Aligning Education and Training to Meet Energy Workforce Needs

The U.S. energy sector has become highly innovative in developing and applying new technologies. These innovations often require higher-paid, more--highly skilled labor, yet many employers in the region report that they have difficulty filling jobs, particularly for medium-skilled (or semiskilled) positions that require only a high school education and a certification or some additional training.

To keep pace with rapid changes in technology and employers' needs, community colleges and postsecondary career and technology centers need to effectively and efficiently modify existing curricula and programs and develop new ones. In addition to learning core technical skills, workers need to acquire soft skills, such as professionalism, critical thinking, and problem-solving, to better adapt to their work environments.

These issues are particularly salient in West Virginia and southwestern Pennsylvania. The region's abundant coal resources have long shaped its economy. New hydraulic fracturing (or “fracking”) to tap that natural gas from the Utica and Marcellus shales has resulted in a new natural gas–extraction industry. In addition to coal and natural gas, the energy sector in the region includes the nuclear, wind, and solar energy industries, as well as firms that design and manufacture the specialized equipment to seek, profitably use, and transport these forms of energy. Given this potential demand, a clear challenge facing West Virginia and southwestern Pennsylvania is how to support the workforce-development pipeline that trains workers for these positions. This pipeline involves recruiting, training, and educating the local talent pool (both young recent high school graduates and adults already in the workforce) to fill the job and skill needs of energy-industry employers, for both the short and long terms.

Recognizing the challenges facing the region in employing its local talent in the energy sector, in 2013, the National Energy Technology Laboratory (NETL) asked the RAND Corporation to recommend improvements and strategies to support institutions of public education in West Virginia and southwestern Pennsylvania in meeting likely energy-sector workforce demands.

**Key findings:**

To improve the pipeline of trained energy-sector workers in West Virginia and southwestern Pennsylvania, area leaders should:

- implement deep, enduring partnerships between employers and educational institutions for developing curricula, providing equipment, conducting alignment assessments, and offering on-the-job experiences for students
- provide bridge services to support social services and counseling
- provide comprehensive training opportunities and degree-bearing courses, integrating technical training with work readiness and basic skills
- improve awareness of energy-sector education, training, and employment opportunities
- prioritize recruitment and retention of quality instructors
- address geographic constraints on students.

The two analyses had similar objectives: to develop a strategy for energy-sector employers and public education and training institutions to ensure that local workers have the knowledge, skills, and behaviors to fill semiskilled jobs (i.e., those that high school or two-year-college graduates can fill) in the energy sector now and in the future. The RAND team worked closely with the staff at NETL, the Community and Technical College System of West Virginia (CTCS), the Allegheny Conference on Community Development, and the Three Rivers Workforce Investment Board to scope the studies.

RAND researchers relied on U.S. Department of Labor Employment and Training Administration data; interviews with education administrators and key employers; interviews with experts in the fields of energy, workforce development,
and education; discussion sessions with students in energy-related postsecondary training programs; and a review of promising practices undertaken by education–employer collaborations in other regions and sectors.

For West Virginia, the analysis sought to identify key skills needed in the energy sector now and in the future, to ascertain gaps between educational and training programs and workforce needs, to identify barriers to potential talent acquiring needed education and training, and to suggest approaches to close gaps in workforce skills. In southwestern Pennsylvania, the analysis sought to document key technological innovations in the energy sector so as to predict where more workers and skills might be needed and to identify best practices of educational and training programs in other sectors that could be used in the region.

The RAND team found that the region’s workforce-development pipeline is fractured and incoherent (see the figure). Some workforce talent is not eligible for training and postsecondary education opportunities because they did not graduate secondary school or acquire adequate skills while there. Little information is available to communicate the advantages of a two-year degree or certification or the types of job available in the energy field. Education and training programs are not well aligned with available jobs. Finally, pathways to postsecondary education and jobs are not always well developed.

**Actions to Improve the Region’s Workforce-Development Pipeline for the Energy Sector**

**Short-Term Measures**

1. **Develop Ongoing and Sustained Partnerships Among Industry Leaders, Training Providers, and Other Providers of Education**

   The deep and consistent involvement of industry in developing educational and training programs and in providing opportunities for job seekers upon graduation has been one of the most successful practices of other energy-sector consortia and partnerships. RAND analyses found many examples of industry leaders serving as advisory board members for program or colleges but no examples of direct, continued involvement in curriculum development, providing internship opportunities to students, or actively recruiting program graduates into available jobs. Industry employers and community colleges and training programs need to develop stronger, sustained partnerships regarding curriculum, improve quality, and better assess demand for talent and skills. Employers can play a critical role in curriculum development, providing formal internship programs that offer practical experience for students, identifying job needs and vacancies, advertising programs, and providing equipment and materials for training.

