Career currents

Exploring Today's Energy Careers with the NEED Project Vol. 2, No. 1 October 2006

Crane Operators Keep Materials Moving

Crane operators working in the construction industry are a specialized group of **Material Movers**. Material moving occupations are classified by the type of equipment they operate or the goods they handle. Each piece of equipment requires different skills to move different types of loads.

Material movers work in every part of the country. Some work in remote locations on large construction projects, such as highways and dams, or in factory or mining operations.

Most material moving jobs require little work experience or specific training. Some employers prefer applicants with a high school diploma, but most simply require workers to be at least 18 years old and physically able to perform the work.

Material movers, known as operators, use machinery to move heavy construction materials over short distances, for example, around a construction site. Operators control equipment by moving levers or foot pedals, operating switches, or turning dials. They may also set up and inspect equipment, make adjustments, and perform minor repairs when needed.

Crane Operators operate mechanical boom and cable equipment to lift and move materials, machinery, and other heavy objects. They extend or retract horizontally mounted booms to lower or raise hooks attached to loadlines. Most operators coordinate their maneuvers in response to hand signals and radioed instructions. Operators position the loads from onboard consoles or remote consoles at the site.

According to the Bureau of Labor Statistics, crane operators held 50,000 jobs in 2002, with a median salary earning of $17.47 per hour.

Information from the Bureau of Labor Statistics' Occupational Outlook Handbook, www.bls.gov.

Career Currents provides educators and students with resources to introduce energy careers. Each issue of *Career Currents* focuses on a different sector of the energy industry. No single issue is meant to be all-inclusive to either the sector profiled or all careers in energy. This issue focuses on careers in the wind industry.

A key person on the wind farm construction team, a crane operator lifts the blades onto a wind turbine.

In This Issue

Passport to Energy Careers Fair 2
Job Hunt Suggestions 2
College Opportunities 3
Development Engineer 4-5
Wind Jobs 5
Energy Career Chat 6
Hot Topics in Wind Research 7
Career Opportunities & Resources 7
TX Passes CA in Wind Capacity ..... Back

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NEED welcomes your questions, comments, and suggestions. Please contact info@need.org.

Passport to Energy Careers Fair

During the second annual Passport to Energy Careers Fair, students attending the 26th Annual Youth Awards Program in Washington, DC explored a variety of energy career options. Organizations participating in the Career Fair included American Electric Power, BP, Cape Light Compact, Dominion, Energy Information Administration, Halliburton, Nuclear Energy Institute, U.S. Department of Energy and the U.S. Environmental Protection Agency. While browsing the informative displays, students collected brochures and fun give-away materials. They talked to representatives from each organization, asking questions about career opportunities in each industry. NEED would like to thank all the organizations for their participation in the Career Fair.

Suggestions for Getting a Job in the Wind Industry

- Most jobs in the field of wind energy research require an electrical, computer or mechanical engineering background.
- Earn a bachelor's or master's degree from one of the colleges or universities in the U.S. specializing in wind-specific training.
- Attend a university with a wind research lab. Students who receive specialized training have a better chance to go straight to work in the wind field after graduation.
- An internship with a wind company is one of the best ways to enter the field. Not only will you receive valuable hands-on industry experience, but you'll have the chance to show a future employer your skills.
- A great opportunity to network and learn about job openings in the wind industry is the American Wind Energy Association's (AWEA) career workshop for college students, held every June during the National Windpower Conference & Exhibition. Visit www.awea.org for dates and details.

Suggestions from: Robin Arnette, "Careers in Wind Energy," ScienceCareers.org, July 14, 2006. For more information visit: http://sciencecareers.sciencemag.org/career_development/previous_issues/articles/2006_07_14/careers_in_wind_energy/(parent)/68.

College Programs Train Students for Careers in Wind Energy

The wind energy industry is growing faster than any other energy sector in the world today, making it an exciting career opportunity for today's students.

A **Wind Energy and Turbine Technology** program is available at **Iowa Lakes Community College**, in Estherville, Iowa. The two year program trains students to install, maintain, and service modern wind turbines. Upon completion of the program, skilled technicians earn an Associate in Applied Science degree. (A one year diploma is available, too.) Learn about the program at www.ilcc.cc.ia.us/programs_study/industrial/wind_energy_turbine/index.htm.

