

# CAREER CURRENTS

EXPLORING TODAY'S ENERGY CAREERS WITH THE NEED PROJECT

## WHERE THE WIND BLOWS

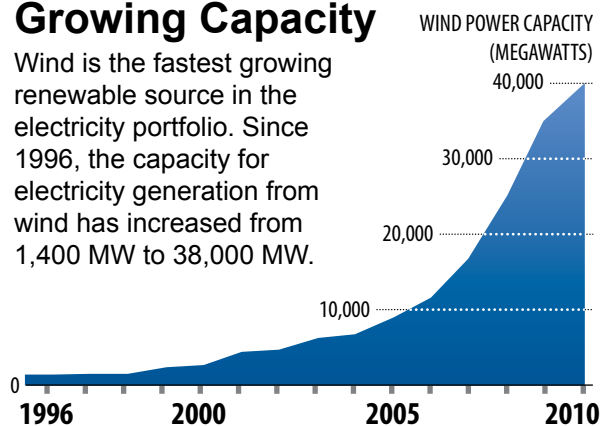
You have heard, “The answer is blowing in the wind.” Well, maybe there’s a career for you blowing in the wind! From research and development to manufacturing and operating, there are a myriad of career opportunities in the wind industry.

Using wind as a source of energy has been around for centuries, but it is still a relatively new means of electricity generation. However, wind power has been the second fastest-growing source of new electric power generation for several years (natural gas is first). According to the American Wind Energy Association, there are more than 35,600 wind turbines installed in 38 states. Wind provides a clean source of energy, and the wind that turns the turbine blades costs nothing.

As the wind industry continues to develop, and as demand for renewable energy increases, so do the opportunities for new careers. Forty-two states have manufacturing facilities related to the wind industry and/or wind farms. In 2010, Texas, Illinois, and Colorado had the most jobs in the wind industry, but jobs can be found coast to coast. With this growth comes an assortment of related careers: engineering, manufacturing, operations, maintenance, environment, safety, communication, public policy, and legal/law. There’s a career blowing your way in the wind industry!

### Growing Capacity

Wind is the fastest growing renewable source in the electricity portfolio. Since 1996, the capacity for electricity generation from wind has increased from 1,400 MW to 38,000 MW.

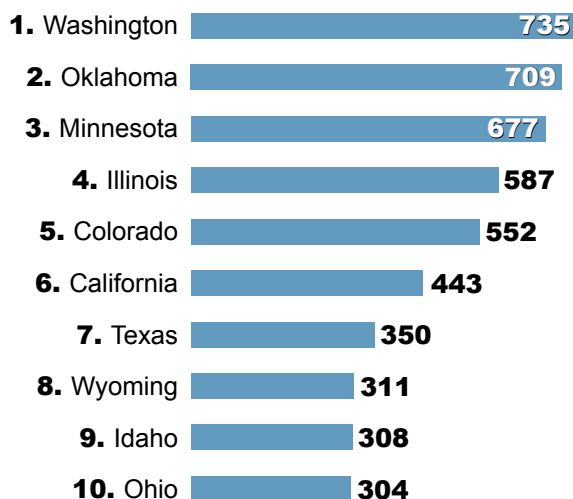


Data: EIA

Note: Capacity is the maximum output the equipment can supply to the system. Actual electricity generated may be lower than capacity due to many variables including weather and maintenance.

### Wind Projects Under Construction (Capacity MW), 2010

RANK/STATE CAPACITY IN MEGAWATTS



Data: AWEA

# MAKE NEW FRIENDS, AND KEEP THE OLD



NEED congratulates Tim Meko, NEED's Creative Director for the past 17 months, on a recent career move. At NEED, Tim was responsible for the visual facelift of all the curriculum guides and accompanying graphics. He recently accepted a position at the Urban Institute in Washington, D.C. as the resident Infographics Specialist. Tim has promised to stay in touch, agreeing to do freelance work for NEED and will stay on as a Visual Communications Advisor.



Johnna Hetrick joined NEED in September as NEED's new Creative Director. She is a Virginia native and previously worked at Interstate Worldwide Relocation Services. Johnna is excited to use her skills in graphic design and layouts as she works on NEED curriculum guides, the web site, and other NEED materials.



Another Virginia native, Pam Seader recently joined NEED's staff as the new Program Coordinator. Pam will be working in NEED's national office helping to notify teachers of upcoming workshops and preparing materials for workshops. Be sure to say 'Welcome' to Pam if you call the office.

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# WIND FARMS: HARVESTING THE WIND

Wind power plants, or wind farms, are clusters of wind turbines grouped together to produce large amounts of electricity. These power plants are usually not owned by a public utility like other kinds of power plants. Most wind farms are owned by private companies and they sell the electricity to electric utility companies. Currently, the largest wind farm in the world is Roscoe Wind Plant located near Roscoe, Texas. The farm's 627 wind turbines produce 780 megawatts of electricity, which is enough to power more than 230,000 homes.

