

Research Brief, 2009

Wind Turbine Technicians



Centers of Excellence
Economic and Workforce Development
California Community Colleges

The Centers of Excellence, in partnership with business and industry, deliver regional workforce research customized for community college program decision making and resource development.

For additional information, access the complete environmental scan available online at:

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**ECONOMIC &
WORKFORCE
DEVELOPMENT**
through the
CALIFORNIA
COMMUNITY
COLLEGES

Introduction

The California Community Colleges Economic and Workforce Development Program (EWD) has charged the Centers of Excellence (COE) with identifying industries and occupations that have unmet employee development needs. Technician level training in renewable energies, such as solar and wind, are appropriate for community colleges and have recently received considerable attention. For these reasons, the Centers of Excellence examined the wind energy industry from a community college perspective.

California currently receives only 2.6% of its energy from wind, but aims to get 20% from solar, wind and other renewable sources by 2010. However, not all locations in California are suitable for wind power generation. There are distinct areas, such as the San Francisco Bay Area, the Central Valley and the Inland Empire, which provide the proper conditions for consistent and sufficiently powerful winds. Thus, those areas are highlighted within the complete scan.

Determining California's Role

With more than 25,000 turbines generating energy in the USA and only approximately 24 programs educating technicians nationally, there is an unquestionable industry need. However, a key challenge is determining the right number of programs to offer in California so the Community College system does not over saturate the local labor force.

Given the distribution of turbines nationally, many students trained to be wind turbine technicians in California will undoubtedly be recruited by an out-of-state firm and leave California for work within the industry. For colleges considering building wind energy programs they must strike a balance in the decision-making process between providing the opportunity for skill training and ensuring local jobs are available.

The intent of this report is to provide community colleges with available data and insight into the short- and long-term occupational outlook for the wind industry. In addition, the report provides recommendations for colleges interested in exploring opportunities that may exist within the local labor market to develop and implement training programs for wind turbine technicians. This Center of Excellence statewide study encompasses California's three largest wind generation regions, the San Francisco Bay Area, the Central Valley and Southern California's Inland Empire.

Wind Turbine Technicians

Just as a car requires periodic tune-ups, so do wind turbines. This scheduled and predictable maintenance becomes the primary role of the wind energy technician. Wind turbine technicians install, inspect, troubleshoot and repair wind turbines and their internal and external components. They determine the tasks, tools, equipment, and parts necessary to maintain highly automated systems.

Many California employers end up using original equipment manufacturers and independent providers. Very few wind farms in California have full-time technical staff to maintain turbines. A majority of employers interviewed outsource this function, often to firms based outside California.

Interviews with regional employers indicate that the average turnover for a Wind Technician is three years. Often, they either get promoted or experience burnout. Interviews with California-based businesses has confirmed that technicians are quickly promoted into lead workers, site supervisors, and safety officer positions providing them with a career ladder and accelerated earning potential.

Entry level wind energy technicians earn wages from \$15 to \$25 per hour. Some California businesses indicate that they are advancing workers quickly into supervisory and team leader positions paying more than \$60,000 per year for workers with only three years experience. Experienced technicians, those traveling with overtime, and most supervisors can earn more than \$120,000.

Traditional vs. New Skills

Traditional: Good physical condition for ladder climbing and occasional heavy lifting; meteorology; basic math; ability to work comfortably at heights up to 350 feet; safety certification; experience using hand and power tools; electrical; basic engineering skills; mechanical, hydraulic, and electrical maintenance repair and troubleshooting experience.

New: Understanding advances in technologies and turbine designs, computer software and computer diagnostic systems, testing equipment, and schematics. Technicians should be knowledgeable in mechanics, hydraulics (these systems control the pitch of the blade), and electricity (technicians need to understand control systems, and how power is generated and connected to the power grid).

According to the former AWEA Executive Director Randy Swisher, *"the lack of transmission infrastructure is the single greatest long-term strategic constraint facing the wind industry."*

These two elements – transmission and consistent policy – are the most important variables that will influence the future growth of the wind industry.

Employment Projections

California's wind industry requires anywhere between 265 to 832 technicians in total, depending upon a number of variables including: the age of the turbines, manufacturer specifications for maintenance, the addition of future transition lines, and the percentage of turbines under warranty at a given time serviced by out-of-state firms. Additional considerations in using these calculations in developing programs include the average turnover of wind turbine technicians, as well as the number of wind farms that contract with out-of-state firms for their operations and maintenance. California's wind technician need is relatively small in its absolute size and a conservative approach to for-credit curriculum development is recommended.

Employer Needs and Challenges

It is a generally accepted fact that the current economic situation has impacted hiring practices across all industries. This includes the wind energy industry. According to the former AWEA Executive Director, Randy Swisher, "the lack of transmission infrastructure is the single greatest long-term strategic constraint facing the wind industry."

Throughout this report's data collection and industry validation process, wind industry employers expressed interest in California Community Colleges providing training in the wind energy industry. Employers offered many suggestions on how community colleges can assist in providing a skilled workforce for the wind industry. Some of the most frequent suggestions included:

- Work with high schools to develop curriculum that teaches conservation and renewable energy in order to create the value base for working in the renewable energy sector.
- Train more engineers and engineering technicians. There are not enough professionals in these fields to meet current demand.
- Offer job readiness and work maturity skill training to workers. Make this subject a standard course in existing degree/certificate programs.

