging of the utility workforce continues to pose potentially formidable replacement and workforce education challenges as these skilled workers transition into retirement.

Figure 4 shows that among the age cohorts for all industries in the five Pacific Northwest states combined, 37 percent of the workforce is made up of employees under age 35 and just 20 percent of the workforce in all industries is age 55 or older.[47] In contrast, for each state's utility sector, just 20 percent or fewer of employees are under 35, while 30 percent or more are 55 and older. More broadly, more than 60 percent of utility workers across the region are now 45 years of age or older. As noted in the 2008 *Workforce Challenges* report, these dynamics suggest that the supply of less-experienced workers may not match the demand generated by future retirements among more experienced older workers.

Figure 4. Age Cohorts and Percentages by State: Utilities versus All Industries (Five States Combined)



Findings

This study inquired specifically about the employment and workforce issues that affect electric power employers and employees across the Pacific Northwest in two specific occupation areas: customer service and energy efficiency. Topic areas included:

- Current demand and vacancies;
- The aging workforce, retirement forecasts, and industry responses to it;
- Recruiting new workers and estimating future demand;
- Supplementing the skills of new workers;
- Supplementing the skills of experienced workers; and
- Attracting youth to the industry.

It is important to note that this study is based on a limited employer sample, and the data do not account for vacancies, retirements, or hiring estimates at other organizations. Thus, the data reported by employers likely understates the actual number of current and future employment opportunities available for EE/C program managers and CSRs across the region. The tables presented in this section are adapted from the 2013 *Workforce Challenges* study.[48] The data from all nine occupations are included as reference points for comparison.

Overall Demand

The primary method for measuring overall demand in the industry is employers' self-reports. Current employment and new labor demand related to current vacancies and forecasts of employment demand over the next three years are summarized below. As shown in Table 4, current employment of CSRs (1,635) represents a comparatively large group, while there is a relatively small number of EE/C program managers (166). Similarly, employers reported a modest number of current vacancies for CSRs and just three vacancies existed for EE/C managers.

The table also shows that employers do not expect to expand the number of positions in these two occupations over the next three years. Indeed, despite its large base, employers do not anticipate adding any new CSR positions. The addition of just one EE/C program manager position was forecast by employers.

Table 4. Current Employment, Vacancies, and Projected Staffing Change in FTEs per Occupational Group, 2013-2016

Occupational Group	Total Current Employment in Occupation	Number of Current Vacancies	Percentage Change in Next 3 Years	Net Future Growth in FTEs, Nest 3 Years
Operator	1,039	28	0.2%	2
Mechanic	912	15	2.0%	18
Electrician	964	39	0.6%	6
Technician	854	24	0.1%	1
Line Worker	2,120	60	< 0.1%	1
Power Systems Operator	388	18	0.0%	0
Power Engineer	878	85	3.1%	19
Customer Service Representative	**1,635**	**51**	**0.0%**	**0**
Energy Efficiency Program Manager	**166**	**3**	**0.6%**	**1**
Totals	**9,105**	**305**	**0.5%**	**48 FTEs**

The Aging Workforce

All the industry representatives interviewed for this study were asked about the retirements they anticipate and how they were planning for those retirements. In most cases, employers were well aware of the issue for the targeted occupations; most knew how many of their current CSRs and EE/C managers were or would soon be eligible to retire.

Table 5 illustrates employers' five-year retirement projections across several occupations. Taken together, 17 percent of the total workforce in these occupations is expected to retire within five years, and employers reported that they expect to fill nearly all of these openings. The forecast for CSRs was the lowest among all occupations at 8.8 percent. While the total number of retirements for EE/C program managers is not large, the 38 retirements represents nearly 23 percent of the current workforce, the second-highest among the occupations studied.

Table 5. Anticipated Retirements in FTEs per Occupational Group, 2013-2018

Occupational Group	Number of Retirees Projected	Percent of Current Workforce Expected to Retire 2013-2018
Operator	152	14.6%
Mechanic	150	16.4%
Electrician	251	26.0%
Technician	158	18.6%
Line Worker	386	18.2%
Power System Operator	66	17.0%
Power Engineer	210	20.5%
Customer Service Representative	**144**	**8.8%**
Energy Efficiency Program Manager	**38**	**22.9%**
Total	***1,555***	***17.0%***

Naturally, employers realize the potential damage caused by losing senior staff in a short period. In fact, *no employer reported being unaware of the looming problem.* Many have developed strategic plans for replacing their veteran staff as they retire. How much planning – and how well it has been absorbed at the operational level – varies, as evident in the comments of industry representatives with whom we spoke.

Customer Service: Changing Demands, Changing Responses

All across the United States, and indeed the world, the utility industry is transforming. Although plagued in recent years by the effects of deep recession and reduced consumer use, energy demand is now returning. The lean years are not gone, however, and consumers of all types seek ever more cost-efficient ways to work and live. At the same time, consumers are coming to expect online delivery of information and services, and are seeking from every utility the same level of service and easy access to information offered originally by only a few industries. The rapid pace of change in technology and mobile communications benefits both consumer and utility, but demands greater expertise and knowledge from employees.

> ***"We still have people who want to have a face-to-face conversation, so the challenge for representatives is to make them feel like it is personal and overcome the distance."***

Today, power companies find that those employees who "touch" their customers are truly critical resources, whether their task is to explain a bill, help choose a new appliance, or design a custom lighting system. The industry now serves increasingly sophisticated customers who want to understand their utility bills in detail, determine the relationship between what they use and what they pay, and learn how to control their costs. As consumers meld this information into purchasing decisions, companies are compelled to help them, which often requires assembling information from formerly separate departments and making it useful to the public. In the interviews conducted for this study, it was very apparent that companies have now interrelated the staff who specialize in billing and finance with those whose expertise is consumption and conservation.

The Customer Service Representative Defined

The most common elements of the CSR's daily work are described in the CSR skill standards recently created by WSU for project sponsors .[49] Their prime duties focus on helping customers understand their bills and their payment options; providing information about company policies and programs; and making referrals for additional information and service. They are on the front line with customers during electric outages and gas emergencies, and they take information and report problems to relevant departments elsewhere in the company. Usually CSRs are the first contact the utility customer has with the company, and they are responsible for resolving customer complaints whenever possible and making referrals when resolution is not possible.