Choosing the location of a wind farm is known as *siting* a wind farm. Before building a wind farm, wind speed and direction must be studied to determine where to put the turbines. As a rule, wind speed increases higher off the ground, over open areas with no obstacles in its way. The site must have strong, steady winds. Scientists assess the wind source in an area for one to three years before choosing a site. Measuring the wind and obtaining construction permits require the greatest amount of time.

The best sites for wind farms are on hilltops, the open plains, through mountain passes, and near the coasts of oceans or large lakes. Turbines are usually built in rows facing into the prevailing wind. Placing turbines too far apart wastes space. If turbines are too close together, they block the wind from reaching other turbines.

There are other things to consider when siting a wind farm, such as: *What is the weather like? Do tornadoes, hurricanes, or ice storms affect the area?* Any of these weather conditions may cause expensive damage to the wind turbines and associated equipment. *Is the area accessible for workers? Will new roads need to be built?* New roads are expensive. *Can the site be connected to the power grid?* It is expensive to lay long-distance transmission lines to get electricity to where people live, so wind farms are often located near transmission lines with available capacity. *Will the wind farm impact wildlife in the area?* Developers building a wind farm need to get permission from land owners (either public or private), local community and government agencies before building.



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The NEED Project is a 501(c)(3) nonprofit education association providing professional development, innovative materials correlated to the National Science Education Content Standards, ongoing support, and recognition to educators nationwide.

Career Currents provides educators and students with resources to introduce energy careers. Each issue 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.

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## Selecting a Wind Project Location



- 1. Wildlife and critical habitat**  
Understanding of known threatened or endangered species present at site; protection and mitigation assessment
- 2. Utility-scale wind resources**  
Average speeds of 7 to 11 m/s (15 to 20 mph)
- 3. Proximity to existing high-voltage transmission lines**  
Existing transmission lines or utility substations located near the project site; available capacity on the existing grid infrastructure; attractive electricity markets are close to load center and in a state with a mandated Renewable Portfolio Standard
- 4. Landowner interest**  
Private vs. Public land; agreeable to development and construction activities
- 5. Highway access**  
Materials to be delivered via truck
- 6. Preliminary wind energy project study area**

Source: Shell Wind Energy



# WORKING IN WIND

There are a variety of occupations you could pursue in the wind industry. Every step in the development of a wind project depends on workers with many different skills.

## RESEARCH AND DEVELOPMENT

### Aerospace Engineers

Design, test, and supervise the making of turbine blades and conduct tests in aerodynamics. They work with meteorologists to determine the best way to site a wind farm and configure the blades.

### Civil Engineers

Design and work on the construction of different aspects of a wind farm, including roads, buildings, and towers. They have to consider weather and other conditions to ensure safety and effectiveness.

### Electrical Engineers

Design, develop, test, and supervise the electrical components: motors,

controls, lighting and wiring, generators, communications, and transmission systems.

### Electronic Engineers

Responsible for the complex systems that use electricity to control the electronics that operate the turbine systems.

### Engineering Technicians

Responsible for operating and maintaining the equipment.

### Environmental Engineers

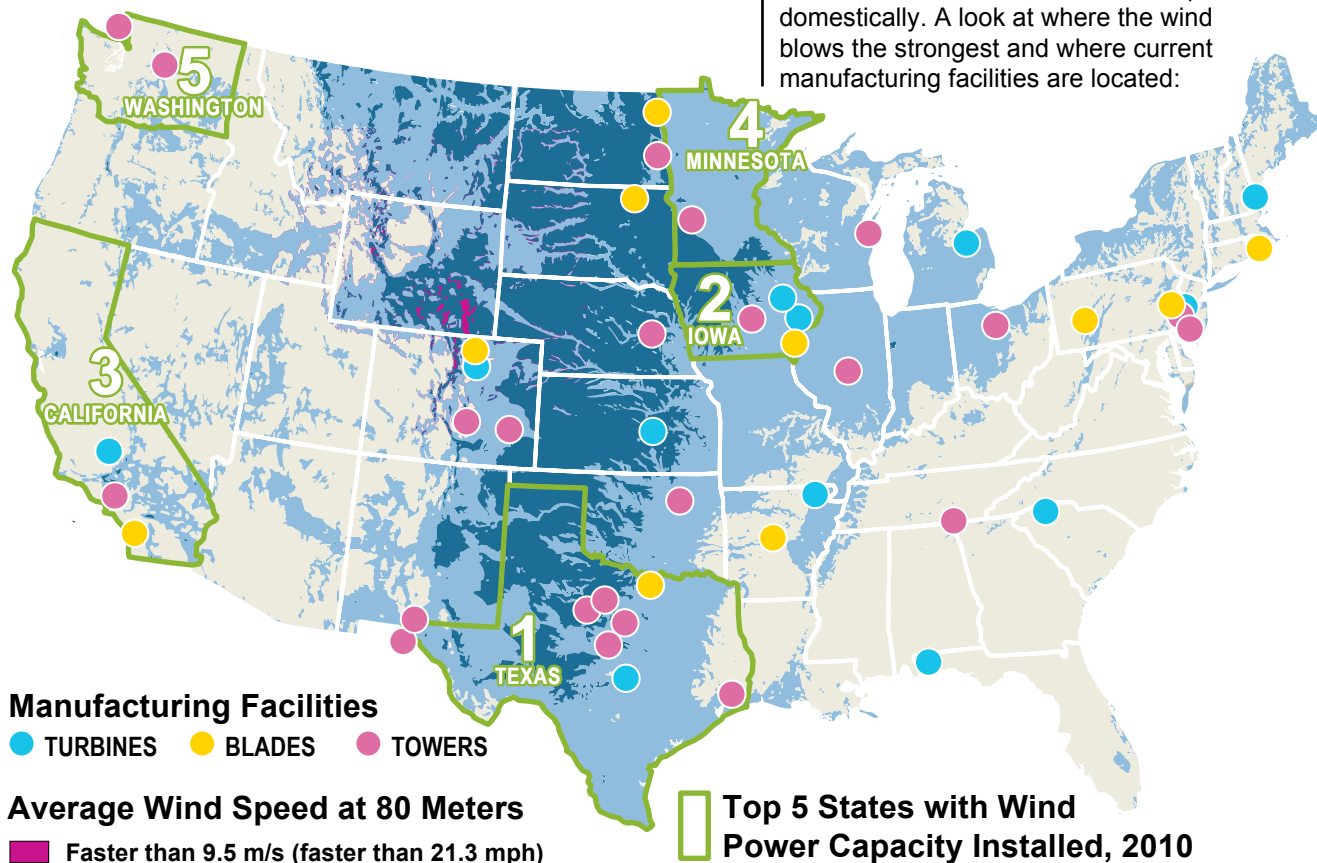
Consider the potential environmental impacts of wind turbines, such as: noise, visual impact, impact on local species, interference with radar and telecommunications, and electric and magnetic fields caused by the generating equipment.



