

Center for Energy Workforce Development  
2011 Executive Summary

# State of the Energy Workforce

## Skilled Utility Technicians and Engineers

## Welcome

While the nation as a whole is recovering from the devastating economic downturn, the energy industry today stands well-poised for expansion. Electricity use has grown dramatically over the past 30 years, and annual electricity demand is estimated to increase by 30 percent by 2035. President Barack Obama and his administration are strongly committed to investing in the energy industry, setting aside more than \$80 billion in the American Recovery and Reinvestment Act for clean energy and other projects.

At the same time, the industry is facing significant workforce shortages—an estimated 46 percent of the workforce (approx. 200,000 skilled workers) may need to be replaced by 2015, in large part due to the upcoming waves of baby boomers reaching retirement age in the coming years. Among the most critical jobs that will need to be replaced include engineers of all disciplines (power engineers in particular) and skilled utility technicians (lineworkers, generation technicians for all fuel types, transmission and distribution technicians and plant/field operators for all types of generation).

All of these positions have specific requirements for education and on-the-job training, and potential workers are being lost in the pipeline due to a lack of basic skills among many of today's high school graduates. Utility companies found that overall, 30–50 percent of applicants (those that met the minimum requirements for a position) were not able to pass pre-employment tests. Companies needed to interview an average of 30 applicants for every hire.

When you add to the skilled worker shortage and aging workforce the constant growth and development of new technologies in the industry, you get to the core of a critical issue that the Center for Energy Workforce Development (CEWD) is dedicated to addressing:

***How do we build a diverse, qualified pool of workers who have the right knowledge and skills to enter critical energy-industry positions at the right time?***

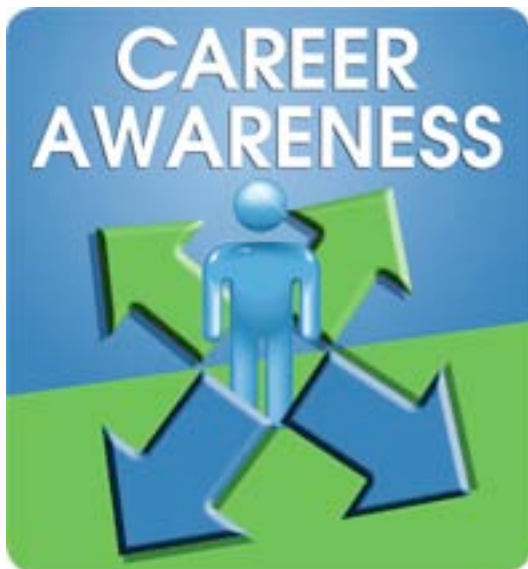
## CEWD and the Four Strategic Pillars

Since its creation in 2006, CEWD has worked to evaluate and understand the needs of the energy industry and to build a workforce development structure based on a number of common threads. These common threads have been fleshed out by CEWD in the form of **Four Strategic Pillars of Workforce Development**. Guided by these four strategic pillars, CEWD has developed a number of key initiatives, strategies and best-practice standards for the industry, whose specific implementation are outlined in further detail in this report.

### Career Awareness

*Objective: Increase awareness among students, parents, educators and non-traditional workers of the critical need for a skilled energy workforce and the educational opportunities that can lead to energy careers.*

With initial surveys in 2006 showing very little awareness among high school students of the career opportunities available in the energy industry, CEWD set



out to build awareness by launching a national brand: **Get Into Energy (GIE)**.

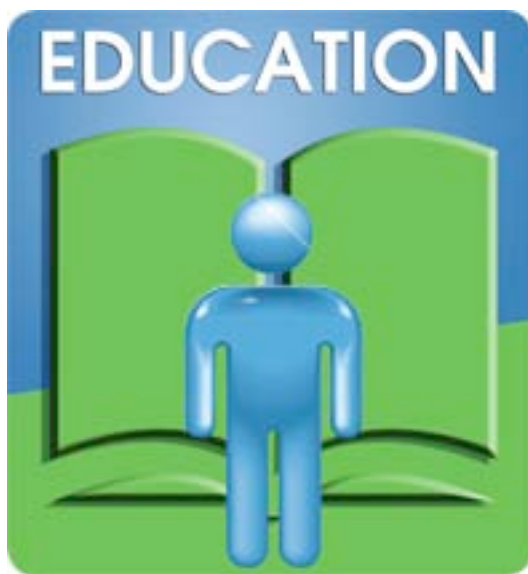
Since its inception, GIE has expanded its visibility at the local, state and national levels. Branded materials including brochures, posters and trading cards have been distributed at schools and career fairs across the country. Each of CEWD's State Energy Workforce Consortia can also incorporate the Get Into Energy brand via GIE logos specific to their state.