CSRs usually have two to four years of previous work experience in customer service or related work and strong communication skills. They must develop detailed knowledge of the company's policies, practices, and credit programs, and understand the rules and regulations common to all utilities in the Northwest. Their position requires:

- Solid reading and basic mathematics skills.
- Strong communication skills, particularly in listening, speaking, and writing.
- Well-developed abilities to visualize, recognize, and solve problems, for which creative thinking and decision-making skills are critical.
- The ability to keep learning and applying newly acquired skills and knowledge as rules change, new technologies and policies are adopted, and customer programs are developed and applied.

In addition, over the last three to five years, customer service managers have observed a dramatic increase in the need for CSRs to have technological skills, particularly computer-related use and research skills.

Taken together, these are critical skills because CSRs serve as the most common "public face" of a company. In describing the 2012 skill standards for CSRs, manager Aundrea Jackson of Puget Sound Energy noted:

> The skill sets needed to educate, serve and empower the consumer will not only provide a career path for Customer Service Representatives, but also becomes the foundation for changing the relationship between the utility and the consumer.[50]

These interviews illustrate how that change has occurred so far and how it continues to evolve.

Changing the Customer Service Delivery Model

Participants in these interviews were asked to consider the ways in which skill demands were changing for CSRs. Most managers immediately considered skills related directly to changes in customer service delivery, such as that described by one manager: "We are working to move our customers away from the traditional walk-in to electronic payment." This means developing a way to meet customer service needs without face-to-face contact. Not every customer is pleased with the change, so the pressure is on customer service departments to provide service that still feels personal and helpful, despite being delivered offsite.

Most managers described the importance of CSRs' communication skills in performing that work. They mentioned a correlation between the CSR's familiarity with online and web communication and social networks. "The most critical difference would be more computer skills, including social media skills, because customers use all those. Workers not using them are at a disadvantage." These communication and social skills were inextricably linked with the larger change – the increasing need for more sophisticated computer skills – but managers emphasized the purpose of the change: moving customers to find personal service through online and web communication.

Not all customers need help transferring to online services, of course. Other managers spoke of the rising service expectations of a different kind of customer. Accustomed by banking and other industries to have 24-hour service availability and online access to accounts, customers want the

same from their power companies. These changes combine to make a wide range of computer skills ever more essential to CSRs.

Computer Skills

Computer skills primarily refers to:

- Using the computer to view customer accounts so CSRs can discuss billing and payment details, tracking savings, customer information, regulations, and complaints.
- Checking customer eligibility for a variety of programs.
- Helping customers understand what their bills mean and what likely is driving their usage.

As one representative responded, "Typical questions include: 'What is peak time? How does it affect me?'" Managers reported that their CSRs now spent more time explaining company programs and policies to customers, helping them understand the terminology of energy consumption and conservation. Most reported that the single most common request from customers was for help saving money, and that meant CSRs needed to know answers to common questions about energy consumption, and be able to access detailed information on appliances, energy-saving programs, and customer options.

These computer skills are so important that several companies reported routinely testing computer skills as part of the new hire process. "We test computer skills just like we conduct aptitude testing for math and (web) navigation skills."

The third most common response about changing skill needs was the ability to use specialized computer programs. Companies were often utilizing proprietary or customized software, which required both new and incumbent workers to master fairly complex programs. "We made a lot of changes with online and third-party vendors, so our workers have to be up on the computer generally and those specific skills. We have ongoing training that we keep going with the group. It's not that things change, but people need reinforcement because the program is just difficult."

It should also be noted that the increased demands of consumers affect the need for increasingly sophisticated self-service options. This demand is not on CSRs directly, but on the interface of customer service and information technology departments. As one manager noted,

> Changes in banking are driving changes in customer service for everyone, especially in self-service offerings. (Customers) expect service via the web and they expect it to be easy, with sophisticated telephony, making it intuitive yet sophisticated. We had self-service options, but they were not sophisticated, so we had to become better at web service and provide web support.

Training

As a result of these changes, nearly every company in the study is engaged in training to support computer-related skills. Many reported that they started with their in-house staff, usually on an ad hoc basis, and then created a package for training new hires. A few reported some resistance from long-term employees. Companies that reported resistance responded by creating policies that linked promotion and advancement, and even job performance reviews, to computer skills. "We start new folks with the simpler calls, then [those with] higher skills begin to earn higher pay. You can't progress without technical skills and you can't stay at low skill, low pay – you must keep adding skills."

Assessing what new hires needed from training, managers commented on the skills they now screen for when hiring that mark a change over the last few years. Even in smaller communities, skill needs have changed. A manager from one rural utility noted that computer and social media skills for CSRs are critical because their use among customers has increased : "Workers not using them are at a disadvantage."

Commonly, the CSR managers were able to rely on in-house trainers. While they all reported needing and relying on training to help incumbent employees keep up with changes, only one described having a formal training program. One large energy company reported having two full-time trainers. "Employees get 40 hours of training during the year, scheduled as a team, of varying lengths. Plus we have a resource center available." Several employers allowed employees to request training and also relied on supervisors to nominate employees in need of updates. Refreshers for billing procedures, which are complicated, were frequently cited as an example.

Succession and Employment Planning

In addition to discussing skill changes and training issues, CSR managers were asked about retirements and hiring plans. Many companies still feel the effects of the recession, reporting delayed retirements and much less turnover than in the past. Customer service managers were all

aware, however, of senior personnel in their departments and the need to consider pending retirements in their planning.

As for formal planning, most managers reported that while it was underway, planning for upcoming retirements was not yet formalized. One manager noted: "We are in the process of creating a district workforce development plan, but currently much of it is up to managers to evaluate their business and decide if they have resources to justify replacements. It's always a question of whether the loss can be absorbed, or if other efficiencies can be made, or if the replacement is required. Managers make the decision and build the business case."