IMAGE COURTESY OF NREL

## Where the Wind Blows, the Jobs Go

More than 50 percent of the parts used to manufacture U.S. wind turbines are produced domestically. A look at where the wind blows the strongest and where current manufacturing facilities are located:



Data: AWEA, NREL

Note: Does not include potential offshore wind resources.

### **Health and Safety Engineers**

Identify and measure potential hazards to ensure safety in manufacturing and the operation of wind turbines.

### **Industrial Engineers**

Study the requirements for designing and manufacturing to increase productivity.

### **Materials Engineers**

Test, develop, and work with plastics, metals, ceramics, and other materials to determine the best materials for the electronic and electrical needs.

### **Mechanical Engineers**

Supervise manufacturing; research, design, develop, and test tools and mechanical devices used on wind turbine systems.

## **GENERAL MANUFACTURING JOBS**

### **Assemblers**

Put components into larger products such as the turbines and blades.

### **Industrial Production Managers**

Monitor production and keep the schedule; ensure there are no problems and the manufacturing process and materials are up to standard.

### **Machinists**

Use tools to make precision parts according to blueprints; they finish parts that cannot be done by automated machinery.

### **Quality-control Inspectors**

Make sure that everything fits and moves properly; wind turbine components need to follow the design and manufacturing specifications.

### **Welders**

Use heat to fuse metal, such as welding together cylinders of steel to form turbine tower segments.

## **PROJECT DEVELOPMENT**

### **Asset Managers**

Represent owner interests: finances, budget, and contracts.

### **Atmospheric Scientists**

Also called “meteorologists” – assess whether wind and weather conditions are adequate to attain the greatest amount of energy.

### **Environmental Scientists**

Work with wind farm developers to be sure that the ecosystem is protected.

### **Geologists**

Study the ground and recommend where to place the turbines and how to build the foundations.

### **Land Acquisition Specialists**

Work with land owners, governments, and communities to gain support for wind projects.

### **Logisticians**

Work with manufacturers and construction teams to keep transportation efficient and on schedule.

### **Wildlife Biologists**

Evaluate a wind farm’s effect on local animal life and supervise reports of environmental impact.



IMAGE COURTESY OF NREL  
Aerospace engineers are responsible for designing and testing wind turbine blades.



## **CONSTRUCTION OCCUPATIONS**

### **Construction Equipment Operators**

Use bulldozers, road graders, and other equipment to build roads and make sure wind turbine components arrive to a site safely.

### **Construction Laborers**

Work on wind farms preparing the site and building the infrastructure; they might also be turbine service technicians.

### **Crane Operators**

Use cranes to lift pieces of the turbine off the trucks, stack tower segments, and lift blades to the hub.

### **Electricians**

Use wires and tools to get the electricity from the turbine’s generator to the power grid.

# Q&A

NEED GETS TO KNOW INDUSTRY PROFESSIONALS

## DICK WILLIAMS

Dick Williams joined Shell in 1980 upon receiving an electrical engineering degree from Penn State. He was named President of Shell Wind in 2008.



### HOW DID YOU DECIDE TO WORK IN THE ENERGY FIELD?

Until 7th grade, I wanted to be a camera operator at a TV station. My dad retired from the Air Force and we moved to Pittsburgh just as I was headed into 6th grade. It was 1968 and I chose to go to an Alternative Middle School where they were trying new things in science and math. My 7th grade science teacher – Mr. Zibrida – had a HAM radio license and he started a club for amateur radio operators. Several of us said, “but we’re only in 7th grade.” He said, “So?”