Credit: Charlie White

Iowa Lakes Community College owns and operates a 1.65 megawatt wind turbine, which provides hands-on experience for students beginning careers in wind energy.

The Technology Department at **Appalachian State University** in Boone, North Carolina, offers a unique Bachelor's degree in **Appropriate Technology**. It gives students a broad education in many technical areas, such as metal working, construction, drafting and design. In addition to a strong technical foundation, students develop an in-depth understanding of solar, wind, hydropower, green building, sustainable transportation and resource management. Hands-on experience is emphasized.

In addition, the Technology Department offers the only master's program in this field. Graduate degree programs provide advanced education, research opportunities, and professional development in selected technical areas.

The Appropriate Technology Program offers coursework, hands-on training, research projects, and other unique wind power applications for students. Explore the career opportunities at www.wind.appstate.edu/workshops/degree.php. For more information on the Appropriate Technology degree at Appalachian State University, visit www.tec.appstate.edu.

Oregon Institute of Technology, in Portland, Oregon, has long been both an advocate and user of sustainable energy systems. It is the only geothermally heated university campus in America!

Oregon Tech offers a Bachelor of Science in **Renewable Energy Systems**. The program includes a solid foundation of physics, chemistry, mathematics and communications, coursework in mechanical and electrical engineering principles, and renewable-energy specific courses in energy systems, heat-pump systems, photovoltaics, energy management and auditing, wind and biomass, renewable-energy transportation systems, zero net energy buildings and fuel cells.

Graduates are prepared for graduate study or immediate employment as field engineers, energy auditors, renewable energy system integrators for homes and businesses, manufacturing engineers for component and subsystem manufacturers, designers for components and subsystems, local and state government renewable energy inspectors, planners and other positions in the energy field. For more information about the Renewable Energy Systems degree at Oregon Institute of Technology, visit www.oit.edu.

Credit: Vanessa Fettes

Power produced by Iowa Lakes Community College's wind turbine is sold to the city of Estherville, Iowa.

Living on a Remote Island Eating Octopus

All in a Day's Work for Dusty Murdock

If you like solving problems, "roughing it" style camping and seeing the world, you'll find Dusty Murdock's job in the wind industry fascinating. Dusty works as a **Development Engineer** for Powercorp Pty Ltd, in Darwin, Australia. His job takes him to some very remote locations, as he sets up and maintains remote power stations that provide electricity to small towns, islands and resorts located far from existing power grids.

Dusty grew up in a small Midwestern town, Black Creek, Wisconsin; population 1,052. His advice to other small town kids, "Go to a university and work hard. Doors will open up for you." While attending the University of Wisconsin-Madison, in Madison, Wisconsin, he earned bachelor's and master's degrees in Electrical Engineering. His job offer at Powercorp came directly through contacts he made during graduate school.

He adds, "My real life experiences such as fixing tractors on the farm, shop classes and a summer job wiring houses, help me as much as the technical stuff I learned in school. Common sense and the ability to work with my hands are so important. Don't be intimidated by math and science; you need them to be successful in school, but you don't necessarily use calculus every day in your job."

Credit: Dusty Murdock

Dusty spent several weeks living on one of the remote Cocos Islands, while interfacing these four wind turbines to the power grid.

At Powercorp, Dusty works on some cool projects. A recent project took him to the Cocos Keeling Islands in the Indian Ocean. One remote island has a small power station running off of four diesel engines. Using the fuel farm as the primary source of power is very expensive, since diesel fuel needs to be shipped on a barge to the island. So the Cocos Islands purchased four 25 kW wind turbines, and hired Powercorp to create a wind-diesel power system.

Credit: Dusty Murdock

Commissioning a project on Graciosa Island, part of the Azores Islands in the Atlantic Ocean, off of Portugal.

According to Powercorp, "Wind energy is clean, free and available whenever the wind blows. Reciprocating diesel alternators are the first choice for reliable, 24/7 electricity supply to communities in remote or off-grid locations. The concept of a wind-diesel power system is to combine the two power sources in a way that makes best use of the advantages of each type of generation."