Absorbing personnel losses from retirements seemed the most common situation, although many customer service managers also noted that, overall, not much hiring is planned. "Most hiring in the Northwest is just replacement hiring. We halted hiring in '08. We used to have 20-25 in new hire classes, but not since '08. Now we have low turnover. We do have retirement issues: we have a mature workforce, but they are staying longer. We had two (leave) this year – so it's happening, but not huge. Most vacancies are filled with overtime."

Overall, there was less concern about replacement hiring or expansion than might be expected. Most managers seemed more concerned about – and were spending more time on – issues of training and responses to changing customer service demands.

Partnerships

Even as CSR managers reported that hiring was down, they agreed that hiring did still occur. They were asked about recruitment and, particularly, about ways they might partner with colleges and universities to attract future workers, such as through internships. One typical response:

> College partnerships are hard. Our schedules are too flexible. We use bidding for shift assignments, based on performance and tenure, so there are shift changes. Therefore, we don't have students very often.

In a few cases, CSRs were covered by a negotiated contract; for them, substantive duty changes were not appropriate. Managers of employees with contractually defined responsibilities found many of the research questions did not apply to them, and did not care to speculate on changes that might be proposed in the future.

Customer Service Representative Summary

- It is easy to find entry-level applicants, but many applicants lack sufficiently sophisticated computer and software skills.
- The CSR occupation was previously marked by high turnover in some regions, but it has apparently stabilized in all areas since the recession.
- Work is often more demanding, difficult, and complex than anticipated: employers are linking employment and progression to continual skill advancement.
- Customer expectations are changing.
- Communication, IT and problem-solving skills are essential to match billing/use/conservation information to customer needs.

Energy Efficiency/Conservation Program Managers

EE/C departments serve a critical role for power companies, but exactly what they do and how they fit into company structure appears to vary widely. Simply stated, the objective of such units is to help reduce customers' energy use. Achieving this objective serves to reduce energy consumption in the region, which helps companies reach legislatively mandated and regulatory conservation goals. This, in turn, saves money for consumers – residential, commercial, and industrial. The potential public savings from energy conservation is immense because it helps to reduce the need to build new generation infrastructure.[51]

Nationally, customary qualifications for EE/C program managers begin with engineering or related degrees (architecture, for example) and experience in energy engineering. Required areas of knowledge include energy codes, energy accounting and economics, audits and instrumentation, electrical, HVAC and lighting systems, building operations, and energy measurement and verification. Each of these knowledge areas may also become an area of specialization for an EE/C program manager.

In reality, EE/C managers usually do not follow a pre-defined career pathway; they often bring with them expertise developed through other utility jobs, or through employment in other energy companies or other industries, such as manufacturing, where energy use can be high and efficiency is a cost-reduction strategy.[52]

Generally, EE/C program managers are responsible for the successful operation of the programs offered to customers to help reduce energy consumption. Those programs are largely standardized

for residential customers and more tailored for commercial and, especially, for industrial customers. Thus, depending on the size and scope of the employer's customer base, EE/C program managers may be running a high number of fairly routine residential programs or they may be managing a team of engineers who analyze energy use and create conservation and efficiency programs specifically tailored for commercial and industrial customers. Their team may help other companies establish energy conservation programs and units of their own. This range of assignments makes describing the individual occupation of EE/C program manager somewhat complex.[53]

Role of Subcontractors and their Supervision

Because many of the EE/C solutions are broadly applicable and well-defined, many utilities subcontract these services, especially for residential customers. According to a 2010 analysis, most energy conservation subcontracting falls into three categories: program implementation constitutes 75 percent of the market; program consulting design constitutes 10 percent of the market; and evaluation, measurement and validation constitute 15 percent of the market.[54]

EE/EC staff and managers frequently provide oversight to contractors and their programs, making project and contract management skill another useful asset. "On the residential side, most of the measures are pretty standard, well known. We use third-party vendors. We'll put money into groups who are doing work for multiple utilities and they handle the administration of those things. Like for energy efficiency appliances, they pay the rebates and things like that."

Marketing Skills

For commercial and industrial utility customers, EE/C program managers were more actively involved in helping customers select options and designing solutions. Persuading these customers to invest in energy efficiency and energy conservation measures is lot like marketing and sales, as some managers recognized: "Especially on the commercial/industrial side, they develop sales skills." One manager reported investing in sales and marketing training for current staff: "We've actually been authorizing training for staff in marketing . . . It's an asset for us now. It's nice to have more folks with those skills." In some places, the EE/C function is supporting the company's general marketing efforts, and some managers found that employees who understood and could use social networks were helpful in providing EE/C information.

All EE/C program managers noted what a surprise these roles are to many new EC/EE engineers. "Many technicians do not understand the need to do customer relations and to 'sell' products." At least one manager who was interviewed was currently seeking a trainer to provide marketing instruction to EE/C staff and was seeking advice from other managers to find an instructor. Marketing skills were also related to EE/C departments' need to design and develop new programs as technologies changed.

Some organizations said they are having a hard time filling energy efficiency positions because some required skills are beyond those learned under the umbrella of "energy efficiency." EE/C staff must also have an understanding of how markets work and be able to recognize stages of customer involvement, such as identifying an early adopter.

EE/C staff also often serve as community representatives, supplying the public with information about ways to save energy and money. They operate booths at fairs, speak directly to community groups, and contribute to the general understanding of the benefits of energy conservation and how to acquire them.

Project Management Skills

Because EE/C staff often provides services to multiple customers, frequently across multiple interactions, "there's more project management being done, and multiple programs being juggled." Predictably, this was particularly true in smaller and more rural companies.

Overall, this increased focus on customer service, product explanation, and "sales" increases the need for EE/C workers to have communication skills as well as collaborative and team skills. For managers, project management has become more complex as the range of services provided for customers broadens. One manager summarized the demand for broader skills as follows:

> (We) need more versatility. (I) look for a well-rounded, versatile, adaptable engineer with communication skills. At some levels, everyone has technical skills, but what else do they bring to the team? If I'm hiring an entry-level worker, I will give more leeway, if they can learn, but for a senior position, they all have technical skills so what are they going to bring? Financial? Business? Marketing? What else is in the background?