We all got HAM licenses in 7th grade. We built towers and transmitters and we were talking to people all over the world. I never wavered after that – I was going to be an electrical engineer. I applied and entered Penn State University after high school. It was hard, but I loved it. I realized that we were always going to need power (electricity) and that was the path for me.

I had 13 job offers when Shell came to campus. They called and I said “no thanks.” I was going to IBM. Shell kept calling and I agreed to meet the recruiter. I didn’t get dressed up; I put on a pair of jeans and a flannel shirt and went to meet him. I didn’t want to work in Houston. I didn’t want to work for an oil company. I didn’t want to work in a plant or in pipelines.

Later that night, a man I would end up working for three times called. He heard I didn’t want to work at Shell. He knew I was a Pittsburgh Steelers fan, and he said, “well, I just want you to know the Steelers stink.” Right then, I decided I would accept the flight to Houston to meet this guy just to get out of State College, PA in the winter. So I did. And halfway through the first day I decided I was going to work for Shell. They believed in me. They respected me (even if they didn’t respect the Steelers), and I accepted.

### HOW DID YOUR EXPERIENCE IN OIL AND NATURAL GAS PREPARE YOU TO BE PRESIDENT OF SHELL WIND?

I came to Shell Wind to find that this role and the development of this energy source is a real combination of my previous positions. Developing wind energy combines exploration for the energy sources, production of that energy source (finding the best turbines and the best technology to harness wind energy and generate electricity) and distribution.

### WHAT MADE YOU SURE THAT WORKING IN WIND WAS A GOOD CHOICE FOR YOU?

When I accepted the position as President of Shell Wind, I am sure the team thought “he has no wind experience, he just won’t understand us.” Within a couple of weeks I realized that within

this group at Shell Wind, and throughout the wind industry, there is a great amount of passion and ingenuity. I knew this was a good choice – working with creative and passionate people. Developing and operating wind projects tapped all I learned from oil and gas exploration, from pipeline work, and from my time working on the financial side too.

### HOW IS WIND DEVELOPMENT LIKE OIL AND GAS DEVELOPMENT?

Our wind maps look just like the 3D seismic mapping we use for looking for oil and natural gas below ground. But, of course, our wind maps are about the above ground resources. We’re working with some of the same equipment and functions – hydraulics, motors, pumps, our engineers work with the same engineering equations, and many of our team members working on wind analysis are former “downhole” people who worked in our oil and gas operations. Financing the projects is also similar.

The wind industry is where the oil and gas industry was 40 years ago. We’re working on expanding best practices in safety, long-term planning, maintenance, equipment reliability, and forecasting. We have taken Shell’s best practices and principles and applied them to the wind business. However, we don’t have 40 years to get to where we need to be – we have maybe 3-4 years.

### WHAT BACKGROUND AND SKILL SETS DO MOST OF SHELL WIND’S PEOPLE HAVE?

Many of them have come from the business development side and have power company transmission and project experience. Wind blends so many skills. We have mechanical engineers, chemical engineers, electrical engineers, and we have those with mathematics backgrounds, financial backgrounds, and communications people too – who work to educate and communicate our work.

### WHAT DO YOU SEE AS THE BIGGEST CHALLENGES FOR THE INDUSTRY IN THE COMING YEARS?

I put these in a couple of different categories. First, are the political and regulatory issues. Until there is a consistent policy, every renewable technology is going to struggle. Wind is a huge capital investment. For example, one 2 megawatt turbine is a 3-4 million dollar investment. Our last windfarm has 132 turbines. There’s a math activity for you! That’s a substantial investment and having inconsistent energy policy makes it hard to plan, model, secure financing, and to consider the long-term success of the project.





Shell's NedPower Mount Storm Wind Project, situated atop the Appalachian Mountains, in Grant County, West Virginia.

**“There is room for all skills in the wind industry. We need people with skills in human resources, safety, communication, health, finance, environmental science, and biology.”**

The second challenge is transmission of electricity. When we look at a map of the nation's best wind resources, we see that the wind is best where the majority of America's people do not live. Wind is over the plains, most of our population is on the coasts. Shell has become a partner in some transmission companies to simply get a seat at the table to be able to plan best for projects. The federal government will, very likely, need to spearhead the improvement of our electric grid. A good example is the Eisenhower Interstate Highway system. The Federal government took the lead, worked with the states and landowners and built the system on which our goods, services, and families move on a daily basis.

Wind is a vision issue, a passion issue, a legacy issue...what are we going to leave for our kids? A consistent energy policy is desperately needed. We must get serious as a country and get consistent policy.

#### **HOW DO YOU APPLY YOUR ENGINEERING DEGREE FROM PENN STATE UNIVERSITY EACH DAY?**

I wish I was an engineer 30 years younger today. The technology they get to play with (I mean work with) on a regular basis is fascinating. Then, they get to think about how we put these technologies together – not just the electronics, hydraulics, and mechanics of the turbine itself, but how you weave together the different energy sources like wind with solar, wind with gas, solar and storage, etc.