In addition to generating awareness for energy careers, the GIE website ([www.getintoenergy.com](http://www.getintoenergy.com)) features section that offer information and resources specifically designed for its target groups: Young adults, veterans, those interested in engineering, and adults in the midst of career transition. A section for women will be introduced in the near future as well.

## Education

*Objective: Create clearly defined education solutions that link industry-recognized competencies and credentials to employment opportunities and advancement in the energy industry.*

Because of the lack of a common curriculum and set of competency requirements across the industry, it can sometime be difficult for a student graduating from a



program in one area to qualify for the job in a different area or company. This is why CEWD has partnered with the U.S. Department of Labor and experts from around the country to develop a set of common competencies for positions in Generation, Transmission and Distribution. These common competencies can then form the basis for developing common curricula for training and education, which allows for a system of “stackable” credentials and ensures that students’ time and money will be invested in transportable skills that can lead to multiple career paths.

The **Energy Competency Model** developed by CEWD breaks down the basic competencies, industry fundamentals, industry technical competencies and job-specific competencies into eight separate tiers, with each tier becoming more specialized as you go up the pyramid. This model allows students to match job requirements with their skills. Training programs can also be developed or modified to address “skill gaps”—where candidates fall short in the skills needed for the jobs that companies are trying to fill.

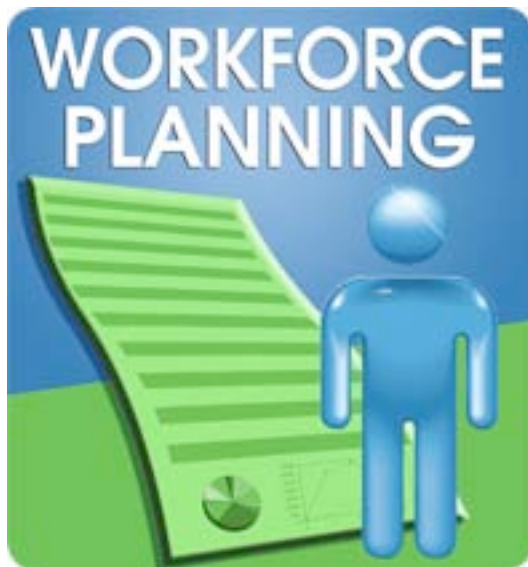
CEWD has also worked extensively with educators and employers to create a framework for **industry credentialing** that aligns with the tiers of the Energy Competency Model. This includes a new credential being developed by CEWD—an Energy Industry Fundamentals Certificate covering industry-wide and industry-specific technical competencies (Tiers 4 & 5).

In addition to competencies and credentials, CEWD has identified **Education Pathways for Skilled Utility Technicians**, which outline the most effective structures for education in those positions. The education pathways show how those in skilled craft positions (such as lineworkers, welders and generation technicians) can move up the job ladder in their career based on their education and years on the job.

## Workforce Planning

*Objective: Balance the supply and demand for a qualified and diverse energy workforce.*

CEWD's approach for workforce planning begins with company business strategy, leading to a set of key workforce strategies to guide the creation of a workforce of



the right size and with the right skills to keep the business strong and competitive. This means assessing the workforce implications of replacing the aging workforce, analyzing the composition of the workforce on a national level, implementing strategies to address the issues and judging the success of those strategies using appropriate metrics.

Starting in 2007, CEWD began conducting annual **Energy Workforce Surveys**, which were crucial in identifying the workforce gaps that will be caused by retiring baby boomers, as well as the skill gaps that leave potential

applicants unqualified for positions that companies are looking to fill. The surveys also found that emerging technologies and the focus on renewable energy, energy efficiency and the Smart Grid do not necessarily lead to discrete new jobs in the industry. Rather, existing positions gained additional responsibilities or new skill requirements. While additional training may be needed for new equipment and technology, the foundational skills and competencies remain the same.

In order to help determine if specific workforce development strategies are successful—an essential part of workforce planning—CEWD worked with industry

experts to create a **Workforce Evaluation and Metrics** process for its member companies. Two types of metrics are defined in the process:

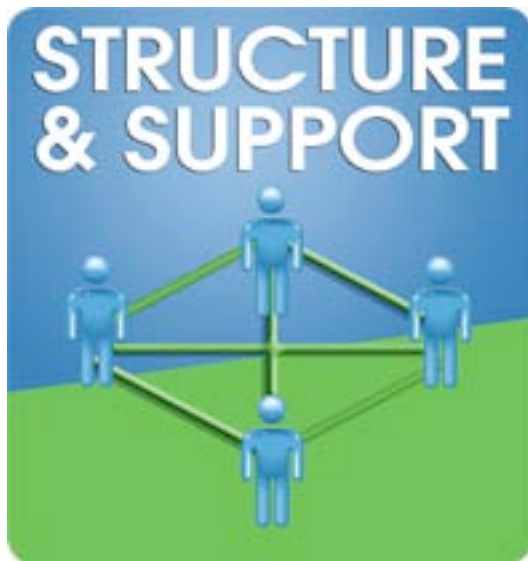
- **Key Performance Indicators (KPIs)**, which are quantifiable measurements that reflect progress toward defined goals (for example: number of hires vs. planned hires).
- **Critical Success Factors (CSFs)**, which assess actions that need to be in place in order to achieve strategies (for example: existence of focused career awareness programs).