Effect of Technological Change

All of these changes are, at heart, technology driven. The CSR partnership is driven by the technology of the consumer, but other EE/C roles are affected by technological changes in the industry, such as grid modernization, information technologies, or communication systems. Interestingly, many managers saw technological change itself as "no change" because technological developments have always shaped the work they do. "The *skills* people need are basically stable, but the *products* keep changing."

Identifying Problems and Options

EE/C staffs are serving as technology scouts: "We expect employees in this unit to have an eye for new technologies – and the ability to explain how they could impact us or how they could benefit us." Another manager described it as the ability to "see what's changing and know how it is going to affect us." One manager called this combining "analytical ability" with the ability to recognize industry cycles to stay on top of new products.

Managers also mentioned the importance of being able to adapt quickly to new technologies: "Adaptation is key." Both analytical and adaptive skills were referred to as "the ability to use new knowledge." Further, managers recognized the importance of staff flexibility: "The ability to go back and forth between a conservative hydro culture and affect new policy [and] new conservation methods." Fiscal skills also applied to program development: "When we develop programs, we have to look at their financial impact, how they will be marketed, and we are small scale. I'm sure it's critical for much larger utilities. Maybe they can have separate skill sets, but we can't have exclusivity."

EE/C staffs were required not only to spot new technologies, but to use them. "There is sometimes a personal technology gap among new hires, or those we hire from different backgrounds. This is common among older hires. The younger tend to be technologically savvy. And that is not just a necessary skill for analysts. Program managers need to have these skills themselves and use the tools."

Training

With such a complex set of essential skills required among EE/C workers and with the rapid pace of technological change in the energy industry, training is often required. Most managers described providing knowledge more than skills, and most training revolved around introducing new products that were expected to be of interest to customers. Some described the need to build new programs when technologies made significant advances. Many reported regular trainings provided by the vendors of products, and some pointed to shared training provided by or attended with other power company employees.

> Our training usually happens through our network of other utilities and other vendors. Our staff get up to speed in a hurry and (design) communication for our customers. We have regional groups we're part of so other eyes and ears are at work, too – a network of people. All staff participate in those trainings, depending on our expertise (residential or for industrial customers).

The most common training scenarios are product responsive:

> Major technology changes are (made) to products for conservation. Examples include heat pump technology, particularly the advent of ventless heat pumps; changes in lighting, including prices dropping for LEDs, and lighting controls; for small business, multiple ways to control computer and accessories costs, with smart strips, for example, and networking tools that can control power use. The employees of this unit must be familiar with all these things, especially heat pumps (because of demand), but we rely on trade allies/product representatives to provide the detailed information on how the product works and how it would be installed and used.

A few managers asserted that their own staff were the trainers, in most cases.

> Usually our (staff) are the ones (who) learn about and know about new products. We try to provide the information for the customer service reps, like high-level FAQs for them to use with customers. We take in a large number of calls from customers to help explain the programs. We have a web presence, newspapers, radio, to try to [convey] to the customers what we're doing so they call for details. We do rely on contractors, when they are in town, and keep in good communication with them about what their programs are so they help us sell to our customers.

That was not the most common scenario, however. Most managers reported that most of their training was done externally. "We usually send out because there're only four of us – too few to bring someone to us. We coordinate with PR folks, since they're often doing the same kind of training so we coordinate and then can compare."

Most managers cited their reliance on trade organizations, such as the Northwest Energy Efficiency Alliance, a regional group noted for holding trainings and conferences. Several cited the Northwest Public Power Association, and national meetings and conferences, as well. A few reported sending staff to school, but that degree of support was not common: "I did support training at college, for a marketing person, but not usually." The most common source of information was vendors. One employer actively encouraged employees to work closely with vendors and create "trade allies." And all of the managers were interested in helping EE/C staff stay current on EE/C products and technologies. As one manager noted, "I always encourage requests for training and I will support them as well as I can, as the budget allows."

New Hires and Internal Development of EE/C Specialties

A few managers discussed how new hires are prepared for the EE/C specialization. (Many never used new hires, but only experienced engineers with an EE/C interest, or they hired from other companies' EE/C units.) Companies with multi-state operations most commonly reported a special training in addition to general new hire induction. "Their initial training is the same as the other new agents, about 12 weeks, but then energy efficiency specialization begins. We operate in six states, so the agents need to know all the rules and regulations for each place we operate. The rates are detailed, but pretty straightforward. Increasingly, though, new hires know something about energy efficiency, the way many people now do."

Planning for Replacements and New Hires

Among the EE/C program managers interviewed for this report, hiring plans vary widely. Only a very few are planning for growth, and their plans are not yet fully developed; a few are planning only for retirements and replacements; and a few are responding ad hoc to vacancies.

Actively Planning for Retirements

Consistent with the findings from the 2013 *Workforce Challenges* survey, only a few companies that were interviewed for this study anticipated growth in their workforce. More expected that retirement replacements would be the only reason for hiring in the next few years. A few managers noted that retirements in other companies could cause their experienced staff to move to those companies. This still means that their replacement hiring would be retirement driven – just not due to retirements from their own companies.

One manager admitted, "In the case of engineers, skilled ones are simply hard to find. We usually hire from other utilities because we pay more. But the hardest to find are employees with statistical, economist, evaluation skills. We also hire these from other places, so they have experience, especially state agencies. Again, because we have a better pay scale."

With the shortage of experienced staff, the most common scenario is to plan for replacements by preparing current junior staff, so that any new hiring remains at the entry level (where more candidates are available). To address this, some companies have closely aligned CSR and EE/C staff, particularly where new hires initially have the same general skills and all receive common training. Those who choose to develop an EE/C specialty are helped to do so. (Other specializations include expertise in complicated billings.) Their specialty training consists of exposure to the more experienced agents. All the hires of this combined unit are expected to know the basics of EE/C, but when customer conversations become more complicated or issues are not being resolved, customers are transferred to specialists who are committed to staying with the customer until resolution. This can take a long time, but the specialists are chosen because they are adept at and committed to resolution.