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**Challenges Facing the Energy-Sector Workforce-Development Pipeline in West Virginia**

- **Students completing high school lack necessary skills**
- **State-mandated regional consortia exist but structure and reported effectiveness vary**
- **Education and training programs are not providing adequate workplace competencies or practical skills to students**

**External context that may influence the flow of talent through pipeline:**
- State, local, federal education and labor policies
- Regional economy

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**Communication is faltering:**
- Students and the community do not know whether acquiring a two-year degree will provide a job market advantage. Little marketing of job opportunities or degree programs to high schools or the broader community.

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**Job postings are typically not aligned with available college programs:**
- Request job experience rather than a specific degree.
2. Include Bridge Services for High School and Younger Students and Even for Low-Skilled Workers No Longer in School

Bridge services focus on increasing job skills and opportunities and help ensure that workers develop the personal effectiveness, academic, and workplace competencies needed to succeed in a wide range of occupations. These competencies focus on broad knowledge, skills, and attributes, such as an individual’s professionalism, interpersonal skills, teamwork, math and science knowledge, and ability to follow directions.

3. Develop Comprehensive Training Opportunities

Integrating technical training with work readiness and basic skill training can help job seekers by providing all they need in one place. Comprehensive training might also include internships and on-the-job training as part of community college program requirements. New community college courses might design curriculum through collaboration with industry, with hands-on modules offering students practice integrating technical and soft skills. Community colleges might also integrate innovative practices being implemented in other systems facing similar issues regarding developmental education. Existing workforce-development training programs that, by design, work hand-in-hand with employers to develop specific, as-needed training and certification programs could offer means to help workers already in the labor market but needing credentials. Expanding and improving opportunities for on-the-job training and career counseling can also help in developing comprehensive training opportunities but might take time to develop. Often, students told RAND researchers, classrooms provided opportunities for hands-on experience but not opportunities to demonstrate technical skills to employers.

Longer-Term Measures

4. Improve Awareness of Available Energy-Sector Education and Training Programs and Employment Opportunities

At the time of this study, education and training administrators noted that some of their energy-related programs were only partially filled. This could be due to students’ lack of awareness of these programs and of job opportunities. Improved communications about opportunities that degree and nondegree programs provide could encourage more students to seek training for energy-related jobs.

5. Prioritize Recruitment and Retention of Quality Instructors

Education and training programs in the region have difficulty attracting and keeping successful instructors.

Reducing the competition between industry and colleges by developing agreements between training institutions and energy-sector employers could allow more employees to teach in education and training programs. Employers might be willing to offer incentives to employees who teach at CTCS and other education partners or to set up cooperative agreements so that industry can allow employees to teach for specific semesters.

6. Improve Readiness of Talent Entering Postsecondary Education and Training Programs

This study revealed that a key first step to improving the pool of talent entering postsecondary education and training programs is to focus efforts on improving the basic skills of all schoolchildren in the region. We therefore recommend that state departments of education work more closely with higher-education and training providers to emphasize to K–12 students the importance of basic mathematics and reading skills in finding energy-sector jobs. Among all the strategies, this could be the most difficult to plan and implement because it would involve not just strategic private–public partnerships but also state-level agencies and departments.

7. Work to Remove Barriers to Implementation

Students rarely attend education or training programs outside the areas where they live, and community colleges do not recruit students from regions outside their service areas. Geography can also pose a barrier to employment and other training opportunities. Such barriers might be overcome by offering reliable transportation, online courses, and childcare options where they do not already exist. Institutionalizing cross-communication and collaboration across organizations can help remove barriers to and accomplish all the action items listed above.

Institutions that train, or retrain, workers face many challenges. They must be able to anticipate how technology is changing workforce needs and adapt quickly. They must also develop workers’ core skills, as well as nontechnical skills, such as critical thinking and problem-solving. Workers also need to master information technology to facilitate on-the-job training in new competencies that technological innovations demand. Employers need to participate with workers and institutions to ensure that investments made in acquiring and upgrading skills are appropriate.
This brief describes work done in RAND Justice, Infrastructure, and Environment and documented in Energy-Sector Workforce Development in Southwestern Pennsylvania: Aligning Education and Training with Innovation and Needed Skills, by Gabriella C. Gonzalez, Reema Singh, Rita Karam, and David S. Ortiz, RR-807-NETL, 2014 (available at www.rand.org/t/RR807), and in Energy-Sector Workforce Development in West Virginia: Aligning Community College Education and Training with Needed Skills, by Gabriella C. Gonzalez, Sean Robson, Andrea Phillips, Gerald Paul Hunter, and David S. Ortiz, RR-812-NETL, 2015 (available at www.rand.org/t/RR812). To view this brief online, visit www.rand.org/t/RB9810. The RAND Corporation is a research organization that develops solutions to public policy challenges to help make communities throughout the world safer and more secure, healthier and more prosperous. RAND is nonprofit, nonpartisan, and committed to the public interest. RAND's publications do not necessarily reflect the opinions of its research clients and sponsors. RAND® is a registered trademark. © RAND 2013

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