These metrics, combined with existing industry data, form a comprehensive picture that allows companies and organizations to know what effect their workforce development investments are having and to make more informed decisions about those investments.

## Structure and Support

*Objective: Organize energy industry workforce development efforts to maximize the effectiveness of national, state and individual company initiatives.*

Much of CEWD's work is based on the idea that the industry can accomplish more by working together than it can separately. This philosophy has led to valuable



partnerships at regional and national levels between educators, government agencies and the industry, including the creation of **State Energy Workforce Consortia** across the nation.

There are currently 28 of these State Energy Workforce Consortia (North Carolina and South Carolina have a combined consortium), and five more are in the planning stages. The purpose of the consortia is to set up a “Grow Your Own” energy workforce using strategies specific to each state’s current and future needs.



With support from CEWD, including an annual State Energy Workforce Consortia National Forum, energy consortia have been successful in driving the initiative to create the needed energy workforce. They have established key partnerships, won federal grants, developed new career awareness programs and are making an impact on workforce policy at the state level.

## Get Into Energy Career Pathways

The four strategic pillars come together in a common framework created by CEWD to guide workforce development in the energy industry: the **Get Into Energy Career Pathways (GIECP)** model. The GIECP model seeks to draw in qualified new workers by focusing on the needs of three groups:

- **Students and Potential Applicants** – Outreach and support will be provided through targeted career awareness campaigns and career advising and guidance.
- **Educators** – A clear system of competencies, industry-recognized credentials and a uniform curriculum will provide an education framework for career preparation.
- **Employers** – The State Energy Workforce Consortia model will be used to encourage employer collaboration with educational and government institutions.

With the support of grants from the Bill and Melinda Gates Foundation, CEWD has implemented a GIECP campaign geared toward low-income young adults, and a Troops to Energy Jobs initiative is under development to help guide military veterans to careers in energy.

## Other Workforce Development Efforts

Significant strides are being made in laying the foundation for a diverse and qualified workforce, through the efforts of CEWD as well as other organizations within the industry. In the nuclear energy industry, which has been surveying its members about workforce development needs longer than other utilities, one

such initiative is underway: the **Nuclear Uniform Curriculum Project (NUCP)**, developed by the Nuclear Energy Institute (NEI) Work Force Working Group.

A three-step pilot of the NUCP was launched in 2008, beginning with an industry assessment of Associate's degree education programs to see what curricula were being offered and to determine supply and demand needs for critical workforce areas. In the project's second phase, the industry partnered with community colleges to create a uniform curriculum that listed the discipline-specific requirements of each concentration. In the third phase, seven consortia participated in the implementation of new programs and the transition of existing programs to the new curriculum. The NUCP was rolled out strategically to the rest of the country after the successful completion of the pilot, and currently there are 36 NUCP education partnerships in existence.

Another initiative has been launched by the Institute of Electrical and Electronics Engineers (IEEE), whose Power and Energy Society (PES) sought to address the major attrition that will be faced by power engineers in particular. In 2007, the IEEE PES created the **Power and Energy Engineering Workforce Collaborative (PWC)**, a group charged with identifying and addressing challenges in the power engineering industry.

The PWC holds student job fairs and has developed a career service website ([www.pes-careers.org](http://www.pes-careers.org)) where students can get advice on pursuing careers in power engineering. The PES Governing Board also established a \$1 million IEEE Power & Energy Society Scholarship Fund in the summer of 2010, to entice high school and undergraduate students to study the field. The seed money for the fund will be followed by a two-year fundraising campaign to increase that amount to \$10 million.

## Moving Forward

Through strategic efforts and collaboration both within the energy industry and with educators and organizations outside of it, significant strides have been made in addressing the skilled worker gap and building a new energy workforce pipeline.



Through the targeted research and workforce development programs of the past five years, CEWD has identified critical elements of the most effective workforce development initiatives, which are:

- Collaborations between educations, industry and community, such as the State Energy Workforce Consortia
- Focused on real jobs and current demand
- Focused on career paths for entry-level employees that lead to future advancement
- Align education from pre-K through age 20+
- Link college credit and work experience

Going forward, CEWD urges the energy industry to focus on how to make the most of what we have learned, and to apply our resources to the areas where we can produce the biggest impact.