Building an Energy Workforce for the 21st Century

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Prepared by the Democratic Staff of the U.S. Senate Committee on Energy & Natural Resources

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PART I: INTRODUCTION

Three decades ago, the average U.S. home used electricity for lighting and for powering a television, and a couple of large, and a few smaller, appliances. Today, Americans are connected to the Internet, own multiple televisions and appliances, and are constantly charging their computers, cars, tablets, and cellular phones. Consumers also want more control over their energy choices: some are generating their own power with solar panels, controlling home thermostats from their smart phones and exploring energy storage and electric vehicle solutions.

Although we require electricity to accomplish so many new tasks, we continue to rely on an electricity grid that, in part, was built more than 30 years ago. Upgrading legacy systems with new technologies will be essential for increasing efficiency, boosting reliability, ensuring security, and helping to reduce pollution. The energy decisions we make today will shape our economic and environmental future.

We cannot upgrade our energy *infrastructure* without upgrading our energy *workforce*. A high-skilled energy workforce will enable the integration of new technologies that benefit consumers and increase competitiveness. These new technologies and the accompanying workforce are key components to helping reduce our carbon footprint and ensuring we transition to a 21st century energy economy.

These new energy upgrades will present tremendous opportunity for the workforce and economy of Washington state and entire West Coast. This report finds that an estimated 234,000 energy jobs will be added to the region over the next 15 years, with many of these positions paying 50 to 80 percent more than the average annual salary. Enrollment in these worker training programs has grown by 5 percent in Washington state in the last three years.

Our energy system is also becoming increasingly more complex, with millions of miles of pipelines, hundreds of thousands of miles of transmission lines, and more renewable energy being brought onto the grid—all while being run by smarter operating systems. During this time of transition, there is a growing demand for newly skilled energy workers and for workforce training. At the same time, the energy workforce is aging and industry is facing a skills gap in hiring qualified employees to run and maintain the grid of the future.

This report also finds more than three-quarters of energy companies found it difficult to hire skilled workers to fill open positions. In addition, energy apprentice training is not keeping pace with retirements in the Pacific Northwest, where only 8 percent of workers are currently being trained as apprentices, but 17 percent of workers are expected to retire by 2018.

The energy industry, organized labor, community colleges, and workers themselves should not view these challenges as a threat, but—with the right investments—as a tremendous opportunity to grow our economy and create millions of new jobs in the United States.

Smart, targeted Federal investments that cultivate public-private partnerships will be critical to growing an energy workforce for the future. These partnerships will lead to new solutions and investments required to retrofit our energy infrastructure.

We must act to ensure that the U.S. becomes the world leader in developing and deploying these new energy technologies and products with the best trained and best equipped workforce in the world.

PART II: KEY FINDINGS

- **234,000 estimated new jobs in the West Coast energy industry will need to be filled over next 15 years.** The U.S. Department of Energy's Quadrennial Energy Review found that 1.5 million new jobs nationwide will be added across the energy sector by 2030 because of retirements, infrastructure growth and repair, and changing energy technologies. As we modernize and upgrade our grid, the Pacific Northwest is uniquely positioned to take advantage of this growing economic opportunity.

- **Enrollment in energy workforce training programs has increased by 5 percent in Washington state.** Demand for energy workforce training at community colleges across Washington state is continuing to grow. In the last 10 years, the number of workforce training programs in the state has quadrupled, from 5 to 20. Enrollment in training in key clean energy sectors like wind, solar, sustainability, and smart buildings is growing at twice that rate, with growth of almost 12 percent.

- **Energy worker retirements are occurring at a rate more than double the percent of new energy apprentices are being trained.** The average energy worker is seven years older than the average worker across all industries in the United States, and more than 500,000 workers are expected to retire in the next 5 to 10 years. Apprenticeship programs at utilities in the Pacific Northwest have only been training 8 percent of their workforce with apprenticeships, but 17 percent of the utility workforce is expected to retire by 2018.