"Consumers want electric power when the wind isn't blowing. Diesel fuel can be expensive when shipped to remote places. A good solution is to run the diesel alternators continuously but substitute a proportion of wind energy when weather conditions are suitable. Total fuel consumption goes down and power remains available at all times."

To run the power station most effectively, Dusty needs to inject as much wind power into the station as possible; diesel fuel supplies the rest. Dusty designs a box of power electronics that processes the power from the turbines and makes it compatible with the grid (grid stability).

The power electronics box is designed and built in the Darwin office. When ready, the massive box travels to the remote island on a barge. **Electricians** install and wire the box. Dusty arrives on the island towards the end of installation and checks that everything is working. After *commissioning* the job (starting the power electronics working), there is a long "babysitting period." Dusty spends a few weeks fine-tuning the system, monitoring the power electronics and making adjustments as needed. He also trains local utility workers on how to manage the system. From contract to commission, most jobs take 12-18 months.

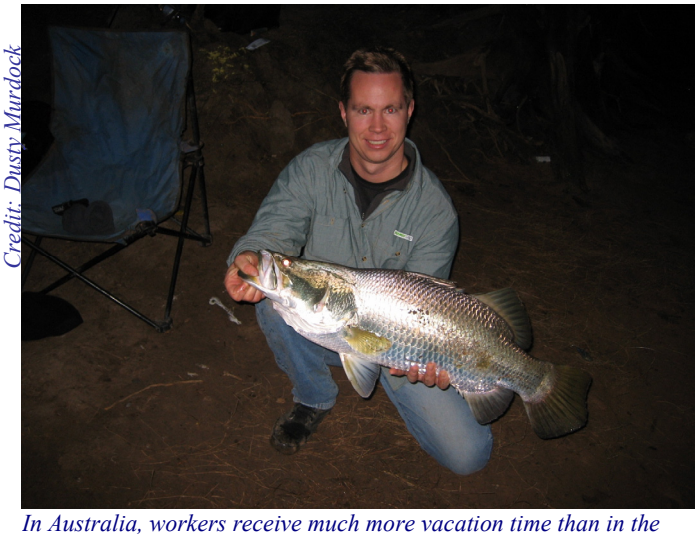
While commissioning a job, Dusty lives in the remote location for several weeks at a time. While working in the Cocos Islands, Dusty lived on a larger, more inhabited island in a hotel, and took a barge across to the remote island during installations. Once commissioning began, most of the other workers went home. Then, Dusty moved to a small, remote island and lived with a local Malaysian family. They cooked all of his meals, including a memorable one of tiny octopus. In return for their hospitality, the local family received money from Powercorp.

Once Dusty returns home to the office, the job isn't over. He is responsible for service and maintenance after an installation, too. For at least six months, Powercorp keeps an eye on the remote power station using a computer. From his computer in Australia, Dusty dials into a modem at the remote site, usually a mobile phone antenna attached on top of the power station. He looks at real time and historic data, such as wind speed, amount of power the station produced and energy consumption. Since it would cost thousands of dollars and several days of travel time to send someone back to the remote island to fix a problem, it's important for Dusty to be able to fix problems over the computer, through the power electronics he created, from thousands of miles away!

Dusty says the most rewarding part of his job is, "after I've spent a couple of years designing a box and commissioning it. I turn it on and it works. Everything comes together. It's really cool." He enjoys the travel and adventure, too. Dusty's travel equaled eight months last year, mostly out of Australia. His travels took him to jobs on an island off Portugal, a mine in western Australia, and to New Zealand to design and manufacture new equipment.

Does Dusty miss living in America? "Yeah, sure," he says, "America is home, always will be. I'll live there again someday, but for now, I have this opportunity to do something cool."

Credit: Dusty Murdock



In Australia, workers receive much more vacation time than in the U.S. Dusty enjoys fishing and camping when he has time off work.

Credit: Dusty Murdock

A wind development engineer spends some time in an office, using a computer to design and build power electronics that connect a wind turbine to a power grid. Most of his/her time is spent out in the field, in remote locations such as this island off the coast of Portugal.

Not All Wind Jobs Require an Engineering Degree

According to Green Energy Jobs, wind energy projects rely on partnerships between large and small companies. Depending on your personal preference, you'll find job opportunities at small companies providing specialty products, and at large international companies. The international nature of the wind industry means that individuals with additional language skills are especially valued.

