Education and Training for a New Wind Frontier

The U.S. Department of Energy (DOE) 20% wind energy by 2030 report predicts that 20% of the nation’s electricity could be generated by wind power by 2030.

This is a steep goal considering only 1.5% of the nation’s energy is currently generated from wind turbine sources.

Under DOE’s scenario, the wind industry would have to ramp up capacity to 16,000 megawatts (MW) annually beginning in 2016 and continue adding 16,000 MW each year through 2030.

In 2007, the U.S. wind industry installed a record-breaking 5,244 MW and expanded wind power generating capacity by 45%, according to the Global Wind Energy Council. The industry has grown in the United States by an average of 29% annually over the past five years.

While positive, the surge in production capacity also forces changes in infrastructure and labor available to meet this increased demand. The wind industry is working to keep up with this tremendous growth by cultivating and hiring a skilled and enlarged workforce.

**Jobs Outlook**

According to Julie Clendenin, communications consultant, American Wind Energy Association, Washington, DC (AWEA/202-383-2500), the U.S. wind industry currently employs about 50,000 domestic workers in a wide range of job categories at wind farms and across the supply chain.

AWEA estimates that if the wind industry realizes the DOE’s “20% Wind Energy by 2030” goal, the wind industry would support 500,000 jobs across varied fields including construction, manufacturing, wind plant technicians and businesses related to and supporting the wind industry like transportation and component manufacturers.

“As the wind industry ramps up its installation schedule, the need for greater domestic manufacturing will rapidly expand,” indicates Clendenin.

There is currently a high demand for workers in technical and non-technical jobs including wind turbine technicians, design engineers, proposal writers, construction managers, large-load transportation specialists, utility program managers, and a host of others.

Intensifying the challenge to recruitment, the industry is competing for an overall shrinking pool of available workers. Against this backdrop, the U.S. Department of Labor projects virtually no growth in the “prime age workforce,” defined as between the ages of 25 and 54, and expects a substantial slowdown in labor force skill growth in the next 20 years.

**Training the Workforce**

Stakeholders from both industry and government have partnered with
academia to prepare and motivate a future workforce.

The U.S. Department of Energy’s Wind Powering America, and the National Renewable Energy Laboratory (NREL) launched a Wind for Schools program in 2005. The program aims to help rural school districts install 1.9-kW wind turbines for use in education, and to encourage incorporation of renewable energy education into the K-12 science curriculum.

The initiative has designated Wind Application Centers in five states: Colorado, Idaho, Kansas, Montana, and Nebraska.

These centers, managed by a nearby university or college, are responsible for providing technical assistance to rural schools in installation and data management of wind turbines, providing a wind energy curriculum for collegiate students and providing expertise and information to businesses, policy makers, or the general public.

Here is a look at some of those centers:

**Kansas Rural Center.** Dan Nagengast, director of the Kansas Rural Center, (city, state, phone number), says his state presents favorable conditions for harnessing wind and rural school districts can benefit financially from installation of their own wind turbines.

Working with the Wind Application Center at Kansas State University,
Manhattan, the Wind for Schools program not only helps Nagengast meet rural economic development goals, it also helps provide a base for future labor force development.

Nagengast indicates that 15 turbines will be installed over a three-year period in rural Kansas schools, with four already in place. With each installation, the schools integrate renewable energy education for elementary through high school students, providing both a knowledge base and an interest and awareness of this growing industry.

Kansas State University. Ruth Douglas Miller, Associate Professor in the Department of Electrical and Computer Engineering, Kansas State University, Manhattan (785-532-4596), manages the university’s Wind Application Center under the NREL program.

Kansas State offers electrical engineering and computer engineering degrees with an elective wind engineering course. Specializing in systems and communications, the school has its own Skystream 3.7, 1.9 kW wind turbine offering hands on experience to students. Miller says the center is working with utilities, wind developers and wind energy businesses helping the team gain perspectives on preparing engineers to meet the demands of employers.

“As a department we are working on expanding curriculum in renewable energy,” she explains.

While there is keen interest in wind energy programs and solutions overall, Miller indicates nationally the average university enrollment in electrical engineering programs, utilized heavily in the wind industry, has declined.

NEED and KidWind. Two additional programs aimed at developing students’ interest in wind energy are the National Energy Education Development Project (NEED Project) and the KidWind Project.

NEED, in cooperation with AWEA, offers classrooms hands-on activities to explore motion, weather, the history of wind, and modern wind technology.

KidWind Project, created by former teacher Michael Arquin, is a team of teachers, engineers and scientists committed to promoting wind power through affordable tools and training programs that “challenge, engage, and inspire students of all ages.”

Technical Schools, Colleges, and Universities

Growth in wind energy curriculum and programs at technical schools, colleges, and universities has skyrocketed in the past three years.

Iowa Lakes Community College. In the fall of 2004, Iowa Lakes Community College, Estherville, offered the first, and then only, wind energy technician program.

Under the leadership of Program Coordinator Al Zeitz, who was hired from GE Energy to help run the school’s wind turbine, the college quickly grew its program with an industry-driven curriculum.

The pilot program in 2004 had 15 students, eight of whom completed a two-year degree program. Today current program enrollment is over 100 students. To date, 51 students have graduated. Zeitz indicates there is a high demand for graduates who typically see multiple employment offers for various entry level positions. On average entry-level wages in the technician arena span from $35,000 to $40,000.

Iowa Lakes continues to expand its program, says Zeitz, and is looking at a number of options to serve the growing student base and the growing needs of the industry.

“Industry training for existing technicians will continue to grow also,” indicates Zeitz. “We’re investigating adding a blade repair certificate option.”

Universities also are adding programs and courses to address wind industry unmet needs.

Texas Tech University. In 2007, Texas Tech University, Lubbock, established the first multidisciplinary doctoral degree in the United States.

The program integrates wind science...
and engineering into one graduate degree. The Texas Tech Wind Science and Engineering Research Center uses more than 35 years of multidisciplinary wind-related research.

Illinois State University. In the spring of 2008, Illinois State University, Normal, chartered a new interdisciplinary renewable energy bachelor degree with wind energy components.

Illinois State expects to fill a gap between technician programs and graduate degrees offering a renewable energy bachelor degree program supported by a new Center for Renewable Energy.

The Center, developed with initial funding through the U.S. Department of Energy, has three major functional areas: supporting the renewable energy major; public outreach; and applied research.

There are more than 40 students enrolled in the charter program which began in late August.

“There is going to be a lot of demand for these students,” says David Loomis, associate professor of economics at the Center, noting the department already has companies asking for resumes. “We want our Center to develop partnerships with these companies.”

Loomis, along with Randy Winter, ISU Department of Agriculture, and David Kennell, ISU Department of Technology, administers the Illinois Wind Working Group which is affiliated with the Department of Energy’s Wind Powering America state wind working groups.

Last year, Loomis, Winter, and Kennell hosted renewable energy professionals on campus to study course offerings. The group identified gaps in the curriculum which led to development of four new courses and the final curriculum package for the new degree.

Additionally, the school has installed energy lab equipment including a wind turbine, wind tunnel, and data acquisition equipment.

As wind power grows, as a component of the U.S. energy mix for the future, universities, colleges and technical programs are aiming to provide the market with educated, skillful graduates and grow their programs to meet the evolving needs of a rapid growing industry.

With collaboration from government, businesses, and academia, the wind industry is poised for positive economic impact, promising jobs, and growth for a new renewable energy frontier.

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