- **77 percent of energy companies find it difficult to hire qualified employees.** With an aging workforce and looming retirements, the energy industry faces a skills gap. Employers continually report they cannot find skilled workers to fill open positions. As our grid transitions, new workforce training programs are needed to help fill this gap.

- **Energy workers in Washington state earn almost $30,000 more annually than the average salary.** Energy and manufacturing jobs are an economic boon and have long been a tool to help working families make it into the middle class. The average salary of a utility worker in Washington state is 57 percent higher than the average salary in the state, meaning more money in the pockets of new workers each year. This is true across the entire Pacific Northwest region, where utility workers make 82 percent more than the average salary across all industries in the region.

PART III: GROWING DEMAND

234,000 new energy jobs on West Coast by 2030

Demand for energy workforce training growing by 5 percent in Washington state

Last year, the U.S. Department of Energy released the first installment of the Quadrennial Energy Review entitled, "Energy Transmission, Storage, and Distribution Infrastructure." The Quadrennial Energy Review provided both a comprehensive review of our transmission, storage, and distribution capabilities, as well as policy recommendations for updating our energy infrastructure.

Included in this first-of-kind report was an overview of employment and workforce training in the energy sector. The Quadrennial Energy Review found that the energy sector will employ an additional 1.5 million new workers by 2030. These jobs will likely be located in the construction, installation, maintenance, and transportation sectors.[1]

This presents a tremendous opportunity for Washington state and the entire West Coast, where an estimated 234,000 new jobs in the energy field will need to be filled in the region by 2030.[2]

As the energy sector continues to modernize to become more efficient, resilient, and secure, specialized and advanced training will be needed. Some 200,000 workers with STEM skills will be in demand to help run the 21st century grid.[3] The Quadrennial Energy Review noted that there will be new opportunities for positions in areas like smart grid management, meter installation, and software systems. With the right investments in our energy grid, these will be the jobs that help power our economy.

Our energy usage and electric grid has changed, and so have our energy workforce training models. Eleven years ago, only five energy workforce training programs were in place across Washington state. The focus of these workforce training programs was strictly on electrical plant operations. Not a single workforce training program existed for wind energy, solar energy, or nuclear energy.

As more renewable energy has been brought on the grid, the number of workforce training programs in the state has quadrupled. Today, 20 workforce training programs are in place across Washington. This includes programs focusing on renewable energy, like the Wind

[1] Quadrennial Energy Review - Chapter VIII, U.S. Department of Energy (2015)
[2] Energy Committee Staff estimate based on industry data for Census Division 9 (AK, CA, HI, OR, WA) in U.S. Energy and Employment Report, U.S. Department of Energy (2016).
[3] Quadrennial Energy Review - Chapter VIII, U.S. Department of Energy (2015)

Energy Technology Program at Walla Walla Community College and the Solar Clean Energy Technology Program at Shoreline Community College. Centralia Community College is continuing to lead the way for training workers in the power generation industry, including specialized training on smart grid technology.

New programs have also been created for skilled workers in nuclear energy and clean-up, such as the Nuclear Technology Program at Columbia Basin College.

The demand for these programs demonstrates the need for continued investment in energy workforce training programs to help fill the 1.5 million new workers called for in the Quadrennial Energy Review.

In Washington state alone, the demand for these energy workforce training programs has grown by 5 percent over the last three years.[4] Some programs are growing at a more rapid rate, with growth of 11 percent in wind energy training, 6 percent in solar energy training, and 10 percent in sustainability.[5]

Growth is occurring even faster in new technology areas like smart buildings, where demand for training at South Seattle College has grown 33 percent since the program started in 2013.[6]

In addition to the programs at the community college level, Western Washington University established the Institute for Energy Studies in 2012. The Institute for Energy Studies is one of the only bachelor's degree programs in the country to combine technology, economics, business and public policy at the undergraduate level to prepare students for jobs in the new energy economy. Over the last three years, enrollment in the Institute for Energy Studies has more than doubled.[7]

Western Washington University also works in partnership with community and technical colleges to develop curricular programs and streamline pathways to degrees in energy-related studies for students who would like to continue their education.