Specialized employment areas exist in wind energy. While many jobs require an engineering background, many others offer good opportunities for individuals who lack direct experience, but have enthusiasm and useful skills:

- Turbine Manufacturers
- Component Subcontractors
- Blade Manufactures
- Transportation Logistics
- Project Management
- Finance and Legal Expertise
- Planning and Environmental Skills
- Site Testing
- Tower Manufacturers
- Pile Driving
- Grid Connection
- Green Electricity Sales
- Domestic Renewable Energy Systems

Source: www.greenenergyjobs.com/wind-intro.php.

Energy Career Chat

Meet Chris Copeland, the Operations Manager of Wintec Energy in Palm Springs, California.

Career Currents (CC): How did you get interested in wind energy?

Chris Copeland (Chris): I have always had an interest in equipment and building, and it grew into wind farms.

CC: What type of schooling and training do you have?

Chris: I have a college degree and I'm trained in high voltage electrical substation operations and maintenance. I also have a general contracting license.

Chris Copeland, far left, gives a tour to engineering students at a wind farm in California's Altamont Pass.

CC: How is your job as an **Operations Manager** related to the wind industry?

Chris: I oversee the day to day operations of two wind farms in California. I'm responsible for planning, designing and permitting new wind energy projects, too.

CC: Describe your typical day of work.

Chris: Most mornings, I drive the fields and see how the equipment looks. I meet with my **Service Manager** and go over repairs and any problems. Afternoons are usually spent in the office with paperwork and e-mail. When we are building a new wind farm, I am the **General Contractor**, and supervise the construction and installation of the turbines.

CC: What is the most rewarding part of your job?

Chris: Every day is different. I also get to spend a large portion of my day outside, away from a desk.

CC: What advice can you give to a young person considering a career in the wind industry?

Chris: Go into engineering. The pay is great and the opportunities will be even better in the future.

CC: Tell us about some other career options in the wind industry.

Chris: Wind energy employs all different types of skills, from **Technicians** who climb the towers and repair the turbines, to **Crane Operators**, **High Voltage Repairmen**, **Accountants**, **Lawyers** and **Data Entry Clerks**.

CC: Which careers will be in highest demand as wind power grows in America?

Chris: Engineers and technicians who maintain and repair the equipment.

CC: Thanks for sharing your career with us, Chris. The wind industry looks like a promising career choice for students interested in renewable energy sources.

What does it take to install a wind turbine?

- **Utility Engineers**
- **Geophysical Engineers**
- **Concrete/Structural Engineers**
- **Turbine Engineering – Mechanical Engineers, Electrical Engineers, Aerospace Engineers**
- **Site/Civil Engineers**
- **Microelectronic/Computer Programmers**
- **Business Expertise (financial)**
- **Legal Expertise**
- **Meteorologists**

Source: Mike Arquin, KidWind Project, www.kidwind.org.

Career Opportunities in the Wind Energy Industry

Wind energy is the world's fastest-growing energy technology. It may provide around six percent of our nation's electricity by 2020. To keep up with this growth, wind energy companies will need employees in a wide range of fields. For today's students, the wind industry will offer many career opportunities.

Sectors of the wind industry include:

- analyzing wind resources (environmental and consulting services),
- developing, constructing and operating wind energy plants (manufacturing and engineering), and
- selling wind energy output (marketing).

The majority of new jobs are expected to fall in the development, construction and operation sector. Positions in this sector include: **Manufacturing Engineers**, **Plant Managers** and **Quality Assurance Personnel** working on blade production, tower production, or gearbox production. **Electrical Engineers** design machine control systems.

The wind industry also offers opportunities in the service sector, for **Field Technicians**, **Installation Technicians**, and **Operational Maintenance Experts**. These jobs require a range of education and experience, ranging from 2-year degrees to bachelor's degrees in science or other fields. One area that requires scientific expertise is environmental assessment, in which the site that will house the turbines is studied to determine whether drinking water, plants, or animals will be affected by a new wind-power facility. These workers need a bachelor's degree in biology or environmental science. Some of these positions also require extensive professional experience.