College Response and Programs

There were only twelve functioning Wind Turbine Technician training programs in the nation in 2008. The projected number of programs is expected to more than double this year. Although there is no nationally accepted standard for wind turbine technician training, there are basic curriculum elements that are widely agreed upon.

Colleges that already have electronics, electricity, hydraulics, and/or mechanical programs in place are prime candidates to expand offerings to include a wind energy program.



Wind turbine technicians work on towers and platforms 260-plus feet above the ground.

The complete environmental scan contains a description of exemplary programs implemented by a number of community colleges in California, including Cerro Coso Community College and the ATTE curriculum, as well as programs across the nation.

Barriers to Program Development

As a result of the recent popularity of "green" instructional programs, and, in part, due to the success of existing wind turbine technician programs nationally, many colleges are interested in establishing wind energy programs, but have not properly assessed if the institution is in a good position to do so. Barriers to program development may include:

- Access to working turbines (access to the towers and nacelle control systems is critical to student success thus requiring that programs are located within reasonable proximity to wind farms)
- Support from industry partners
- Quality instructors with wind industry, or related experience
- Financial requirements in purchasing, operating, and maintaining the necessary equipment

While the community college system is, in theory, capable of providing training for wind turbine technicians, not all colleges are ideally positioned to take advantage of this opportunity. Challenges to implementing programs may include proximity to sites where employment exists, access to equipment used in the industry, availability of skilled instructors and significant costs to outfit training facilities.

Conclusion & Recommendations

What colleges in the California community college system should offer wind courses or programs? The three main criteria to consider in answering this question are: 1) is the college close to where wind farms, are located, 2) is their labor market demand for wind technicians within their service area, and 3) does a given college have related programs to build upon for training wind technicians.

While the wind industry is very difficult to quantify, there is a slow growing demand that warrants a well planned community college response even in the best case scenario. Even with a high percentage growth, the statewide need is relatively small in its absolute size. Therefore, not every

college in a region that has wind farms will need to develop a wind technician program. A key question that needs to be addressed is whether the number of programs established within the community college system should only satisfy California's workforce needs, or if the capacity to provide trained technicians should exceed the state's demand, thus providing a skilled workforce for the industry nationwide.

The community college main campuses located closest to wind resources (within 20 miles) that should strongly consider responding to this workforce need include:

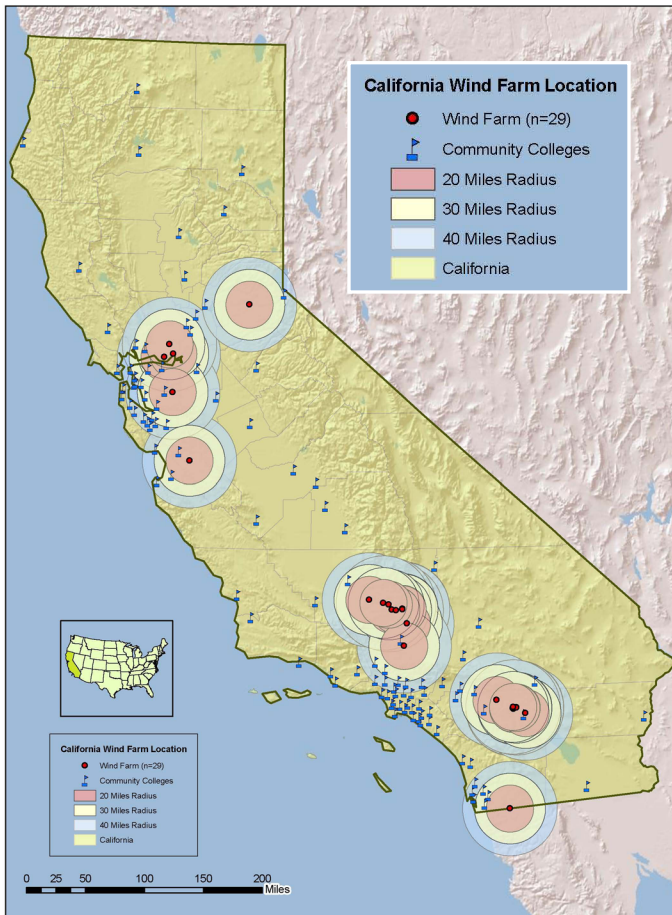
- College of the Desert
- Diablo Valley College
- Gavilan College
- Las Positas College
- Los Medanos College
- Mt. San Jacinto College
- Ohlone College
- Solano Community College

If a college determines that a wind technician program is warranted, then the following two options for responding to the wind industry's need should be considered.

1. Deliver the 208-hour Advanced Transportation Technology and Energy (ATTE) wind technician curriculum in a Contract Education format.
2. Build wind programs leveraged off of an industrial technology program such as mechatronics, mechanical engineering, hydraulics, electronics, electricity, automotive, and aviation.

Among those that are located within 20 miles of existing wind farms, Diablo Valley College, Las Positas College, and Los Medanos College each have approved technology programs that can be leveraged to establish a wind technician program more easily than starting from scratch.

The map on the left shows the distribution of wind farms in relationship to the location of community college main campuses throughout California. The circles represent 20-, 30- and 40-mile distances around each wind farm. (Twenty-nine existing wind farm locations are shown.) If a college has a satellite campus within 20 miles of a wind farm, they may also be a prime candidate to implement a wind turbine technician training program.



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Available now! The Wind Turbine Technicians environmental scan is available to download at www.coeccc.net/wind.