These specialists are often the public face of the utility at public events, so they have highly developed communication skills as well as specialized EE/C knowledge. They are all agents who have been promoted from within, so none are new hires. They constitute a unit with very little turnover because they self-selected. Their assignments often vary as they are rotated around the company to assist on a variety of projects. As a result of their adaptability and highly visible roles, they come into contact with and can help persuade young agents, who may be less prepared, to develop this expertise.

In companies that are still in the process of developing formal workforce training programs, managers respond to vacancies in various ways. One utility reported that retirement incentives caused a higher than expected number of retirements, and filling the positions was slower than expected. Additional retirements are anticipated to occur consistently over the next few years. Although many companies, particularly public utilities, report being constrained from asking about retirement plans, many managers are well aware of their employees' plans.

Actively Planning for Expansion

A small percentage of companies report that they expect to hire into new positions. At least one is still "mapping" their needs and unsure whether they will be hiring new or experienced EE/C staff. They noted that the driver for hiring is conservation:

> Our conservation targets have increased 10-15 percent over the last few years, but the programs meant to meet those targets have increased by 70 percent. New compliance regulations also drive more hours of work, so [we are] attempting to figure out what kind of staff/functions are needed. We have a senior engineer with a Ph.D. working on conservation projects, so [I am] trying to determine if I need more of those or more compliance-focus managers. Good chance [we will] need more help, but we need to be very clear about actual function. Not sure just someone with the same skills that we have now. [We] also have a few retirements coming up, one within two years and one within five, so will be looking to backfill those. Those are always done after a review to ensure they are still needed, so that is part of the planning work. In a perfect world, I'd get someone on board a year ahead of time so they could cross train before the retirement and be mentored. But [I] don't know if we can do that yet. We have to check resources and build the business case for it.

Not Expanding, But Changing

Many companies cover all three major sectors: residential, commercial, and industrial. Each sector is dynamic, so approaches to meet energy efficiency goals are changing. As one respondent explained, "Most of our load is actually residential, but most of our savings early on have come from industrial/ commercial projects. We've been able to meet targets with just a few of those. But that low-hanging fruit is picked and now we have to ramp up and expand residential to meet the new goals. It's more work because you get fewer savings for each residential measure. So, not more people, but the number of measures and programs offered are increasing (not employees.)."

Challenges to Hiring and Retention

As noted above, few companies are looking for new hires. Many are working to prepare new hires to replace senior employees as they retire (or are recruited away from the company). Most companies report that they hire staff from other utilities, trade allies or associations, and some state agencies. These staff are usually hired by companies with better pay rates, and these companies favor employees with three to five years of experience (or ten, if they can find them.) All of the managers hire new graduates when necessary. A few reported cultivating relationships with local colleges to recruit qualified new hires, and most would welcome more college partnerships.

Raiding other companies for seasoned staff, of course, means that retention is an issue for everyone, especially those companies with lower pay scales and tighter budgets. Worse still is competition from non-engineering firms that seek the combination of project management, marketing and public communication skills cultivated in EE/C work. As one employer lamented, "Once they have the management wherewithal or whatever, even though they have that engineering degree, they will go off and do something else."

Future Employment Issues

Contracted Energy Services

More than one EE/C program manager speculated on the future of energy employment and the strength of subcontractors. One function that is frequently subcontracted – energy evaluation – was on the minds of at least two energy managers, both of whom expressed concerns in the context of their company's employment predictions. As one noted:

> There has been a substantial effect of evaluation legislation on third-party contracting and it will have an impact on what happens to us in the future. If we can change our processes of evaluation to having everybody like them better, we may grow. If people don't trust us, we may actually shrink in the number of engineers we will have and we'll increase using a third party, where they will do most of that work. So how that happens in the next couple of years is going to have a big effect on whether I'm going to need three people in five years or three of my people are going to go to [a contractor]. Evaluation measurement of energy efficiency in the product industry is growing since the passage of Initiative 937 in the state of Washington so lots of companies are doing that. A lot of analysts and engineers are now part of that process. If we had done that work, we would have seven more full-time employees working for us more than we do right now.

Energy Efficiency Program Manager Summary

- It is easy to find interested candidates, but few have utility or power experience.
- EE/C program managers require excellent communication skills, including marketing.
- EE/C program manager turnover is low and departments are small.
- Program management skills are needed for industrial customers – EE/C elements are only part of a continuum of services.
- EE/C program managers need to collaborate across departments, particularly with CSRs.

The Continuum from CSR to EE/C: Teamwork and Communication Skills

As consumers seek more information about their energy use and ways to reduce it, a wide array of programs have been created to help them. Some services have become quite standardized, ranging from databases of information about energy-efficient appliances to various weatherization packages. So commonly are the two conversations connected that companies share similar "steps" for leading most consumers from billing questions to energy conservations measures.

Frequently, customers insist that the first step be a meter test to insure that the report of their usage is accurate, especially when substantial increases have occurred. When the accuracy of the meter readings has been verified, consumers want help to determine what is driving their consumption and to learn what they can do to reduce or manage their costs. (In Washington, they can also be referred for Energy Audits online. While this is not a state provision in Oregon, many utilities will perform audits.) One utility provides an educational information option on its website that includes interactive vignettes – like detective stories – that challenge the viewer to find the source of power usage.

For most customers, the follow-up to billing enquiries is a discussion of EE/C options. Whether this conversation begins with the CSR (usually by web or third-party referrals) or moves immediately to EE/C departments, common initial discussions include the efficiency of high-usage appliances, such as furnaces and water heaters. Many consumers are not able to make major expenditures, but some are ready to take that step, so explaining costs and benefits is an essential part of the conversation. It is essential that CSR or EE professionals be able to anticipate the implications of a customer's action. For example, if the customer is considering improving their insulation, the CSR/EE will need to help them think ahead by considering ventilation as part of the process. Ideally, there is enough trust between the utility and the customer that the customer will rely on the CSR/EE to provide advice about new products and services even if they are offered by outside vendors. These are usually lengthy conversations, which illustrates that communication skills are increasingly important to EE/C, as they are for CSRs.