[4] Pacific Northwest Center of Excellence for Clean Energy e-mail to Energy Committee Staff, August 9, 2016
[5] Pacific Northwest Center of Excellence for Clean Energy e-mail to Energy Committee Staff, August 9, 2016
[6] South Seattle College e-mail to Energy Committee Staff, August 2, 2016
[7] Western Washington University e-mail to Energy Committee Staff, August 11, 2016

PART IV: GRAYING WORKFORCE AND SKILLS GAP

Average age of energy worker is more than 50 years old

45 percent of key workers in electric utilities to retire

Energy apprentice programs are not keeping up with retirements

The majority of our energy infrastructure was built more than 30 years ago and needs to be upgraded.[8] We need to make the right investments in energy workforce training to prepare the next generation of workers to take over and run an electricity grid to meet tomorrow's energy challenges.

The energy industry faces a challenge with an aging workforce that could derail future growth. In fact, the energy workforce in the United States is aging and older than the average worker. The average age of an employee in the energy industry is more than 50 years old, and more than 500,000 workers are expected to retire in the next five to 10 years.[9] For comparison, the median age of all employees in the United States is 42.[10]

Many of the baby-boomer generation in the energy sector are retiring or preparing to retire in the coming years. In the electric utility sector alone, 45 percent of the workforce is expected to retire by 2024, meaning almost 100,000 jobs will need to be filled just to maintain current levels.[11]

In the Pacific Northwest, 17 percent of the utility workforce is expected to retire by 2018.[12] These retirements will come in critical positions, such as line workers, operators, technicians, electricians, and power engineers. Employers expect to lose between 18 to 26 percent of their current workforce in these areas.[13]

In addition to facing retirement challenges, the energy industry faces a skills gap challenge. The energy industry must replace an aging workforce with skilled employees, but energy companies and utilities have consistently highlighted a skills gap as the main challenge in filling these positions.

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[8] Quadrennial Energy Review – Chapter I, U.S. Department of Energy (2015)
[9] High Growth Industry Profile – Energy, U.S. Department of Labor (2016)
[10] Labor Force Statistics from the Current Population Survey, Bureau of Labor Statistics (2015)
[11] Gaps in the Energy Workforce Pipeline, Center for Energy Workforce Development (2015)
[12] Workforce Challenges of Electric Power Employees in the Pacific Northwest, Pacific Northwest Center of Excellence for Clean Energy (2013)
[13] Workforce Challenges of Electric Power Employees in the Pacific Northwest, Pacific Northwest Center of Excellence for Clean Energy (2013)

A recent survey of the energy sector found that 34 percent of firms faced difficulties in hiring because applicants lack experience, training, or technical skills. In addition, 30 percent of firms claimed insufficient qualifications, certifications, and education as the prime reason for not hiring new employees. In total, 77.5 percent of energy companies found hiring qualified employees to be somewhat or very difficult.[14]

One way to ensure that the institutional knowledge of these retiring workers is not lost is through apprenticeship programs. Apprenticeship programs are a proven tool for workers to learn new, advanced skills that make them much more productive and ready to take on the high-growth jobs in our economy.

Apprenticeship programs are a win-win for both employers and employees. They help companies find and train skilled workers, while allowing employees to earn a paycheck while they continue to learn. Apprenticeships also allow older workers to pass down their knowledge to younger workers, presenting opportunities to continue working and saving for retirement.