But probably the most important kind of assessment work is resource assessment. **Wind-Resource Assessors** characterize the wind resource at a particular site, analyzing wind patterns, predicting how much electricity a wind farm on that location will be likely to produce, and providing technical information to support site-choice decisions. Such data is important to another group, the **Utilities** and **Grid Operation Managers**. Once a wind farm is up and running, managers need to know how much power it's going to be producing at each hour of the day in every season. It's helpful to have those predictions because they need to manage the overall grid. Therefore, people in **Meteorology** can find a career in wind energy, too.

Also, people with degrees in computer science, aerodynamics, atmospheric science, or mathematics are likely to find positions in wind energy.

Source: Robin Arnette, "Careers in Wind Energy," ScienceCareers.org, July 14, 2006.

Hot Topics in Wind Energy Research

- **Turbine research** - improving turbine design (aerodynamics), understanding the nature of wind (inflow and turbulence), and using computer models to design efficient and low-cost turbines (modeling structures and dynamics).
- **Wind resource assessment** - preparing maps with wind data such as average wind speed and variability.
- **Forecasting** - using weather models, such as Doppler radar, to predict wind speeds and patterns at various altitudes. Using old data to predict how the wind will behave at a certain time.
- **Utility grid integration** - integrating the energy produced by wind into a utility grid. New techniques and models will ensure that grid operators can manage variable-output technologies with maximum efficiency.
- **Energy storage** - using technology to store wind energy as electricity. Some methods include converting wind energy to chemical energy (like hydrogen), and flywheels.

Source: Robin Arnette, "Careers in Wind Energy," ScienceCareers.org, July 14, 2006.

Wind Energy Information & Career Resources

- American Wind Energy Association – www.awea.org.
- The Bureau of Labor Statistics offers young people an opportunity to explore a variety of careers at www.bls.gov/k12/index.htm.
- The JETS' website, www.jets.org, includes resources, articles, and activities about engineering and technology careers.
- KidWind Project – www.kidwind.org.
- The National Renewable Energy Laboratory's (NREL) National Wind Technology Center– www.nrel.gov/wind.
- Renewable Energy Access – www.renewableenergyaccess.com.
- U.S. Department of Energy - Wind and Hydro Technologies – www1.eere.energy.gov/windandhydro.

Texas Passes California in Wind Energy Capacity

According to the American Wind Energy Association (AWEA), Texas now leads the nation in wind power capacity. AWEA's Second Quarter Market Report shows that Texas holds 2,370 megawatts (MW) of capacity, enough to power over 600,000 average American homes, while California's current capacity equals 2,323 MW. Texas gained its lead with the expansion of the Horse Hollow Wind Energy Center which grew from 210 MW to 500 MW earlier this year.

Credit: Chris Copeland, Wintec Energy

Historically, California has led the nation in wind energy since building the first commercial wind projects there in 1981. At one time, more than 80 percent of the world's wind power capacity was located in California. And although it has fallen behind Texas, development activity in California remains active. For example, PPM Energy's 150 MW Shiloh Wind Project in Solano County and the Sacramento Municipal Utility District's 24 MW project near Rio Vista came online earlier this year.

AWEA reports that a total of 822 MW of wind power have been installed so far in 2006, including wind projects in Alaska, California, Colorado, Hawaii, Massachusetts, Minnesota, Montana, New York, North Dakota, Ohio, Pennsylvania, Rhode Island and Texas.

AWEA expects another 3,000 MW of new wind power capacity to be installed in 2006 with the addition of wind power facilities still under construction. Since the U.S. currently hosts 9,971 MW of wind power, the country will undoubtedly draw on more than 10 gigawatts of wind capacity by year's end – a major milestone for U.S. wind energy.

Wind turbine sales are also creating new U.S. jobs. A Spanish wind turbine company, Gamesa, recently opened a manufacturing facility for wind turbine blades in Pennsylvania, expected to employ more than 230 people. Gamesa plans to build three more manufacturing plants in the state, employing up to 300 workers. In addition, Knight & Carver Wind Blade Division, of San Diego, California, is building a wind blade repair and manufacturing facility in Howard, South Dakota, slated to begin full-scale production in November. The facility expects to employ 10-25 full-time employees.

For more information, visit: www.awea.org/newsroom/releases/AWEA_Quarterly_Market_Report_072506.html.

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