In at least one case, the relationship between CSR and EE/C was so close that the EE/C program manager shared the same concerns about customer relations as did the CSR manager of the same company (in separate interviews). "We are trying to develop our agents (internally) so they can

meet the needs of many remaining customers who still would prefer if we had all our old local offices, so they could solve their problems in face-to-face conversations. And we are anticipating the day when we tackle chat and other more social approaches to [help us handle] customer interactions. Right now we are using highly structured and monitored interactions, but as more business, such as online retailers, engage in instant chats with customers, the expectation will rise among [our] customers that they should be able to do that with us, too. We're preparing."

In fact, most managers referred to the resources their EE/C staff commonly use: information from DOE, ENERGY STAR®, and similar sources that have made energy consumption data accessible. (And depending on the customer, they may refer them to those sites, as well.)

But not all customers' needs are so readily addressed. Sometimes the situation requires interpretation or more complex assessment to accurately diagnose and resolve the concern. This is the juncture where CSR and EE/C services meet, and all the companies interviewed have developed some means for easing their juxtaposition. In some cases, these two functions are actually part of a single department that is focused on the customer service function. In other cases, CSRs and EE/C agents work as a team: the CSRs are responsible for all initial contacts but have a regular source of information to help them answer difficult questions. In more complex cases, CSRs can transfer the customer to readily available EE/C program managers.

> Our most senior agents, with particular expertise and interest in energy conservation, are assigned as a special team to address customer's energy efficiency questions and issues. We call them the Energy Advisor Team.

The importance of teamwork skills is evident. Whether CSRs and EE/C program managers are in separate units in the same department or are organized as a team (formal or ad hoc), they must support each other seamlessly to provide full customer service and to reach EE/C goals. Companies continue to invest much thought into this relationship and have come up with an array of solutions. While structures vary among companies, the nature of the solution – partnership between these two functions – is universal.

Increasing Importance of Communication Skills

The importance of EE/C program managers' communication skills extends much further than coordinating with CSRs. All of the managers interviewed for this study indicated that communication proficiency was paramount.

Managers noted how deficient many new hires were in communication skills, and how difficult it was to use these new hires in positions that required maximum public contact. As a result, several utilities rely only on their more experienced engineers who have an interest in conservation and the experience to move more flexibly among customers, policy makers, and the company management. One manager noted how essential it is that his staff "be able to take the technical [information] and put it into several different formats so they can discuss it with me or senior district staff or customers." Being able to "take the detailed information and make it accessible" was universally deemed a crucial skill.

Increased Focus on the Customer

Pressure to accomplish an overarching task – helping customers save money – appears to be a major reason why EE/C staff now work more closely with CSRs than was previously the case.

In hindsight, this makes perfect sense. The 2009 study, *Energy Efficiency Industry Trends and Workforce Development in Washington State*, observed the difficulty of defining "energy efficiency" jobs when related activities occur in so many different industries. The study pointed out that:

> Utilities provide important leadership on energy efficiency and related employment. They also offer a unique relationship and outreach opportunity with consumers. However, they are first and foremost energy service providers; some utilities may have limited interest or capacity for providing economic benefits beyond delivering low-cost power to their customers. Municipal utilities are in the unique position of being embedded within organizations serving community goals, and their structure may lead them to be more aware of their role in local economic development and their ability to help achieve broader social and economic objectives. For example, while Seattle's primary energy efficiency activity emphasizes efficient lighting programs, the city and public utility are also exploring ways to link conservation goals and clean energy investments with economic and workforce development efforts. . . . [55]

For this study, conversations with managers of EE/C programs demonstrated widespread commitment to helping customers with energy conservation. The breadth of activities in many EE/C units was driven as much by the needs of a wide range of customers as by any other needs of the company.

Conclusions

The electric power industry in the Pacific Northwest continues to change. Regulatory and legislative assignments, technological advances, and customer expectations are all increasing. At the same time, experienced workers are aging and economic conditions are improving, which could compel many of those who delayed retirement to resume their plans to leave the workforce. The lack of hiring in most companies during the recession resulted in a smaller than normal pool of mid-career workers who can replace those experienced workers who are retiring.

Together, these conditions continue the threat of a substantial workforce shortage for the industry. Examining the CSR and EE/C program manager occupations in detail illustrates the issues at hand. While most employers reported that employment of both CSRs and EE/C program managers was relatively stable, they also described rising skill and knowledge requirements almost uniformly. The need for some skills – particularly related to communication and computer use – has advanced rapidly, while problem solving, teamwork, and project management skills are also increasingly vital.

And the most influential changes are customer driven. The need to meet energy conservation goals requires that customers be recruited into programs that will help them reduce their energy use and, thus, their costs. At the same time, meeting customers' cost concerns and their service expectations entails providing them with complex information and options that are affordable and conveyed in a way that is easy for them to understand.

In sum:

- There have been fewer retirements in the industry, including among EE/C program managers and CSRs, chiefly as a result of the recession.
- Retirements remain a primary issue, however, as the economy recovers, demand returns, and workers continue to age.
- Skill needs are increasing, particularly communication and computer skills.
- Knowledge demands are also expanding, caused by the proliferating variety of complex energy conservation strategies, tools, and products.
- Most notably, a close relationship now routinely exists between the customer service and energy conservation units.

Recommendations

The findings of this study also have important implications for industry, state workforce and economic development policy, and in the partnerships that are needed to address how industry, education and training, economic development and other stakeholders can support labor market shifts and the continual evolution of the energy efficiency industry in the Pacific Northwest region.

1. Pursue personnel policies that leverage energy efficiency professionals who may soon retire.
    a. Restructure the assignments of those nearing retirement to maximize time available for mentoring and training younger workers.
    b. Evaluate and codify critical assignments being done by workers near retirement to insure that their processes, procedures, and knowledge are not lost.
        i. Include consideration of which, if any, activities might be replaced with technology to enhance operational effectiveness and reduce labor needs.
    c. Rehire retirees as contractors to fill critical skill gaps or to mentor and train replacement workers.
    d. Expand internal and external training for mid-level personnel while senior workers are available to help assess and review what they have learned and fill skill gaps.
    e. Seek experienced workers, including military veterans and workers from other industry sectors, who might most easily adapt to the power industry.

