

# Wind Energy Workforce Development: A Roadmap to a Sustainable Wind Industry

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## Abstract



Kansas State University Wind Applications Center students learn valuable career skills by participating in project installations. PIX16024/Ruth Douglas Miller.

As the United States moves toward greatly expanded wind energy use, the need for skilled workers at all industry levels has been repeatedly identified as a critical issue. Additionally, if the industry and nation wish to capitalize on this rapid industry growth by becoming a major international green technology exporter, reversing current educational trends away from science, engineering, and technical skills must be achieved.

This poster provides an overview of the educational infrastructure and expected industry needs through a discussion of the activities to train workers while addressing issues for each of the education sectors, leading to the development of an educational infrastructure to support wind technology.

## Objectives

In 2008, the U.S. Department of Energy issued a report describing a 20% wind energy future by 2030. The report noted that 500,000 new jobs would be created by 2030 in the wind industry and related fields. Other studies have further identified industry needs, including a Texas Tech University assessment indicating the need for 1,000 professionally trained individuals each year to support expected capacity installation called for in the 20% report.

A survey of industry members conducted by the American Wind Energy Association indicated the following positions are most needed in the near to medium term:

- Accountants
- Electrical and mechanical engineers
- Business development and project managers
- Wind technicians

These fields are expanded to include the following over the long term:

- Manufacturing and material engineers
- Account, project, engineering, construction, and business development managers
- Development directors

But these needs are in sharp contrast to changing energy and science fields:

- According to the AWEA survey, more than 50% of the people entering the wind workforce do not have the technical skills to perform the job they were hired for
- The Center for Energy Workforce Development estimates that approximately 46% of all engineering jobs in the utility sector could become vacant by 2012 due to retirements by the aging workforce and other forms of attrition
- With an expected leveling of the college-age population through 2025, the nation will need to increase the number of students entering science and engineering just to keep pace (specifically in under-represented populations such as women and minorities)
- Explosive growth in the need for science and engineering skills in other sectors of the economy will require the energy field to compete for a limited talent pool

## Desired Outcomes

The following are the desired outcomes of a successful workforce development program:

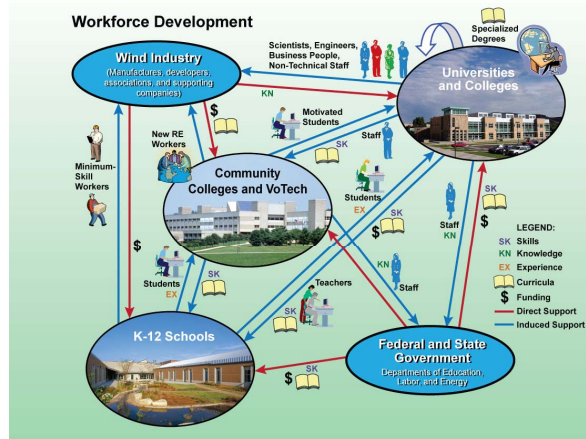
- Rapid growth of the domestic wind industry
- Immediate training to staff new jobs in the wind industry
- Enhanced energy education that maps to the green energy economy, including the creation of a new generation of energy professionals and wind technologists
- Pathways for K-12 through the post-graduate level and into industry
- Standardized curricula and certification for key jobs
- Creation of an infrastructure that in the near term helps the U.S. economy
- Development of trained instructors and continuing education of instructors at all levels of the educational system
- Actively expand the inclusion of women and minorities into the wind industry

## Industry and Education Needs

Through meetings and discussions with the industry and educational organizations, the following overriding industry needs have been identified:

- Development of better or better-defined career ladders, pathways, and training programs
- Better standards and skill categorization
- Stronger alignment with academia at all levels
- Educational pathway development
- Teacher-training programs at all levels
- Program development support to cover the costs of developing programs
- Expanded national-level coordination of an academic system
- Better understanding of available and required elements of a wind education system

## Workforce Development



Developing a capable wind industry workforce requires a holistic approach, providing integrated pathways to allow new and returning students to enter the wind workforce while challenging workers in the industry to expand their skills.

## Recommendations

### National Workforce Development Coordination and Definition

- Expand wind energy skills analysis to better understand industry needs and existing infrastructure
- Develop a cross-disciplinary advisory group and support structure
- Develop teacher-training and support programs to train educators and keep them informed on the changing wind market
- Support the development of wind energy education programs at all levels

### Development Needs of the Primary and Secondary Education System

- Implement K-12 wind energy education programs to expand the pipeline of students interested in wind energy as a career
- Expand K-12 teacher-training programs for teachers interested in wind energy
- Expand efforts to coordinate and support K-12 curricula development
- Expand the implementation of turbines at schools so that students and communities become familiar with wind technology and inspired by a new vision of the energy future
- Spotlight programs, opportunities, and successes to expand the understanding of wind energy
- Implement state and national wind competitions to spark interest in wind
- Develop secondary-school vocational training programs to allow students to rapidly enter the wind workforce
- Develop programs to actively engage young women and minorities at the K-12 level

### Development Needs of Community, Vocational, and Technical Colleges

- Standardize curricula development
- Create and support a community college Web portal to link interested programs, students, and the industry
- Support wind energy infrastructure development at community colleges and vocational programs
- Develop a program to recruit, train, and maintain the skills of wind energy instructors
- Develop coordinated educational pathways for students to expand their skills throughout their career

### Development Needs of Higher Education

- Identify required skills for an expanding wind industry and begin to develop programs in these fields
- Support a national information clearinghouse for university programs to link students to programs and the industry
- Expand Wind for Schools and other program development activities
- Support industry-university collaboration to expand internships, scholarships, fellowships, postdoctoral appointments, endowed professorships, and research opportunities
- Launch university-level national wind competitions
- Develop a university collaboratory (or consortium) similar to the European Wind Energy Academy
- Expand university, industry, and community college collaboration programs

## References

1. *20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply. Executive Summary (Revised).* (2008). 27 pp.; NREL Report No. TP-500-42864; DOE/GO-102008-2578.
2. Swift, Andrew & Walker, Richard. (2009) Filling the Wind Industry's Critical need for Professionals Educated in Wind Energy, Poster at 2009 Windpower Conference and Exhibition, Chicago, IL.
3. National Science Board – The Science and Engineering Workforce – Realizing America's Potential . <http://www.nsf.gov/nsb/documents/2003/nsb0369/nsb0369.pdf>
4. Baring-Gould, I.; Flowers, L.; Kelly, M.; Barnett, L.; Miles, J. (2009). *Wind for Schools: Developing Education Programs to Train the Next Generation of the Wind Energy Workforce.* 11 pp.; NREL Report No. CP-500-45473.