Think about this: There are 13,000 parts on a turbine. Today, we have onboard computers that can tell us what is working, what is not, when there is too much dust, when there are too many bugs, and constantly watching the efficiency of the turbine – making sure we're getting the return on our investment.

And we get to rethink things too, like how do we engineer our gearbox to get real time information on how they are working. Wind forecasting and measurement is beyond wind vanes and anemometers. We're now looking at radar and lasers to look at wind and predict its movement and adjust the turbine for greater efficiency.

#### **WHAT'S ONE OF THE MOST INTERESTING THINGS YOU GET TO CONSIDER EACH DAY?**

Blade design is very interesting. But no one that I know of in the industry has looked at how we will tackle the issue of old and used blades. No one has considered how we recycle blades

that have reached the end of their useful life. No one is looking at the full life cycle. How do we deal with all of that fiberglass? Does it go to the landfill, does it simply end up laying around the windfarm?

We're looking at new blade materials. Alcoa, an aluminum producer, is working to see what may be possible in aluminum and metals. Think of that idea – if a blade fails, it is smelted down and recycled. Once a blade has reached its full life, it is smelted and turned into new blades. The possibilities are endless.

#### **WHY DO PEOPLE LIKE TO WORK AT SHELL WIND?**

You know, I've asked them just that. Our field supervisor at Mt. Storm, one of our major projects located in West Virginia, said it was a couple of things that kept him here. He said it is because the company cares about him. That we respect safety as a team and we have extraordinary long term opportunities. The pay package is good, the stability is good, and having all the options within Shell is a big plus too.

Consider the Mt. Storm scenario for a minute. If shale natural gas development continues to expand in the Appalachian region, the skills our folks at Mt. Storm have, make them easily transferable to developing shale gas in the Marcellus (see the April/May 2011 edition of Career Currents for more about careers in the oil and natural gas industry).

#### **DO YOU HAVE ANY ADVICE FOR STUDENTS CONSIDERING CAREERS IN WIND?**

I had a mentor once who said: “To be successful in this business you have to: 1. Be resourceful, 2. Ask questions, and 3. Always walk into your boss's office with a solution.” I have added a 4th: Network.

There is room for all skills in the industry. We need people with skills in human resources, safety, communication, health, finance, environmental science, and biology. We even have bat people too – who study the impact of wind turbines on bats.

#### **WHAT'S YOUR FAVORITE PART OF THE JOB?**

Sharing the passion that I've gained and showing people that an energy company can and should be involved in wind. To educate, advocate, and advance the business. I left the best job in the world and now have a better one. It is about sharing the excitement of wind and constantly learning and teaching.

# Q&A

NEED GETS TO KNOW INDUSTRY PROFESSIONALS

## REMY PANGLE

Remy Pangle is the Director of Education and Outreach for the Virginia Center for Wind Energy, at James Madison University. Prior to this position, she was the Mapping and Educational Specialist for Offshore Mapping Wind Energy. Remy accomplished her BA at JMU, studying Integrated Science and Technology with a concentration in Environmental Studies. With a passion for the ocean, Remy went on to the University of Maine to receive her master's degree in Oceanography. Recently married, the new Mrs. Pangle also enjoys singing, hiking, watching football, and competing in fantasy football.



### TELL US A LITTLE ABOUT YOUR JOB AND WHAT YOU DO.

I do pretty much exactly what my title says; I reach out to the community and help educate them on wind and the energy it generates. Much of my job is spent debunking myths that students, parents, and community members may have as they are introduced to wind and turbines to generate electricity. We like to grab the students' attention as they are younger, when we feel they are most eager to learn. I also help support the commonwealth of Virginia's STEM curriculum and I am also a state facilitator for the Wind for Schools Program.

### HOW DID YOU DECIDE TO GO TO WORK IN THIS FIELD?

As an Oceanographer in Florida, I spent most of my days watching coral reefs, ocean plants, marine life, and the entire ocean be impacted by climate change. I had the opportunity to work on a solution through the renewable energy source of wind.

### WHAT IS A TYPICAL DAY AT WORK LIKE FOR YOU?

Most of my job is spent communicating with businesses, schools, communities, and other professionals in my industry. I also design and layout graphics, update reports and fact sheets, and work with utility companies and city planners. Other parts of my job are to educate teachers, perform energy audits (many times with students at schools), measure wind, and help implement our guidebooks across the commonwealth of Virginia.

### WHAT IS THE MOST REWARDING PART OF YOUR JOB?

I would have to say seeing a project through to fruition that has hit numerous barriers is the most exciting part of my job. It seems like many of the projects for erecting wind turbines hit different issues, but sticking through it, even in tough times, makes my job very rewarding. While this is the part I most enjoy about my job, it could also be the most challenging part as well.

### WHAT ARE SOME BENEFITS TO WORKING IN THIS INDUSTRY?

I get to travel often to some very exciting places for meetings and conferences. I also enjoy meeting and working with a wide variety of professionals, including oceanographers, engineers, lawyers, finance professionals, and more. For young people interested in a career in the wind industry, it is growing larger every day, so we are in high demand. Plus, we believe in alternative energy and making the world a better place.