2. Pursue and expand partnerships that can improve the energy efficiency labor supply for the industry.
    a. Continue to partner as an industry group with postsecondary education to increase the supply of new graduates prepared for work in the industry. NEET's partnership with the Pacific Northwest Center of Excellence for Clean Energy has helped to focus attention to the value of engaging education and training partners in this important work.
        i. Consider adding new partners from within the region and from other states to broaden the pool of shared resources.
        ii. Continue working to improve the capacity of education and training providers.
        iii. Provide educational institutions with information and support to keep them responsive to industry needs. In particular:
            1. Work with education partners to define and communicate the knowledge and skills required to by industry to enhance program relevance and institutional responsiveness
            2. Actively expand internships and other opportunities to expose students to the real work of the industry.
        iv. Support the design and development of incumbent worker training that fills gaps on a regional basis.
        v. As partners, leverage the resources of postsecondary education to enhance internal training efforts.

b. Increase partnership with public K-12 education to enhance future workers' understanding of the industry and the range of work opportunities within it.
c. Simultaneously, understand the changing goals, values, and mores of the new generations, including the ways in which they are accustomed to working and communicating.

3. Continue to support the development and implementation of critical public policy that enhances the energy efficiency workforce.
    a. These activities should include strong support for targeted innovations in electric power education and training programs, as well as curriculum development and program delivery for universities, colleges and apprenticeships, including:
        i. Continued support to define occupational skill standards,
        ii. Sustained use of standards to inform public education and training,
        iii. Increased support for work-based learning requirements in K-12 and higher education that is focused on strategies to create life-long learners who understand the connection between academic and working skills.
        iv. Ongoing encouragement and support of special projects that target "high demand" occupations and projects to promote technological changes across the industry.

4. Recommendations for future research
    a. Repeat the energy 'Workforce Challenges' study (2013) and related labor market research, including "demand-side" energy efficiency-related occupations, in three to five years to continue tracking industry and energy workforce changes.
    b. Conduct additional occupation-specific research to clarify the causes and effects of retirement, general turnover, and growth in specific occupations.
    c. Analyze and compare enrollments, degree completions, and employment outcomes for students in Science/Technology/Engineering/Mathematics (STEM)-related programs throughout the Pacific Northwest.

Endnotes

[1] See: Hardcastle, A. (2008). *Workforce Challenges of Electric Sector Employers in Washington and Oregon*. Prepared by the Washington State University Energy Program for the Center of Excellence for Energy Technology (now Pacific Northwest Center of Excellence for Clean Energy-Centralia College): http://www.energy.wsu.edu/Documents/WSU_Workforce_Challenges_Final_Report_090311.pdf.

[2] A description of NEET and all work group topics and reports can be found at: http://www.nwcouncil.org/media/4704851/NEET-Report-October-2009.pdf.

[3] Workgroup #5, 'Workforce of the Future' final report: http://www.nwcouncil.org/media/4704851/NEET-Report-October-2009.pdf. *Sixth Northwest Conservation and Electric Power Plan*, Northwest Power and Conservation Council, 2010: See: http://www.nwcouncil.org/energy/powerplan/6/plan/

[4] Regional coordination provided by the PNCECE and its partners. Related energy efficiency products including skill standards can be found at: http://www.cleanenergyexcellence.org.

[5] Hardcastle, A., Jull, P. & Zeiger Hanson, S. (2013). *Workforce Challenges of Electric Power Employers in the Pacific Northwest*. Washington State University Energy Program for the Pacific Northwest Center of Excellence for Clean Energy: http://cleanenergyexcellence.org/resources/. The expanded study also added power engineers and power system operator to the list of occupations studied.

[6] Monthly Energy Review, Energy Information Administration, July, 26, 2013: http://www.eia.gov/totalenergy/data/monthly/pdf/sec1_6.pdf.

[7] Hardcastle, A. (2008). *Workforce Challenges of Electric Sector Employers in Washington and Oregon*, Washington State University Energy Program for the Center of Excellence for Energy Technology (Centralia College): http://www.energy.wsu.edu/Documents/WSU_Workforce_Challenges_Final_Report_090311.pdf.

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[11] The Impact of the Financial and Economic Crisis on Global Energy Investment: EIA Background Paper for the G8 Energy Ministers' Meeting, 2009: http://www.iea.org/ebc/files/impact.pdf.

[12] See: http://www.publicpower.org/Media/magazine/ArticleDetail.cfm?ItemNumber=27546. Also:*Gaps in the Energy Workforce Pipeline: 2011 CEWD Survey Results*: http://www.cewd.org/surveyreport/CEWD-2011surveyreport-021512.pdf.

[13] See: U.S. Bureau of Labor Statistics, Mass Layoff Statistics, *Utilities*: http://data.bls.gov/timeseries/CES4422000006?data_tool=XGtable.

[14] In response to the economic crisis, Congress passed the American Recovery and Reinvestment Act of 2009, commonly referred to as the "stimulus" or the "stimulus package." The immediate goals of the Recovery Act were: 1) Create new jobs and save existing ones and 2) Spur economic activity and invest in long-term growth: http://www.recovery.gov/About/Pages/The_Act.aspx.

[15] See: Economic Impact of Recovery Act Investments in the Smart Grid. *Smart Grid Investment Grant Program*, U.S. Department of Energy, 2012: http://www.smartgrid.gov/sites/default/files/doc/files/Smart%20Grid%20Economic%20Impact%20Report.pdf.

[16] Nutter, T. and Hardcastle, A. *Workforce Trends: What You Can Do Today, Western Energy* magazine, Spring 2012: http://www.westernenergy.org/WE/Archives/2012_Spring/WEI_Spring_2012.pdf.

[17]*Recommendations on Electricity Workforce*: Energy Advisory Committee report, October 17, 2012: http://energy.gov/sites/prod/files/EAC%20Paper%20-%20Recommendations%20on%20Electricity%20Workforce%20-%20Final%20-%208%20Nov%202012.pdf. See also the final report by the *Task Force on America's Future Energy Jobs*, National Commission on Energy Policy, 2009: http://bipartisanpolicy.org/sites/default/files/Final%20report.pdf.

[18] The Pacific Northwest states included in this study are Idaho, Montana, Oregon, Utah, and Washington.