Apprentice programs in the energy industry in the Pacific Northwest are not keeping up with retirements. In a recent survey of Pacific Northwest utilities, an average of only 8 percent of employees are apprentices. It is even less in specific occupational groups, where only 7 percent of line workers are apprentices and 6 percent of technicians are apprentices. This is compared to expected retirement rates of 18 percent for line workers and 19 percent for technicians by 2018. [15]

[14] U.S. Energy and Employment Report, U.S. Department of Energy (2016)
[15] Workforce Challenges of Electric Power Employees in the Pacific Northwest, Pacific Northwest Center of Excellence for Clean Energy (2013)

PART V: ECONOMIC BENEFITS

Pacific Northwest energy jobs pay $34,000 more annually

Energy workers in Washington state earn 57 percent more than the average worker

Energy jobs significantly benefit the economies of the Pacific Northwest and Washington state. These are not minimum wage jobs; these pay much more than a living wage. These positions allow families to pay their bills at the end of each month and to save more for retirement.

Washington state leads the Pacific Northwest in terms of total utility employment, with more than 18,000 federal and non-federal utility jobs. [16]

These utility jobs are expected to continue to grow by 6 percent through 2020. This means more money will be pumped back into the local economy, where utility companies already have a total payroll of more than $1.4 billion in Washington state.[17]

The average salary of a utility worker in Washington is $79,239—57 percent higher than the average salary of $50,256. Across the entire region, the average salary working for a utility is more than $75,000, compared to an average salary of $41,000 for all jobs. [18]

It remains important to take action to make the right investments in workforce training to help grow the economy and create good-paying jobs.

[16] Workforce Challenges of Electric Power Employees in the Pacific Northwest, Pacific Northwest Center of Excellence for Clean Energy (2013)
[17] Workforce Challenges of Electric Power Employees in the Pacific Northwest, Pacific Northwest Center of Excellence for Clean Energy (2013)
[18] Workforce Challenges of Electric Power Employees in the Pacific Northwest, Pacific Northwest Center of Excellence for Clean Energy (2013)

PART VI: TAKING ACTION

To help meet this growing demand for skilled workers, key stakeholders from the energy industry, academia, government, workforce training, organized labor, and employees will need to work in collaboration.

In May 2015, Senator Cantwell introduced the 21st Century Energy Workforce Act (S. 1304) to respond to the challenges identified by the Quadrennial Energy Review.

The legislation would establish a National Center for Excellence for the 21st Century Workforce, a nationwide advisory board focusing on the development of a model energy workforce training curriculum. The advisory board would consist of members from both the private and public sectors and include experts from the energy industry, labor, workforce development, and academia to develop bottom-up solutions, not top-down regulations, to skilling our energy workforce.

This legislation also attempts to leverage private-sector investment in workforce training by establishing a matching grant program for industry, community colleges, and labor to work together to develop workforce training or apprenticeship programs in the energy industry. These programs would be required to provide students with an industry-recognized credential upon completion.

Additional incentives would also be available for workforce training programs that include plans to transition veterans or bring more minorities and underserved populations into careers in the energy sector.

As a result, Senator Cantwell's legislation has received strong support from many different groups across the energy sector and across Washington state, including the International Brotherhood of Electrical Workers, the Pacific Northwest Center of Excellence for Clean Energy, Western Washington University, Tacoma Public Utilities, the Port of Port Angeles, and the Edison Electric Institute.

Senator Cantwell worked with the Senator Energy Committee Chairman, Senator Lisa Murkowski (R-AK), to include these important workforce provisions in the Energy Policy Modernization Act of 2016 (S. 2012), the first comprehensive reform of our nation's energy policy in 9 years. On April 20, 2016, the Energy Policy Modernization Act passed the Senate by a vote of 85-12.

If we are going to remain competitive, it is not just the government that needs to be making these investments in workforce training. We need to also get the private sector to start making these investments once again.

That is why Senator Cantwell introduced the Apprentice and Jobs Training Act (S. 2020). This legislation would provide a $5,000 tax credit to companies for hiring a new apprentice as part of a registered apprenticeship program. This legislation would help incent more companies to both start apprenticeship programs, as well as expand their existing programs.