Remy Pangle explains how a wind turbine generates electricity to a group of students at North Branch School in Afton, VA. North Branch is a partner school in the Wind for Schools Program.

### WHAT ADVICE WOULD YOU GIVE TO A YOUNG PERSON WHO IS INTERESTED IN WORKING IN THE WIND AND POWER GENERATION SECTOR?

I would say the most important thing young people have to realize if they are interested in a career in wind and power generation is that it is an industry with a demand for a wide variety of professionals. Just because science and math are not your strong suits does not mean you cannot have a career in this industry. We need lawyers, marketing professionals, finance persons, legislators, and so on. Energy is almost like a world of its own. It is one of the most multidisciplinary professions available.



# Q&A

NEED GETS TO KNOW INDUSTRY PROFESSIONALS

## CHARLES NEWCOMB

Charles Newcomb is currently the Section Manager of a Wind and Water Deployment Team, which is part of the U.S. Department of Energy's Wind and Water Power Deployment program. Wind Powering America and Charles have the mission to provide fair and unbiased information about the challenges, benefits, and impacts of wind technology implementation. Charles has a Bachelor of Arts degree in Psychology from Oberlin College and a Masters of Agricultural Engineering degree from Colorado State University.



### WHAT PIQUED YOUR INTEREST IN ENERGY, SPECIFICALLY IN WIND AND POWER GENERATION?

When I was finishing up graduate school I was concerned (as an engineer) with what work I could focus on that wouldn't result in some anti-wealth of some sort. Working in renewables allows me to provide value to the industry and at the same time to feel good about having a positive effect on our climate challenge.

### HOW HAS YOUR FIELD CHANGED IN THE LAST 5-10 YEARS?

Since my field bridges a few areas that's easier to answer in pieces. In the small wind world there has been an explosion of companies producing small wind turbines. A lot of this has been positive because consumers have a much broader choice of equipment. Although, this can be confusing for people who don't know the history of the equipment.

In the mid-size wind space between 100kW and about 1MW it's been fascinating to watch the utility-scale machines from a decade ago disappear (they moved past the 750kW range past the 1MW range pretty quickly) for a number of years, and then only recently return via new channels to meet the market need.

In the utility space, the equipment has grown very large and manufacturers have worked hard to maximize equipment uptime and productivity. From the utility and public acceptance perspective it has also been fascinating to see the market gain momentum (once the production tax credit was consistently available), become a significant source of new energy, and at the same time attract the focus, and in some cases the ire, of the public landscape.

### COULD YOU DO YOUR JOB ANYWHERE IN THE COUNTRY? ANYWHERE IN THE WORLD?

My specific job? No. My job needs to be done at the National Renewable Energy Laboratory. However, there are a lot of consulting engineers in the wind business that live wherever they want and work all across the country. All that takes is a lot of experience, intelligence, and contacts. Since there is a lot of work to be done from the project design and implementation perspective all over the world, yes, this could be done anywhere.

### WHAT IS THE MOST REWARDING PART OF YOUR JOB?

A big part of the job is illuminating issues. More often than not when someone has been educated about the truths (rather than misconceptions or exaggerations) about wind they become fast supporters. In our role as honest brokers of information, it is tremendously rewarding to see the lights come on and hear a skeptic say "oh...I didn't realize that!" Also, by the nature of

the technology we tend to work in rural areas and landscapes... at least that's where the constituents are. Because of this I have spent a great deal of time in "towns under 2,000" and really enjoy getting to know people in the heartland. They are creative, amazingly resourceful, friendly, and intelligent, and they deserve the truth.

### WHAT TRAINING AND EDUCATION DO YOU NEED FOR YOUR JOB?

My job now requires (or benefits from) a broad understanding of the technology, the project development process, the stakeholders, the barriers to development, the project finance alternatives, the project ownership alternatives, the resources, etc. My engineering training is critical to understanding the technology. My graduate work was essential to understanding data collection and analysis which helped me to better understand the technology. Time in the field developing projects, taking care of fleets, selling equipment, working with townships to establish or comply with ordinances, working with utilities to understand their concerns and explain our solutions...those were good years spent better understanding the barriers to the wind industry and what it's like for the people and the industries we're trying to help.

### WHAT ARE SOME BENEFITS TO WORKING IN THIS INDUSTRY?

For most people in the industry this isn't a get-rich-quick industry. Because of that, this tends to be an industry where there is a tremendous amount of passion and integrity—especially on the stakeholder and outreach side of things. These types of people are about education and changing a market for the better. To me, it is really exciting to be part of that family of people.

### WHAT ADVICE WOULD YOU GIVE TO A YOUNG PERSON WHO IS INTERESTED IN WORKING IN THE WIND AND POWER GENERATION SECTOR?

If you really want in, come on in. It's a large and growing industry and there are roles all over the place where you can provide value. There's a lot of room for mobility at all levels so if you come in tying rebar, you won't have to do that forever. If you come in as a land acquisition person you can move into project management later. If you come in as an engineer you can move wherever you want. It's a really fun industry for that reason.