[19] Calculations are based on data provided by Energy.gov, updated March 2013: http://energy.gov/downloads/recovery-act-recipient-data.

[20] *Sixth Northwest Conservation and Electric Power Plan*, Northwest Power and Conservation Council, 2010: http://www.nwcouncil.org/energy/powerplan/6/plan/.

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[23] U.S. Energy Information Administration, 2013: http://www.eia.gov/todayinenergy/detail.cfm?id=6090.

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[29] Hardcastle, A. (2013). *Smart Grid Skills for the Energy Workforce*, Washington State University Energy Program for the Pacific Northwest Center of Excellence for Clean Energy. Also: *The U.S. Smart Grid Revolution: Smart Grid Workforce Trends 2011*. KEMA and Gridwise Alliance, July 2011.

[30] McKinsey Global Institute (2011), *Big Data: The Next Frontier for Innovation, Competition, and Productivity*: www.mckinsey.com/mgi.

[31] For more information on the impact of smart grid technology on the future workforce, including the results and products generated by the DOE-funded *Smart Grid Workforce Training* project, see: Pacific Northwest Center of Excellence for Clean Energy: http://cleanenergyexcellence.org/.

[32] *Skill Standards for Utility Customer Service Representatives*, Washington State University Energy Program for the Pacific Northwest Center of Excellence for Clean Energy (2012): www.cleanenergyexcellence.org/skill-panel.

[33] Analysis of the year-to-year data for this period revealed negligible differences in annual employment, and are not included here.

[34] Sources: U.S. Bureau of Labor Statistics, Quarterly Census of Employment & Wages (federal) and U.S. Census Bureau, Quarterly Workforce Indicators (non-federal).

[35] Sources: U.S. Bureau of Labor Statistics, Quarterly Census of Employment & Wages (federal) and U.S. Census Bureau, Quarterly Workforce Indicators (non-federal). Regional utility wages are a weighted average. The federal and non-federal data come from differently structured data sources that are not directly comparable; therefore, the data represent an estimate of combined wages for utilities.

[36] Percentage change is based on comparable private-sector estimates only, and does not include federal and local utility employment. Washington data is for 2011-2021.

[37] Each state computes projections for employment across all industries, in most cases using data provided by the federal government but often supplemented by other, state-level data. Because each state has its own methods and models for determining their projections, the state employment forecasts represent approximate trends based on available data that are not reliably comparable.

[38] State information is from the Quarterly Census of Employment and Wages data maintained by the U.S. Bureau of Labor Statistics: http://www.bls.gov/news.release/ecopro.t02.htm.

[39] The Pew Charitable Trusts (2009), *The Clean Energy Economy: Repowering Jobs, Businesses and Investments Across America*. Pollin, R., Heintz, J., and Garrett-Peltier, H. (June 2009), *The Economic Benefits of Investing in Clean Energy: How the economic stimulus program and new legislation can boost U.S. economic growth and employment*, Department of Economics and Political Economy Research Institute (PERI), University of Massachusetts, Amherst. Wei, M., Patadia, S. and Kammen, D. (2010), "Putting renewables and energy efficiency to work: How many jobs can the clean energy industry generate in the US?" *Energy Policy*, 38 919–931.

[40] See, for instance, the results of the DOE's $5 million investment through the Pacific Northwest Center of Excellence for Clean Energy to develop education and training to support development of the energy workforce: http://cleanenergyexcellence.org/.

[41] The 2008 federal Green Jobs Act created an energy efficiency and renewable energy job training program as well as research and grant programs to support clean energy jobs and workforce development. In the Pacific Northwest, several states including Washington and Oregon passed legislation to target development of new green jobs and related research. See: *2008 Washington State Green Economy Jobs*, Washington Employment Security Department (2009). Also: *The Greening of Oregon's Workforce: Jobs, Wages and Training*, Oregon Employment Department (2009).

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[43] Carnevale, A., Smith N. & Melton, M. (October 2011). *STEM* (Science, Technology, Engineering and Mathematics). Georgetown University Center on Education and the Workforce.

[44] See: U.S. Bureau of Labor Statistics (2006), *A new look at long-term labor force projections to 2050*: http://www.bls.gov/opub/mlr/2006/11/art3full.pdf. Also: Washington Office of Financial Management (2011), *Long-Term Features of the Washington Labor Force*, Forecasting Division: www.ofm.wa.gov/economy/longterm/2011/lt11ch2.pdf.

[45] U.S. Congressional Budget Office (February 2012), *Understanding and Responding to Persistently High Unemployment*.

[46] Center for Energy Workforce Development (2011), *Gaps in the Energy Workforce Pipeline: 2011 CEWD Survey Results*: www.cewd.org.

[47] The age cohorts for all industries were combined to simplify the presentation of data. There was little variation noted among the individual state age profiles.

[48] Hardcastle, A., Jull, P. & Zeiger Hanson, S. (2013), *Workforce Challenges of Electric Power Employers in the Pacific Northwest*, Washington State University Energy Program for the Pacific Northwest Center of Excellence for Clean Energy: http://cleanenergyexcellence.org/resources/.

[49] *Skill Standards for Utility Customer Service Representatives*, Washington State University Energy Program for the Pacific Northwest Center of Excellence for Clean Energy (2012): www.cleanenergyexcellence.org/skill-panel.

[50] Ms. Jackson was interviewed for an earlier iteration of this research for which permission to identify her was obtained. Other sources in this document are from current research, obtained under an agreement to retain anonymity.

[51] See, for example, McKinsey and Company (2009), *Unlocking Energy Efficiency in the US Economy*, which estimated that $1.2 trillion could be saved by 2020 through rigorous energy conservation. For access to the report, see: *http://www.mckinsey.com/client_service/electric_power_and_natural_gas/latest_thinking/unlocking_energy_efficiency_in_the_us_economy*.

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[54] ibid.

[55] Hardcastle, A., and Waterman-Hoey, S. (June/November 2009), *Energy Efficiency Industry Trends and Workforce Development in Washington State,* Washington State University Energy Program, pg. 36: http://www.energy.wsu.edu/ResearchEvaluation/WorkforceDevelopment.aspx.