It's pretty hard to find people who don't like what they do in the wind field. We know that in order to meet our market potential we need to add about another 85,000 jobs and we're anxious to get more talented, motivated, excited people in the ranks!

# Q&A

NEED GETS TO KNOW INDUSTRY PROFESSIONALS

## DENISE BODE

Denise Bode is the Chief Executive Officer of the American Wind Energy Association. Denise holds a bachelor's degree in political science from the University of Oklahoma, a Juris Doctor degree from George Mason University, and a Master's of Law in Taxation from Georgetown University. In 2009, the Women's Council for Energy and the Environment named Denise Woman of the Year.



### TELL US A LITTLE ABOUT YOUR JOB AND WHAT YOU DO.

Since 2009, I have served as the CEO of the American Wind Energy Association. In that capacity, I lead an organization that represents the American wind energy industry. My primary job is to grow demand for wind energy in the United States in order to ensure the advancement of an industry that creates jobs and economic growth. We're bringing manufacturing to the United States, laying the foundation for this industry to develop right here at home.

I also work to broaden our advocacy efforts on the state and federal levels. This means promoting wind energy's benefits to people across the country—those who already have wind turbines in their backyards, those who have never seen a wind farm, and those who make policies for and regulate the energy sector. We are constantly educating Americans on what wind can do for them.

### HOW DID YOU DECIDE TO GO TO WORK IN THIS FIELD? WHAT PIQUED YOUR INTEREST IN WIND?

I've spent my career and the last 30 years working in energy policy. After practicing as a lawyer for a few years, I decided that I didn't only want to be an attorney to implement the law, but rather that I wanted to be involved in making good laws and policy decisions that could change the world.

My interest in wind was piqued when I served on the Oklahoma Corporation Commission and as President of the Southwest Power Pool's Regional State Committee. I first worked on extending the Investment Tax Credits for small wind turbines, but later toured NREL to learn about utility-scale turbines and saw how much had changed with the technology. By the early 90s, it had advanced and had become a really viable source of electricity generation. While serving on the Oklahoma Commission, we incentivized utilities to buy wind and add it to their portfolios, and I saw how people really took to wind energy.

### WHAT IS A TYPICAL DAY AT WORK LIKE FOR YOU?

There really isn't a typical day at work, except for the times I come and go home. Day to day, we have a lot of meetings to discuss policy issues and coordination for events. I could be

doing business and budget planning in one meeting, then move on to a policy strategy session, then have a meeting on earned media and our latest ad campaign, and then end the day with state legislative issues. You have to be very flexible.

### HOW HAS YOUR FIELD CHANGED IN THE LAST 5-10 YEARS?

The American wind energy industry is a completely different industry than it was ten years ago. Ten years ago we weren't even a blip on the screen and today wind has added 35 percent of all new electric generating capacity in the United States. Five years ago, we were importing 75 percent of all manufactured parts. Now we're making more than 50 percent of them right here in the U.S.

### COULD YOU DO YOUR JOB ANYWHERE IN THE COUNTRY?

I think to manage a staff and lead an office, it's necessary to be in the office a majority of the time. The employees have to have someone in the office with them that they can go to. I think it's difficult to manage any size staff remotely, let alone 80 people. I also think it's important to be in the office with them to see what's going on and be able to intuit what people's needs are.

Since a lot of the work we do is about driving national policy, the nation's capital is the principle hub for getting things done. Washington, D.C., is where national planning happens, and so it allows us the opportunity to be a part of the debate and meet with government agency and Hill staff and elected officials while they're forming the policy.

### WHAT IS THE MOST REWARDING PART OF YOUR JOB?

The most rewarding part of my job is being with the people I work with every day. I look forward to interacting with our team at AWEA daily. I learn as much from them as I have in any job. They're not only coworkers; some have also become very close friends. I get a lot out of relating with these people.

Another rewarding part of my job is being able to build a new industry that will create sustainable jobs with a clean, homegrown source of energy. It's the dream of any elected official (if they ran for the right reasons!) to contribute to creating something that will be here to stay and contribute economic value for the nation.



The growing wind energy industry has become a source for 'green' manufacturing jobs in the U.S. Five years ago, 75 percent of turbine parts were manufactured abroad, but today, more than 50 percent are produced domestically. This picture was taken by NEED teacher Clara Jo Elder, while visiting a wind farm near Idaho Falls, Idaho.

#### **WHAT IS THE HARDEST PART OF YOUR JOB?**

The hardest part of my job is making that dream happen! (See previous question.) We are working hard to educate the public and policymakers about how exciting American wind power is, and communicating how it has been a bright spot in the economy. People tend to think energy only changes in geologic time, but the wind energy industry is a fast-paced, quickly developing industry and we're still ramping up.

#### **WHAT TRAINING AND/OR EDUCATION DID YOU NEED TO BEGIN YOUR JOB?**

Going to law school and becoming an attorney really helped me learn how to write and speak effectively and analyze complex problems. Learning to do my various jobs in different policy areas has been the most specialized training as well. I've served in a Governors' Office and worked on in-depth state issues. I've worked in the U.S. Senate and on the Finance Committee and learned the ins and outs of tax policy, which are issues so important to wind. I've been a statewide elected official and thus learned how to raise money to run for an office. I've also learned how electricity works, from the time a wind farm is first sited and planned to how it's delivered to a consumer or home. I spent ten years working on the Oklahoma Corporation Commission working in the trenches, designing transmission policy and hearing rate cases.

I learned how to be an advocate when I started my own law firm. I built it from the ground up, getting a line of credit, making a small business plan, and recruiting and caring for clients. I learned what it means to worry about your employees and make payroll in the private sector. I truly gained an understanding of the skills of an entrepreneur and understanding how they work is so important to my role at AWEA, as businesses are who we represent.

#### **WHAT CHALLENGES DO YOU FACE IN THE INDUSTRY?**

The challenge is educating the public and policymakers about the benefits of wind energy.

We're trying to get to the point where it is understood that wind is one of the most important burgeoning industries in America. We're trying to get policymakers to understand what an important energy source wind is and can be. They are fighting the last war; they are looking at the industry as it was 20 years ago and not recognizing it for the global, high-tech, advanced industry it is today.

#### **WHAT ARE SOME BENEFITS TO WORKING IN THIS INDUSTRY?**

My son said to me that I was finally working in an energy industry of which he was really proud! The benefit is that people—on both sides of the aisle, young and old, across the country—love wind energy and want to see more. Polls consistently indicate that 89 percent of the population favors wind energy. I'm proud to represent this industry in any setting because it's virtuous. Rarely do you receive anything but excitement or interest in wind energy.

#### **WHAT ADVICE WOULD YOU GIVE TO A YOUNG PERSON WHO IS INTERESTED IN WORKING IN THE ENERGY INDUSTRY?**

I'd advise any young person interested in an energy field to do an internship. It's so helpful to figure out early on what type of work they'd like to do, whether it be in the policy or lobbying realm, public relations, or conference and meeting planning. We're such a fast-growing industry and there are many opportunities for the best and the brightest around the world to join the movement.

The wind energy industry is really characterized by a unique and international community of businesses. Getting to interact in the global space has been one of the most fun things for me in this job. I have found that my international counterparts are always helpful and supportive, and we share across borders. Europe especially has been wanting to see the U.S. industry take off.





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## WHAT'S NEW AT NEED?

### INTERNATIONAL YEAR OF CHEMISTRY

NEED, Shell Chemical, the International Council of Chemical Associations, and the American Chemistry Council have joined together to give teachers and students a deeper look at chemistry in daily life, and chemistry's contribution to energy efficiency. Visit <http://chemistry.NEED.org> for background information and hands-on activities to do with your students.

### NEED'S SOLAR BAKE-OFF

In September, NEED invited teachers across the country to participate in a solar bake-off. Classes have submitted pictures and information online. Results of the bake-off will be available in October at [www.NEED.org](http://www.NEED.org).

### CONOCOPHILLIPS AND NEED

ConocoPhillips and NEED partner to bring workshops to 26 cities in 2011. Teachers from across the United States have the opportunity to experience a NEED workshop thanks to the support of ConocoPhillips. Participating educators receive a NEED Science of Energy Kit, a class-set of NEED's popular *Energy Infobooks*, and a full day of energy training. To see the schedule and register for a workshop near you, visit [www.NEED.org/conocophillips](http://www.NEED.org/conocophillips).

### COMED SPONSORED PROGRAM UNDERWAY

In 2011, ComEd increased their support of NEED to include training for over 750 teachers in the ComEd service area in Northern Illinois. ComEd's workshops provide teachers with hands-on kits, classroom resources, and the opportunity to receive home energy efficiency kits for their students. NEED's Home Energy Efficiency Kit program provides energy efficiency and conservation tools to families to help monitor and reduce energy use at home.

### HAWAII ENERGY AND NEED BRING RESOURCES TO HAWAII TEACHERS

In a new partnership with Hawaii Energy, NEED works with local teachers to provide teacher training, classroom resources, and student leadership opportunities to Hawaii teachers. The program is designed to encourage an understanding of energy, to improve energy efficiency and conservation, and to encourage students to consider careers in energy.

### YOUTH AWARDS PROGRAM

It is not too early to start planning your Youth Awards Project and portfolio! For information on how to participate in NEED's Youth Awards Program for Energy Achievement and to view information on last year's winners, visit [www.NEED.org/Youth-Awards](http://www.NEED.org/Youth-Awards).

### IN THIS ISSUE

## Careers in the Wind Industry

In the United States, the wind industry is home to one of the fastest growing job markets. This issue of *Career Currents* looks at many of the opportunities that are available in the wind industry. NEED sits down to talk with Dick Williams, President of Shell Wind; Remy Pangle, from the Virginia Center for Wind Energy; Charles Newcomb, from the U.S. Department of Energy's Wind Powering America Program; and Denise Bode, CEO of the American Wind Energy Association.

For more information about wind energy, check out NEED's wind curriculum online at [www.NEED.org](http://www.NEED.org).